THE DOMESTIC RABBIT

BY DR. T. E. REED
RABBIT SPECIALIST

DEDICATION

This book is dedicated to all of those family members of the rabbit hobbyist who have no interest in the hobby; but, tolerate it to keep the peace.

Sandy N. Reed

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SPECIAL EDITION

DONNIE LORENZ

THE DOMESTIC RABBIT

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PICTURES OF THE VARIOUS BREEDS OF RABBITS WERE FROM BEN'S PRINTING PRESS

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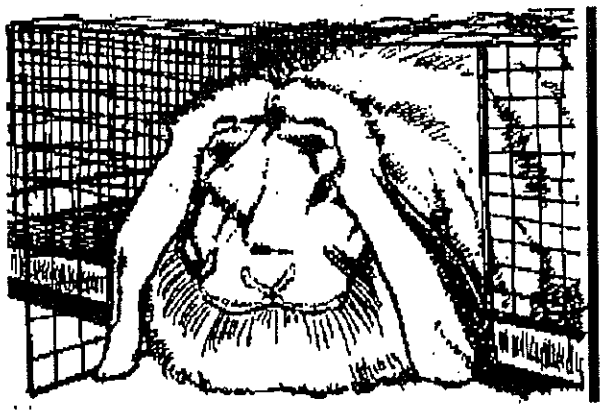
SELECTING A BREED OF RABBITS



TO RAISE AND SHOW

4-H RABBIT PROJECT

INTRODUCTION

The rabbit project is the ideal animal project for all rural and urban 4-H members. Some of the reasons for this are:

1. Very small space needed to house the number of rabbits required for the project.
2. Little capital (money) needed for equipment and project animals compared to most other animal projects.
3. Rabbits are capable of adapting to a variety of housing and environmental conditions.
4. There are more than 40 breeds of rabbits available to meet the desires of each individual 4-Her.
5. There are opportunities for the member to sell progeny from the original project to pay expenses and make a profit.
6. Liquidation of assets (equipment and stock) at conclusion of project is simple, if desired.

SELECTING A BREED OF RABBIT TO RAISE

This will be a major decision. There are 45 recognized breeds of rabbits and many of the breeds have several different varieties (colors). There is a great variation between rabbit breeds and it is important to select the correct breed. Things that must be considered when choosing a breed for the project are:

1. Mature size of rabbit in relationship to size of cage and to the size of youth that will handle the rabbit.
2. Amount of time available to care for the rabbit. Some breeds (fiber producing breeds) require much more grooming time than others.
3. Select a breed that is available in the area. Some breeds are more popular in some areas than others. This will allow easier access to knowledgeable individuals to assist when problems develop.
4. Select a breed that is relatively easy to raise and does not need specialized care. This is especially important for first year members. After some experience, one may desire to raise a more challenging breed.
5. Rabbits have many uses and they vary from area to area. Select a breed where there is a demand for the excess production.
6. Select a breed that appeals to the person that is caring for and raising the rabbit.

THE AMERICAN RABBIT BREEDERS ASSOCIATION, INC.
P. O. BOX 426
BLOOMINGTON, ILLINOIS 61704

The American Rabbit Breeders Association (ARBA) is the only all-breed rabbit organization in the United States. It was founded in January of 1910 at Detroit, Michigan. After a very meager beginning, the association has grown and developed into an association of more than 45,000 members and a budget of over 3/4 million dollars.

One of the major functions of the association is to maintain the **STANDARD OF PERFECTION.** This is a book that all 4-H rabbit club members, their parents and leaders should be very familiar with and use throughout the project. This book contains a very vivid description of each breed of rabbits recognized by the ARBA. It describes the color of eyes, toenails, weights and etc. for each breed and class of rabbits. It will list all abnormalities that will keep the rabbit from competing for and winning awards.

Revisions of this book takes place only every 5 years in the years divisible by five. There cannot be any changes in the **STANDARD** in the time between the 5 year revisions. All county extension services should have this reference book on file in the office.

CHARACTERISTICS OF THE VARIOUS BREEDS OF RABBITS

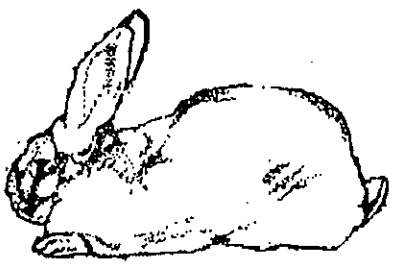
There are several physical characteristics that differentiate the various breeds from each other. Some of these physical characteristics are more appealing to some breeders than others. This is why the breeder selects that breed. Youth members should study these breed characteristics in detail. Then chose a breed that they like, that will adapt to the available housing facilities and that is readily available to them in their geographical area.

MATURE SIZE

Domestic rabbits range in mature weight from 2 1/2 pounds to animals that weigh in excess of 18 pounds. This is a very wide range. The breed of the rabbit will mandate cage size, water and feed utensil size, amount of feed that will be needed each month and the amount of ventilation that will be necessary to supply adequate fresh air. The size of the rabbit also will give indication to how difficult the rabbit will be to handle. It will be much more difficult, and dangerous, for a small youngster to handle an 18 pound rabbit compared to one that weighs 2 1/2 pounds. After the handling technique is mastered with a smaller rabbit, one may desire to raise one of the larger breeds.

The Netherland Dwarf matures as 2 1/2 pounds or less. This is the smallest of all breeds of rabbits recognized by the American Rabbit Breeders Association. There are over 20 varieties (colors) of this breed and the various colors are divided into 5 color groups. Check the **STANDARD** for the recognized colors and the various group classifications.

Netherland Dwarfs are noted for their small size, large, bold round head and short ears. The body should be compact and round; and, as wide at the shoulders as at the hindquarters. The fur to roll back in position when stroked from tail to head. This breed enjoys wide spread popularity throughout the United States and quality stock is available in most areas.



The Flemish Giant is one of the largest breeds of rabbits. Specimens of this breed may exceed 18 pounds. This breed has mandolin type and is very long, massive and powerful in appearance. The head and ears are to be in proportion to the body. Senior Flemish must have ears that are at least 5 3/4 inches in length.

Seniors with ears less than the minimum will be removed from competition. The fur should be as dense as possible and to return to the normal position when stroked from tail toward the head. There are 7 varieties of Flemish Giants, Black, Blue, Fawn, Light Gray, Sandy, Steel Gray and White. The Sandy is by far the most popular variety. The breed enjoys moderate popularity; but, those that raise the breed are usually very dedicated and enjoy working with new breeders. In some areas, good breeding stock may be difficult to locate.

CLASSIFICATION RELATED TO SIZE

The name of the breed may indicate size. The Dwarf, referring to the Netherland Dwarf, implies that the rabbit is small. Other breeds may carry the dwarf gene (unit of inheritance), although they are not as small as the Netherland Dwarf. Included in this group are the American Fuzzy Lop, Dwarf Hotot, Jersey Wooly, Holland Lop and some

Mini Rex.

The term mini relates to something smaller than the original. This term is used in rabbits to indicate a smaller breed than the original. All of the features are the same but scaled down in the same proportion. An example of these breeds are the Mini Lop and the Mini Rex.

Giant refers to large. These include the Giant Angora, Checkered Giant, Giant Chinchilla, Flemish Giant and the French Lop. The majority of these breeds do not have an upper, or top, weight limit.

THE IMPORTANCE OF WEIGHT IN RELATIONSHIP TO SHOWROOM CLASSIFICATIONS

Each breed class is divided into males (bucks) and females (does). Each of the sex classes are further divided by age. Those breeds that have an ideal weight of 9 pounds, or more, has 3 age classifications per sex; or, 6 classes. They are Juniors, under 6 months of age; Intermediates, between 6/8 months of age; and, Seniors, those over 8 months of age. Breeds that have an ideal weight of less than 9 pounds have 2 classes per sex; or, 4 classes. They are Juniors, under 6 months of age and Seniors, those 6 months of are and over. There is no intermediate or 6/8 month old class in the small breeds.

NOTE: Classes are designated by age; but, weight limits, minimums and maximums, are included in some breed classes. Some breeds allow a rabbit that is over weight for a junior or intermediate, to be exhibited in a higher age classification, while others do not. A rabbit can NEVER be exhibited in a younger age classification, than its actual age, even when it does not meet the weight requirements.

ALWAYS check the **STANDARD OF PERFECTION** for the weight and the age requirements of the class that the rabbit is entered to be sure that it is entered in the correct class. Rabbits that are over weight or under weight for the class are eliminated from competition and cannot be placed.

EAR LENGTH

This characteristic has a wide variation in domestic rabbits. Ears range from the ideal length of 2 inches in the Netherland Dwarf to an excess of 26 inches, from tip to tip, in English Lops. Ear length is very important in some breeds. Various breeds have minimum and maximum ear lengths included in the **STANDARD**. When the ears do not comply with these requirements, they cannot compete for awards. NOTE: See end of section for some specifics on ear length.

NETHERLAND DWARF **ENGLISH LOP**

Ears on rabbits have 2 functions, besides giving a distinguishing characteristic to some breeds.

1. Collect and direct sound waves to the inner ear where they may be interpreted by the brain.
2. Assist in maintaining the body temperature at about 102.5 degrees Fahrenheit. The blood vessels in the ears are numerous and come very close to the surface of the skin. As the air moves across the ear, heat is carried away from the body.

Understanding the second function is important to all rabbit growers. Rabbits are prone to "heat exhaustion" when environmental temperatures approach; or, exceed 80 degrees Fahrenheit. This condition is identified by the rabbit breathing very rapidly, drooling saliva from the mouth, the fur around the mouth becomes wet, the raising of the head over the back and collapse. This condition may be fatal.

When observed in the early stages, this condition may be reversed by placing cool water, or ice, on both sides of the ears and moving the animal to a cool place. The amount of heat removed from the rabbit's body through the blood vessels that are close to the surface of the ear is increased by the water evaporating on the ear surface. This also cools the circulating blood that will cool the body.

<u>Notes concerning ear length</u>

- the English Lop has more points (33) allocated to ears than any other breed.
- breeds that have an ear length maximum are:
  1. Dwarf Hotot - eliminated from competition for ears over 2 3/4 inches
  2. Jersey Wooly - eliminated from competition for ears over 3 inches. Ideal length 2 1/2 inches
  3. Netherland Dwarf - eliminated from competition for ears longer than 2 1/2 inches. Ideal length 2 inches.
  4. Polish - eliminated from competition for ears longer than 3 inches

-breeds that have minimum ear lengths

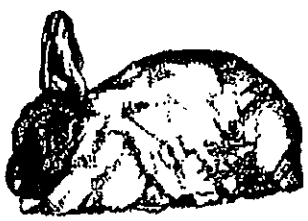
1. Checkered Giants - 5 3/4 inches on seniors

2. Flemish Giants - 5 3/4 inches on seniors
3. English Lops - 21 inches from tip to tip on all age classifications (juniors, intermediates and seniors)

EAR CARRIAGE

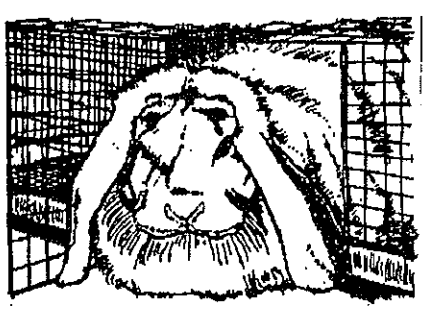
Rabbits carry their ears in various positions depending upon the breed and this allows for distinction of some breeds. The manner in which the ear is carried depends totally upon the shape, strength and position of the cartilage at the base of the ears. Ear carriage is determined by inheritance and is not influenced by actions of the owner. The 3 basic ear carriages are:

1. Erect carriage. This is where the ears are carried in an erect position. Many recognized breeds carry their ears in this position. They are not necessarily carried close together or touching. Some breeds mandate that the ears are close together and touch from the bottom to the top (Polish).



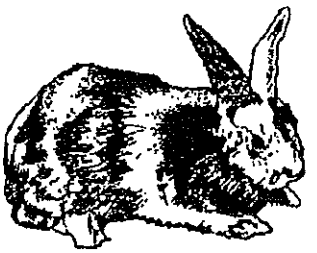
Erect ear carriage that is altered with tips that fall, droop to the side (lazy ear carriage) or has altered shape, must be faulted in accordance with the severity of the fault in relationship to the point allocation. The Dwarf Hotot, Netherland Dwarf and Polish breeds are allocated 15 points for ears. These are the breeds with erect carriage that has the most importance on the ears.

2. Lopped ear carriage. This is a very distinct type of ear carriage where the ears are carried below the horizontal plane from where the ears originate. The Lop eared breeds are:
a. French and English Lops, which share the same specialty club.
b. Mini Lops, a lop with similar characteristics as the French Lop with a maximum weight of 6 1/2 pounds
c. Holland Lops, the smallest (4 lbs. and under) of the normal furred Lop breeds.
d. American Fuzzy Lop, similar



to the Holland Lop, except it has wool instead of fur.

3. "V" shaped ear carriage. The ears are set close together at the base (close to the head) and spread apart in a "close" or wide "V" shape. This is very distinctive in some breeds. Those breeds that are required to carry their ears in a "V" are:



a. English Angora d. Hotot b. Harlequin e. Beveren c. Rhinelander

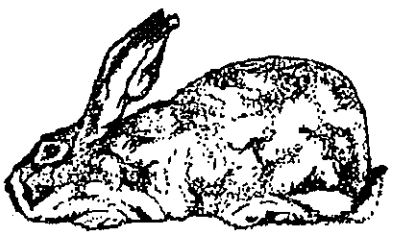
COMMENTS:
The ears on a young rabbit elongate (grow) more rapidly and have a thinner texture at an elevated environmental temperature (summer) compared to the growth at lower temperatures. The ears will appear out of proportion to the body size. Some individuals term these ears "summer ears". At maturity the difference is not as noticeable.

The rapid growth of the ears in young rabbits is to increase the area for heat to be lost from the body into the air. This assists in maintaining the normal body temperature.

BODY SHAPES-TYPE

The distinguishing characteristics of some breeds of rabbits are their body shape. The profile of a rabbit is the outline of the animal when viewed from several positions. The two most common profiles in determining body shape are the side profile and the profile when viewed from the top. The side profile will allow the observer to determine how deep the rabbit is at various locations, where the arch starts and where the highest point of the profile is located. Observing the body from above allows one to determine the width of the body at various locations and the actual shape of the body from the top.

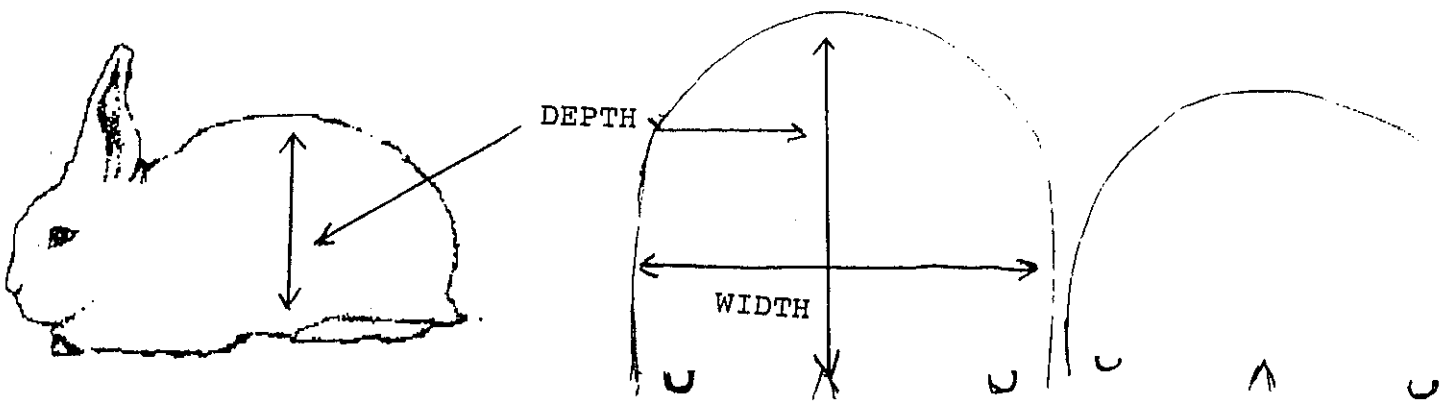
ARCH STARTING AT BASE OF EARS



ARCH STARTING BEHIND SHOULDERS

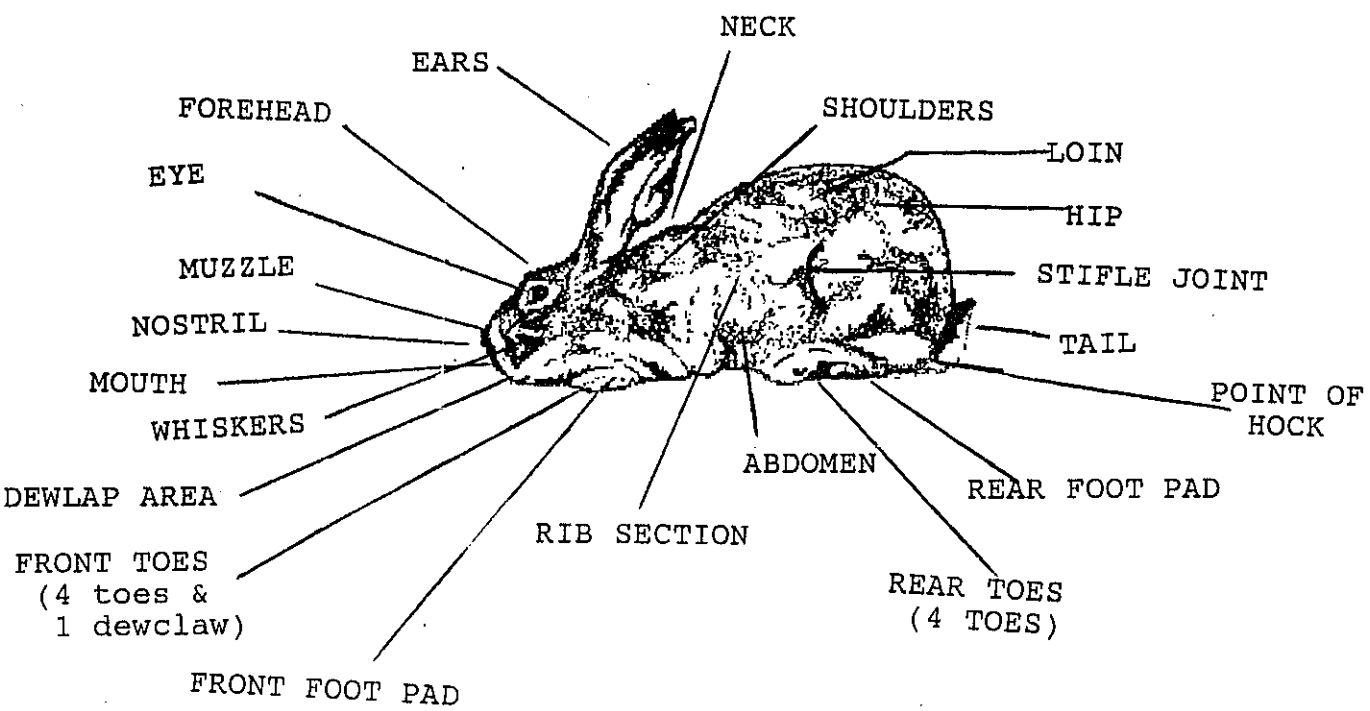
Rabbit breeders use terms that may be confusing to the beginner. IT is necessary to understand the various terminology to insure comprehension of the subject.

The term depth indicates how tall the rabbit is at various locations on the side profile of the body. Depth is the distance from the top line of the profile, at a given location, to the bottom of the rabbit. (Example: Depth at shoulders, depth at the loin). Flat or flatness is another term that is sometimes confused. Anytime an arc straightens out and then continues, the straight area is defined as flat. This may occur any place on the profile of the rabbit where roundness is required. Another place "flatness" applies is where the width of the rabbit exceeds its depth.



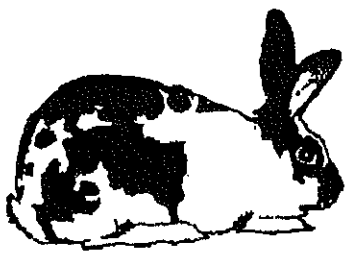
SIDE PROFILE **DEPTH EQUALS WIDTH** **FLAT OVER HIPS**

TOPOGRAPHICAL ANATOMY OF THE DOMESTIC RABBIT



COMMERCIAL BODY TYPE

This body shape exemplifies meat production. The medium length body must be deep at all locations and depth should equal the width. The shoulders will be narrower than hindquarters, and the rise will start just behind the ears and reach a high point as described in the individual breed standards. The loin will be wide, thick and full. The rear legs to be well developed and fill the lower hindquarters. The body to feel smooth and be firm in flesh condition.



The breeds of this body shape are posed in the "standard" posing position. This is setting flat on their rear feet, with the tips of the rear toes, perpendicular (straight up and down) with the stifle joint. The front toes to be placed just under the eye with the foreleg flat on the posing surface.

Posing each rabbit in the correct position, for the breed, is very important. Varying and posing position will allow inconsistent evaluations of the physical characteristics of the rabbit. Placing the rear legs too far under the rabbit will give the false impression of depth at the loin and cause the lower hips to appear undercut. Stretching the body, by placing the hind feet too far to the back will allow the body to appear long, lacking in depth of body and weak in the shoulders. Placing the front feet ahead of the eyes will allow the shoulder to appear low and weak. When the front feet are back of the eye, it will alter the shape of the shoulder. Proper posing is very important.

The exception to the standard posing position for this group is the French Lop. This breed is posed as described; but, should rest lightly on the front feet. This allows for a better view to evaluate the ear carriage, crown, shape and length of ears.

After initial evaluation of the Harlequin in the standard posing position, the rabbit should be allowed to move on the table. This allows for better evaluation of the markings and the distribution of color.

The primary purpose of the breeds with this body shape is to produce a source of edible protein, after harvesting, for human consumption. Rabbit meat is a very desirable source of edible protein in a health conscious society. The latest

research (Lukefahr 1992) indicates that rabbit meat is low in calories, cholesterol, fat, sodium and high in quality of amino acids and is easily digestible. In other breeds of this body shape, the meat production is secondary to wool and fur production (dual purpose). Some of the breeds are primarily a fanciers rabbit and meat production is a by-product to the intended purpose.

The New Zealand White and the Californian are the most popular breeds for commercial meat production. This is due to the demand for white furred rabbits and their widespread superior inherent abilities to produce a 4 1/2 pound fryer in 8 to 10 weeks; and, their feed conversion ability.

Breeds in the commercial body shape group are:

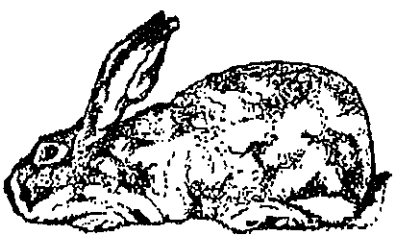
a. New Zealand	b. Palomino	c. Giant Angora
d. Californian	e. Champagne d'Argent	f. French Angora
g. Satin	*h. Cinnamon	*i. Satin Angora
j. Silver Marten	*k. American Chinchilla	*l. Hotot
m. Rex	*n. Creme d'Argent	*o. Harlequin
p. French Lop	*q. American	*r. Silver Fox
s. Sable		

*Indicates limited availability and bred in limited geographical areas.

When raising a breed with commercial body shape, one should have a suitable market available for extra production. Breeds of this body shape enjoy only limited popularity as pets.

MANDOLIN (SEMI-ARCHED) BODY SHAPE

This body shape looks like a mandolin laying with the strings flat on the table. The bodies of this group are usually longer than the commercial type breeds. The arch, on breeds with mandolin body shape, starts behind the shoulder rather than behind the ears, as in the commercial body shape.



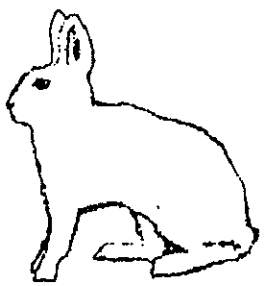
The more popular breeds of this group includes the Flemish Giant and the English Lop. Even these breeds have limited geographical popularity. The American and the Beveren have limited popularity primarily on the west coast and the Giant Chinchilla enjoys some popularity in the Ohio/Michigan area.

Quality breeding stock of the latter breeds may be difficult to locate unless one goes to the specific areas of popularity. Most of these breeds require larger cages and consideration must be given to the type of floor utilized to protect the foot pads of the large rabbits.

The semi-arched breeds are posed in the standard posing position, described in the commercial body shape group. After evaluating the animal in a posed position, one should let the animals move to further evaluate bone structure and type. Some breeds of this group have strains that are very weak in the ankles and will walk on the ankle joint.

FULL ARCHED BODY SHAPE-TYPE

Breeds of this group are usually very aware of their surroundings. Most of these breeds are allowed to move on the table and post naturally in an upright position on their front toes. The exception being, the Belgian Hare and the Britannia Petite. These two breeds are hand posed, by the individual handling the rabbit. They are posed sitting on the rear legs, front legs extended, head held high and ears erect. These posing positions allow these breeds to display the arched profile and/or display their markings. The arch starts at the neck and proceeds over the back to the base of the tail. Most of these breeds have extended length of the front limb. Breeds with this body shape are beautiful and elegant.



Breeding stock of some of these breeds may be difficult to locate due to the regional distribution. Most of these breeds should be considered for the serious or advanced breeder. Marked rabbits, of any body shape, are more difficult to breed and raise quality young due to the difficulty in getting good markings, type and color on the same rabbit.

Breeds included in this body shape are:

a. Checkered Giant b. English Spot c. Britannia Petite
d. Belgian Hare e. Rhinelander f. Tan

COMPACT BODY SHAPE-TYPE

This is a very popular body shape; primarily due to the smaller size of the rabbit. These breeds are generally shorter in body length and all the physical characteristics are "bunched" together. Many rabbits of these breeds are in high demand for pets. Some of the larger faster developing

breeds of this body shape are raised for a source of edible protein for the small family.

Most animals of this body shape are posed in the standard posing position as described in the commercial body shape section. The exception being the Holland Lop. This breed should be posed resting lightly on the front feet and most of the body weight supported by the hind legs. This allows for better evaluation of the head shape, crown, ear shape and carriage, and the bone character

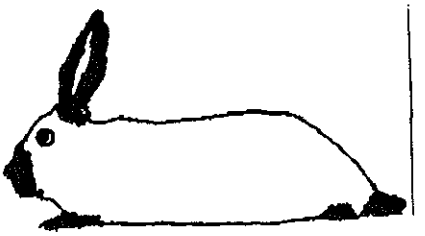
Breeds included in the compact body shape are:

a. Netherland Dwarf	b. Florida White	c. Holland Lop
d. American Fussy Lop	e. Dutch	f. Jersey Wooly
g. English Angora	h. Havana	*i. Lilac
j. Mini Lop	*k. Dwarf Hotot	l. Mini Rex
m. Standard Chinchilla	n. Polish	*o. Silver

*Limited distribution and availability.

CYLINDRICAL BODY SHAPE-TYPE

The Himalayan is the only breed that has this body shape. The body is to be long, tubular, have fine bone and thin textured ears. The top line and the side lines of the body should be straight with the shoulders slightly narrower than the hindquarters. The body shape is often described as the hitting end of a baseball bat. This breed has 43 points allocated to markings.



The breed is posed in a stretched position. The Himalayan is set squarely with the foot pads of the rear feet setting flat on the posing surface. The lower portion of the belly, the chest and the forelegs are laid and stretched on the posing surface with the tips of the front toes under the eyes. Posing in this position allows for evaluation of body shape and the markings. This breed has an excellent personality and is usually very docile. Location of quality breeding stock will depend upon the geographical area.

SUMMARY OF BODY SHAPES

There are a variety of body shapes available for the prospective rabbit owner. The commercial body shape was developed for efficient meat production. The arched shape is unique, elegant and breeds with this shape are usually quite alert. The mandolin type is usually longer than the other

breeds and mot of these breeds are rather large. The compact body shape has breeds that are smaller and have many very popular breeds. The Himalayan breed is the only recognized breed with cylindrical type.

VARIOUS FUR TYPES - STRUCTURES

There are a wide variety of fur structures on the various breeds of rabbits. Fur structures depends upon several characteristics. To understand these one must understand some commonly used terms.

Density - The total number of fur fibers per area of skin at a location on the body surface. Determined by the number of fur follicles per area and the number of fur fibers from each follicle.
Texture - The "feel" of the fur/wool and/or the reaction of the coat when stroked from the tail toward the head.
Finish (coat) - A coat that is complete in the development of guard hairs, under fur and in good condition.
Prime - A coat that is finished and in good condition; a pelt ready for harvest.
Molt - The act of losing fur from the pelt. A normal process that occurs periodically in the life cycle of the rabbit. This is controlled by genetics, health, nutrition and other factors.
Loose or Slipping Coat - Fur fibers that are coming loose from the coat.
Broken Coat - Exposure of the under coat due to the loss of guard hairs or the guard hairs being broken off at mid shaft. Will interfere with the uniformity of the texture over the body.
Guard hairs - The larger diametered and the longer fibers that protrude above the undercoat. Originates from the fur follicle; usually in lesser numbers than undercoat fibers.
Undercoat - The shorter, more abundant and fibers of smaller diameter. May originate from the same fur follicle as guard hair.
Fly back - A coat that lies smooth over the body and when stroked from tail towards the head returns to the original position very rapidly. Length of coat, diameter of guard hair, density and condition all will affect this character. Required on specific breeds.
Roll back - A coat that lies smooth over the body and when stroked from tail towards head returns to its original position gradually. Required on some breeds.
Stand-up coat - A coat that lies smooth over the body and when stroked from tail towards the head, the fibers remain in an upright position. Required on some breeds.
Up-right or perpendicular coat - The fur stands at right angles, or straight up and down, to the skin. The guard hairs are just slightly longer than under fibers. This gives a very plush appearance to the coat.

NORMAL FUR

The standard for this type of fur was developed to meet the needs of the commercial furrier trade. Texture is the most important characteristic of normal fur. The fur must fly back to the original position when stroked from the rear toward the front and lie smooth over the body. Thicker and longer guard hairs must be uniformly dispersed through the dense undercoat to create sufficient resistance when stroked. The guard hairs should not protrude above the under coat more than 1/8 inch and all should be of the same length over the entire body.

The fur should be as dense as possible. The undercoat should be finer and softer than the longer, coarser and uniformly disbursed guard hairs. The quality of the coat must extend completely down the sides and onto the belly. The uniformity of density to carry over the belly; but, the fur will be shorter on the belly.

The normal coat should be clean and free of molt. The length, density, the uniformity of the disbursement and the uniformity of the protrusion of guard hairs over the undercoat should be the same over the entire body. The coat must be balanced.

Breeds which mandate normal fur may be exhibited in breed fur class and the Normal Fur Class. The Normal Fur Class may have several breeds entered.

SATIN FUR

This fur is characterized by the sheen of the coat. The word sheen is reserved for the Satin breed. Other breed coats that shine are said to have luster; or, to be glossy.

The under coat to be fine and very dense. Guard hairs must be uniformly and evenly disbursed among the undercoat. These longer fibers (guard hairs) are not as large in diameter and are more transparent than the guard hairs of normal fur. This allows the coat to be softer in texture. The clear hair shaft reflects the light, like varnish on a table, giving the characteristic sheen of this fur type.

The length of fur should be from 7/8 to 1 1/4 inches in length; ideally, the length will be 1 - 1 1/8 inches. The smaller diameter guard hairs should evenly protrude 1/8 inch above the under coat. When stroked from tail to head, the coat should return to the original position and lie flat on the body.

The quality of coat should extend over the entire body, be free of stain and in good condition. Texture and density are of equal importance in satin fur. The sheen to be uniform over the head, ears and body. the reflection of the light from the clear guard hair intensifies the color.

COMPARISON OF THE IMPORTANCE OF NORMAL AND SATIN FUR CHARACTERISTICS

	NORMAL FUR	SATIN FUR
TEXTURE	40	35
DENSITY	30	35
BALANCE & CONDITION	30	20
SHEEN		10
TOTAL	100	100

The Satin rabbit is very popular and quality breeding stock is usually readily available. Some of the varieties have limited distribution.

REX FUR

This is a very plush appearing coat where all the fur fibers are upright, or perpendicular to the skin. Rex fur is shorter than any other type of fur/wool. The ideal length of this type of fur is 5/8 of an inch and cannot be shorter than 1/2 inch; and, no longer than 7/8 on an inch. The length of coat should be uniform over the entire body.

The fur must be as dense as possible and have the guard hairs uniformly disbursed throughout the coat. the guard hairs must not protrude obviously above the under coat. The guard hairs give resistance and resilience to the coat; and, prevents the coat from being soft (fault).

Rex fur is evaluated by "patting" the coat, with the fingers open, over the body rather than stroking the fur from the tail to the head. This allows for the evaluation of length (how far fur extends between fingers), density and condition of the Rex fur.

Two breeds have Rex type fur. They are the Mini Rex and the Rex, sometimes called the Standard Rex. Rex fur is a result of a genetic mutation many years ago. Rex pelts are the most valuable of all the breeds of domestic rabbits.

Quality breeding stock is usually available in most areas for both breeds. Some of the varieties have limited geographical distribution.

"STAND-UP" COAT

The Silver Fox is the only breed that has this type fur. When the fur is stroked from the tail toward the head, the fur should remain in a standing position without any indication of returning to the original position. While in a standing position, when stroked from head to the tail, the fur should lay in a smooth position.

The coat should be as dense as possible and have guard hairs present. The coat should be 1 - 1 1/2 inches in length. There should not be any hint of fly back or resiliency to the coat.

The popularity and distribution of this breed is limited. Quality breeding stock is very difficult to locate.

WOOL

There are six breeds that have wool covering on the body. There is a differentiation of fiber from breed to breed. Many persons raise these breeds for the excellent fiber they produce. The fiber may be harvested periodically and used to create unique craft items, spun into yarn and used to make garments; or, sold in a raw state. The price of fiber depends upon the breed from which the fiber was harvested and the demand for wool. Production varies considerably from one breed to another.

There are three characteristics of wool that are of extreme importance.

1. Density - This is the most important characteristic and refers to the total number of fur fibers per area of skin. The density must be uniform over the entire surface of the body, including the chest and belly. Length of coat must not be confused with density. To determine density, one may: a) Feel the fiber at several places on the body by feeling the amount of wool between the fingers and the base of the thumb; b) Blowing into the wool, at several locations, to observe the amount of visible skin. The more skin observed, the lesser the density and vice versa.
2. Texture - This refers to how the wool feels and is determined by the number and size of guard hairs in proportion to the amount of under fibers.
3. Length - May be referred to as wool staple. The length of fiber should be of uniform length over the entire body. This will vary between breeds.

The variations of the wool and breed characteristics will be

discussed below.

ENGLISH ANGORA

This breed is very unique and the most popular of the Angora breed. The English should look like a round ball of "fluff" from all directions. It is difficult to tell the front from the rear, due to the furnishings on the head and ears.

Furnishings relate to the wool on the face, ears and extremities (front and rear feet). These include: Bangs - wool at the front base of the ears and may cover the entire face. Side trimmings - The wool that extends laterally (toward the outside) from each side of the face. Fringe - The wool that extends from the outside of both ears. Tassels -wool that extends from the tips of both ears. Extremity furnishings - Front and rear legs must be covered with wool to the tips of the toes.

The wool on the English Angora is allocated 57 points. Density is the most important characteristic. This wool should be as dens as possible all over the body, including the belly. The coat should be silky, alive and fall free as the English Angora is moved about. There must be a greater proportion of under coat to guard hairs. The guard hairs must be present; but, not overly obvious, large diametered or in great number. The length must be uniform over the body and extra advantage is not given to excess wool length.

This breed is bred with white wool and many colors. They are exhibited in two classes, white and colored. See the STANDARD OF PERFECTION for specifics. The color fades in intensity as the fibers get longer.

Mature English Angora bucks should weigh 5-7 pounds and does 5-7 1/2 pounds. Although the most popular of the Angora breed, the popularity is somewhat regional. It may take time and effort to locate quality breeding stock. The English Angora requires considerable care and weekly grooming. The amount of grooming will depend upon the number, size and uniformity of the guard hair distribution. The matting of the wool is initiated in the axially (arm pit) and groin areas.

FRENCH ANGORA

The wool of this breed is much coarser in texture than the English Angora. This is due to the larger proportion of guard hairs in comparison to the under wool. The requirements for density and length are similar to the

English Angora. Wool is allocated 55 points in the French Angora.

Mature French Angoras (bucks and does) must weigh from 7 1/2 to 10 12 pounds; which is larger than the English Angora. The body of this breed is to have commercial shape (oblong) and the head, ears and front legs are to be free of furnishings. This breed is bred in whites and colored. They also are shown in white and colored groups. See **STANDARD** for specifics.

The French Angora requires less time for grooming than the English Angora, if it has proper fur structure. This is due to the coarser wool and the lack of furnishings on the head, wars and feet. This breed still requires periodic grooming. The distribution an availability is about the same and the English Angora.

SATIN ANGORA

This breed is smaller than the French Angora. It has a similar oblong body shape and the head, ears and front legs must be free of wool. The fiber should be as dense as possible over the entire body. The density may "feel" less due to the smaller diametered, clear guard hair that produces the "sheen" to the coat.

This also intensifies the color compared to the non-satinized fiber producing breeds. The fiber should be uniform over the entire body.

The texture of the coat should be soft and silky with the guard hairs prevalent. Wool is allocated 60 points in this breed. The Satin Angora requires periodic grooming. Quality animals of this breed is difficult to locate due to their lack of popularity.

GIANT ANGORA

This is the "wool producing machine" of the Angora rabbit and were developed from the German Angora. Mature animals of this breed will produce from 24-36 ounces of wool per year.

These Angoras are very large and in full coat will appear much larger than their actual weight. Senior bucks must weigh 8 1/2 pounds and over. Senior does must weigh 9 pounds and over. They are to have a commercial body shape.

The wool structure is different than other fiber producing breeds. There are 3 distinct fibers present in the fleece. This attributes to the characteristic extreme density over the entire body.

The **Awn Guard Hair** is the longest and the largest diametered fiber in the fleece. This fiber protects the coat and may be more prevalent in does compared to bucks. These fibers form a noticeable "halo" over the remaining coat. Awn guard hairs are to be straight without any wave or crimp.

The **Underwool** must be very dense and in much greater proportion than the other fibers of the fleece. Obvious waves must be present throughout the entire length of this fiber to give body and resilience to the coat.

The **Awn Fluff** is a unique fiber. the length of this fiber is between the under coat and the awn guard hair. The lower portion (next to the body) having a distinct wave or crimp present that straightens out toward the end and finishes in a fine point. All 3 fibers must be present in the fleece.

The Giant Angora has the longest ideal wool length of all the fiber producing breeds. It must be of uniform length over the entire body with the exception of the "halo" that is created by the awn guard hairs.

This breed requires less grooming than the other Angora breeds; but, it still requires sometime for grooming. Quality breeding stock that meets the weight requirements are difficult to locate. White Giants are the only color that is acceptable for exhibition.

AMERICAN FUZZY LOP

This is a small lop eared rabbit with wool. This breed has less importance placed on the wool than any of the fiber producing breeds. The major emphasis of this breed is on head, ears and body type.

The wool is to be dense as possible and uniform in length over the entire body. The texture is to be slightly coarse with the guard hairs prevalent and uniform in diameter and protruding above the under wool. This provides a decrease in the grooming time needed.

Mature rabbits weigh 4 pounds or under and this is a popular breed for pets. This breed enjoys wide spread popularity and quality breeding stock is usually available in most areas.

The American Fuzzy Lop is bred in multiple colors and exhibited in colored and broken groups. The broken pattern must be an accepted color in conjunction with white. See the **STANDARD** for specifics.

JERSEY WOOLY

Mature animals of this breed must weigh 3 1/2 pounds or less. This breed has similar features (head, ears and body shape) of the Netherland Dwarf with wool on the body. The head, ears and front feet are free of furnishings.

The wool is allocated 39 points and is to be as dense as possible. The length should be from 2 -3 inches and the texture to be slightly coarse. The guard hairs to be in greater number than the under wool fibers. Density, texture and length to be uniform over the entire body.

This breed is bred in many varieties and are exhibited in various color groupings. See the **STANDARD** for specifics.

This breed has wide spread popularity and quality breeding stock is available in most areas. There is a good demand for this breed as pets and house rabbits.

COMPARISON OF VARIOUS CHARACTERISTICS OF THE FIBER PRODUCING BREEDS

CHARACTERISTIC	ENGLISH ANGORA	FRENCH ANGORA	SATIN ANGORA	GIANT ANGORA	JERSEY WOOLY	FUZZY LOP
BODY POINTS	15	20	15	10	20	30
WOOL POINTS	57	55	60	65	39	15
SIZE MALES LBS FEMALES	5-7 5-7 1/2	7 1/2 TO 10 1/2	+6	8 1/2+ +9	3 1/2 UNDER	NOT OVER 4
WOOL PROD./YR	8-14 OZ	10-16	6-10	20-32	LESS THAN 8 OZ	LESS THAN 8 OZ
WOOL COLLECT. METHOD	PLUCK SHEAR	PLUCK SHEAR	PLUCK SHEAR	SHEAR ONLY	PLUCK SHEAR	PLUCK SHEAR

RABBITS WITH MARKINGS

Various markings attract the interest of many individuals to raise a specific breed of rabbits. There are marked breeds that have various sizes, ear lengths and carriages, body shapes, fur structures and lengths of fur.

Many marked breeds are very popular to the fancier and the pet owner. These breeds are generally considered more difficult to breed than a solid colored rabbit. This is because one must give consideration to the correctness of the markings in addition to the type and fur/wool. This fact must be given consideration when youth select a breed of rabbits to raise. It may be advisable to reserve the marked breeds for individuals that have some experience or adult assistance.

HARLEQUIN

This breed is the "clown" of the rabbit fancy because of the marking arrangements. Marking sure more important (60 points) in this breed than any other recognized breed.

The breed is divided into 2 groups and each group has 4 varieties (colors).

1. **Japanese Group -** This group color is a golden orange or a golden fawn in combination with one of the variety colors. The dominate colors, **Black** and

   Chocolate must be in combination with the golden orange. The dilute colors, **Blue** and **Lilac** must be in combination with golden fawn.

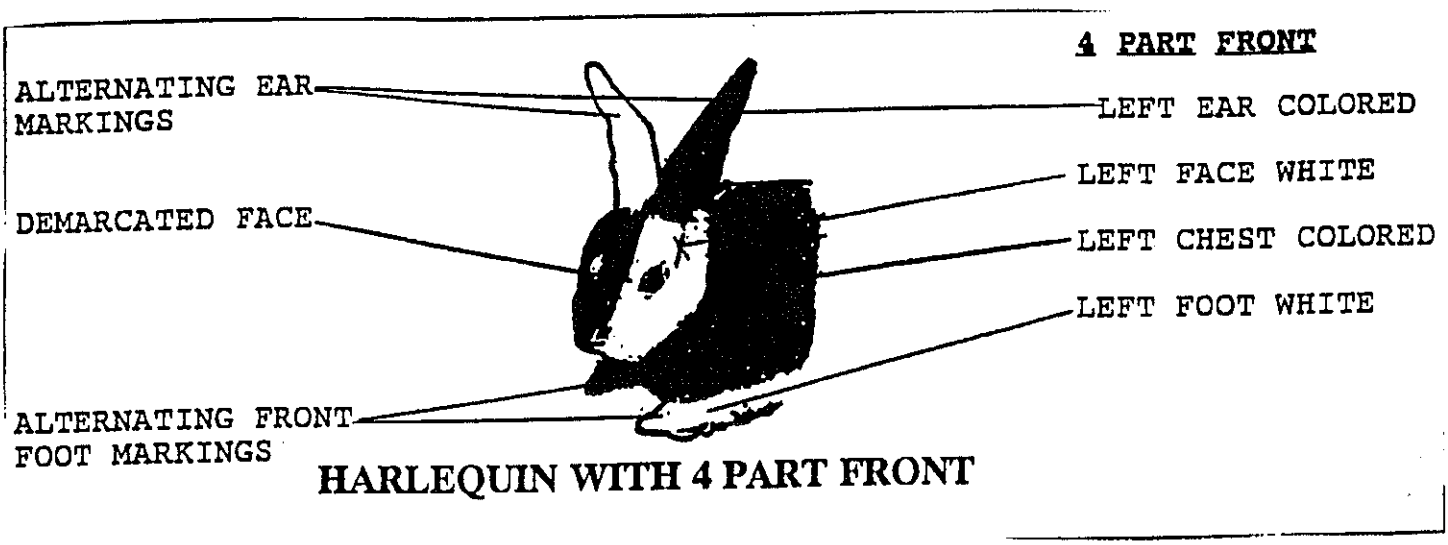
2. **MAGPIE GROUP** - This group color is white with one of the variety colors: **Black, Blue, Chocolate** or **Lilac.**

Each of the groups is judged in individual varieties and a Best of Variety and Best Opposite Sex of Variety selected in each group. A Best of Group and Best Opposite Sex of Group is selected form the Bests of each of each variety. The Best of Breed and Best Opposite Sex of the Breed is selected from the Bests of the Group winners. This can be confusing.

The markings are divided into three 20 point sections, head and ears, feet and legs, and the body. The markings must alternate in color. The Black Magpie will be used as an example in the discussion.

HEAD AND EARS

The ears must alternate in color, one black and one white. The head is divided into two sides, the right and left. The demarcation line should be from between the ears to the nose. The face color to be opposite the ear color. Example: Right ear black and right face white. Left ear white and left face black.



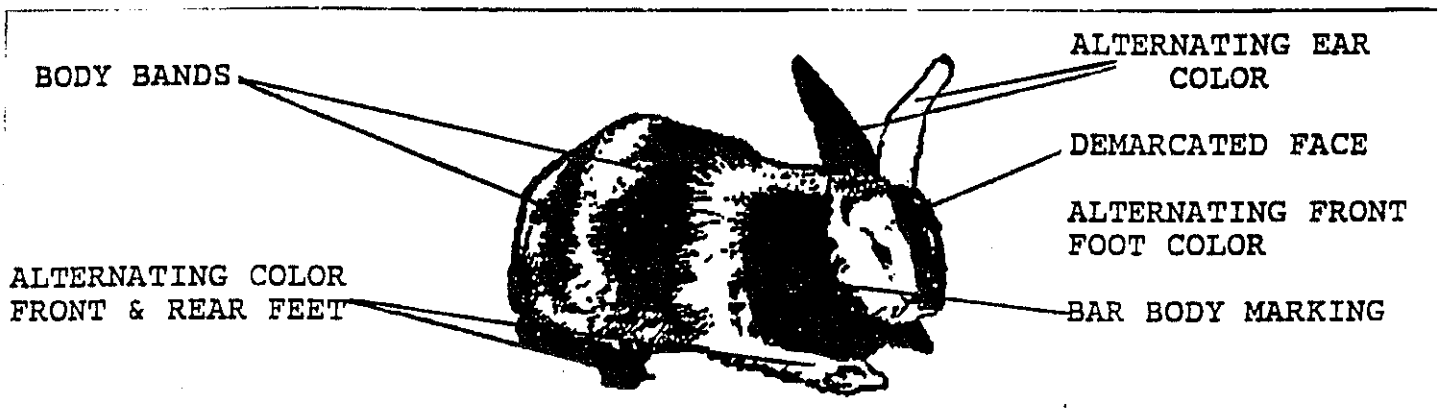
HARLEQUIN WITH 4 PART FRONT

The chest color to be divided in the middle and may be either the color of the fact or the color of the foot that is below the chest. This is a 3 part front. The chest may be an individual section and be opposite the face and foot color of the same side. This is a 4 part front.

FEET AND LEGS
The feet and legs are of equal importance to the head and ears and body. The front feet and legs and the hind feet and legs are to be opposite color. The feet and legs on the

right side must be the opposite color of the left side. Example: Right front foot and leg white, left front foot and leg black. This mandates that the right rear foot and leg is black and the left rear foot and leg must be white.

The foot and leg color must be opposite that of the chest or face, depending on a 3 or 4 part front. The face, chest, and foot and leg must be coordinated.



THE HARLEQUIN

BODY MARKINGS
The body color should frequently alternate between the colors in banding or barring. **Bands** are stripes of color, of varying width, circling the body. **Bars** are strips of color that partially circle the body from the midline on the top to the midline on the belly.

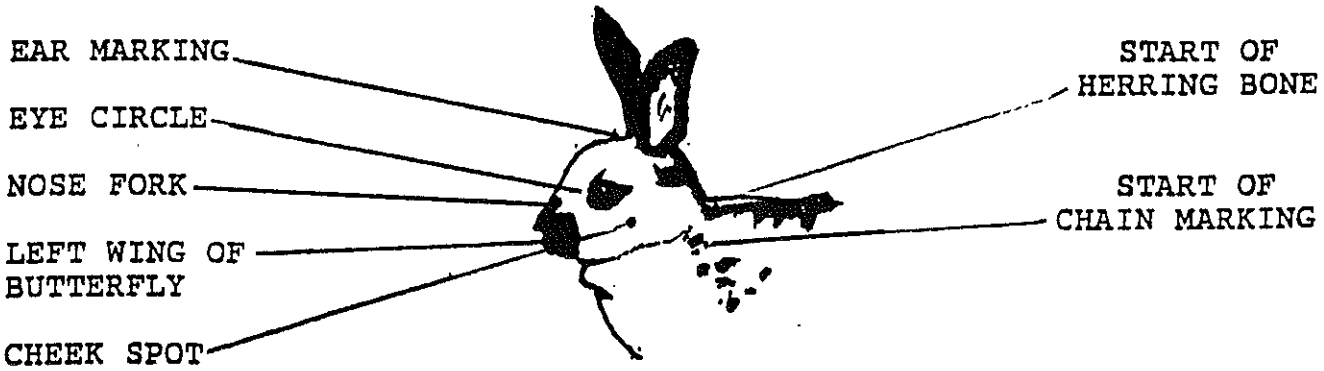
The Harlequin is a very difficult breed to raise. The markings are placed on a commercial shaped body and have ears carried in a "V" shape. They have normal fur.

This breed is posed in the standard posing position. After the initial examination, the Harlequin is allowed to move about the table for evaluation of the markings and the distribution of color.

ENGLISH SPOT

This is a breed that matures at 5-8 pounds, has an arched body shape and has 56 points allocated to markings. There are 7 recognized varieties and the **Black** is most popular in most areas.

The markings are unique and attractive; but, somewhat difficult for the beginner to understand.



ENGLISH SPOT HEAD MARKINGS

HEAD MARKINGS - 28 POINTS

BUTTERFLY - This is the most important marking on the head. The nose fork to extend from the center of the face, extend above the wings 1/2 inch and be round at the tip. The wings should be clean, smooth and include the whisker beds.

EYE CIRCLES - A circle about the size of a quarter that surrounds each eye. There will be a feather on the top of the eye circle. This is normal and not considered a fault. These markings to balance and not connect any other head marking.

CHEEK SPOTS - This is a small round spot, about 1/4 inch in diameter, just below the eye circle. The cheek spots on each side should balance in size and placement with each other. They should not touch any other head marking.

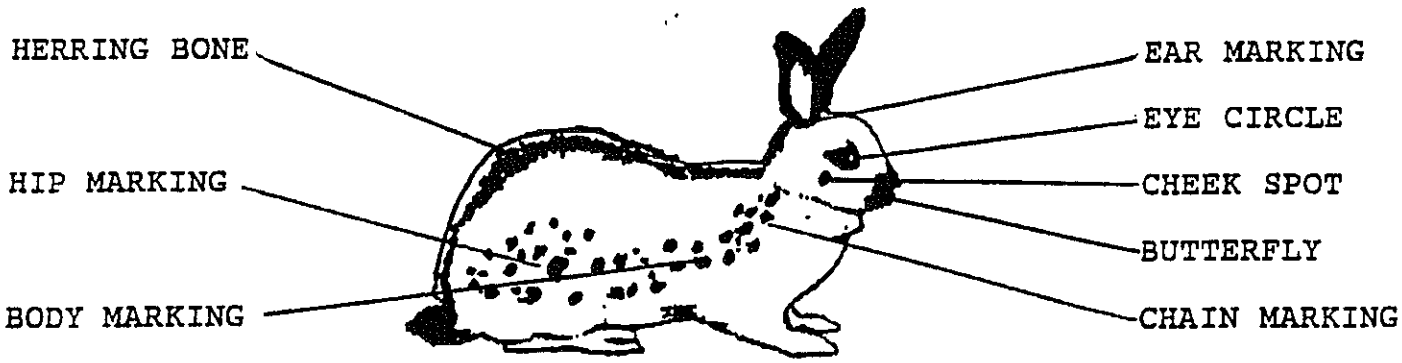
EAR MARKINGS - The ears are to be the color of the variety from the tip to the base of the ear. The ears to appear that they set on the head. There should not be any color running from the ear to the head or any white color running up onto the colored ear.

The head markings are similar to those on the Checkered Giant and Rhinelander. Each has some specifics; but, they are similar.

BODY MARKINGS - 28 POINTS

HERRING BONE OR SPINE MARKING - This is a jagged edged strip of variety color that starts at the back of the ears and extends to the tip of the tail. The color should be continuous, and is faulted for any disruption of the continuous color. Except for the start (behind the ears) and on the top of the tail, any disruption of color (break) of

more than 1 inch total will cause the animal to be removed from competition. This includes more than 1 break with a total of 1 inch or more missing. The width of the spine should taper from the neck to the widest portion (3/4 to 1 inch) over the loin and then tapering to the base of the tail, continuing to the tip of the tail. The entire top of the tail to be colored.



ENGLISH SPOT BODY MARKINGS

SIDE MARKINGS - These are the distinctive markings of the English Spot. They appear as a group of individual spots in the formation of a question mark "?" laying on its side. The bottom of the question mark is at the base of the ear and progresses back to the side and hip. It is divided into 3 distinct areas.

1. **Chain** - This starts with 1 spot the size of a pea, at the base of the ear, and the spots increase in frequency and size to the body markings.
2. **Body spots** - This is a continuation of the chain with more spots. The lower spots form a line along bottom of the belly and the upper portion sweep toward the spine marking. There must be distinct separation of the body marking from the spine.
3. **Hip marking** - The hip marking is a continuation of the body spots. The top line of spots to sweep upward toward spine marking and curve around following the arch of the lower portion of the hip.

SWEEP - The side marking to be an unbroken flow of distinct spots that progress to the rear. Each spot to be round and distinctly broken up with white color.

GRADUATION - The smallest spot should be at the base of the ear and gradually increase in size until the largest spot is in the center of the hip. The largest spot should be in the

size of a dime.

A well marked English Spot, on the arched body with appropriate color, is a sight to behold. This breed is well distributed in most areas and quality breeding stock is available. The English Spot requires considerable patience to raise.

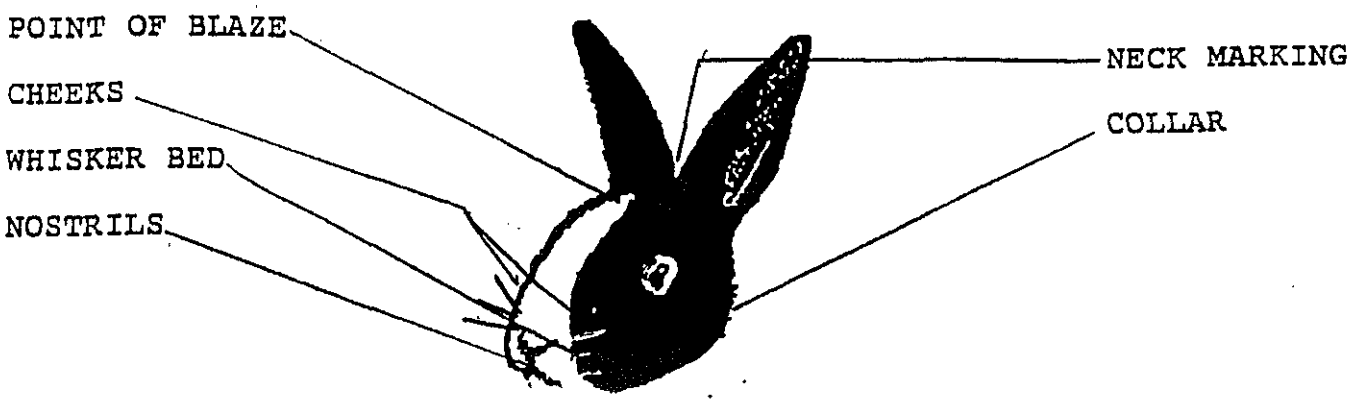
DUTCH

This is a breed of circles and roundness. The head should be round and set on a round compact body. There are 6 varieties of Dutch and they mature at 3 1/2 to 5 1/2 pounds. the markings account for 50% of the total points allocated to the breed.

HEAD MARKINGS

CHEEKS - These are the most important markings on the head (12 points). Each cheek, the colored portion, should be round. They are placed on the round head with the lower portion at the whisker bed, but not touching. The upper portion passes between the ears. Each cheek to be the same. Any alteration of the shape or placement must be faulted in accordance with the severity of the fault.

BLAZE - This is an inverted (upside down) white "V" in the center of the face. The placement and shape of the cheeks creates the blaze. This marking must be very distinct and will include the nose and whisker bed. This marking will continue with the cheek markings.



HEAD MARKING OF THE DUTCH

NECK MARKING - This is a "V" shaped (wedge like) marking just behind the ears. this marking is created by the round cheek markings as they pass between the ears. The neck marking continues on each side to form a collar that follows the jaw line. This marking can be very ragged, where the color extends into the white, and this is called a "dirty

neck". This is a fault and the number of points deducted will depend upon the severity of the fault. A "full neck" is where the white "V" shaped area is completely filled with color. This mandates a 5 point deduction.

HAIR LINE - This is a thin line of white fur fibers between the ears that would connect the tip of the blaze with the point of the neck marking. This may or may not be present. If a portion does exist and is surrounded by color this does NOT eliminate the animal from awards.

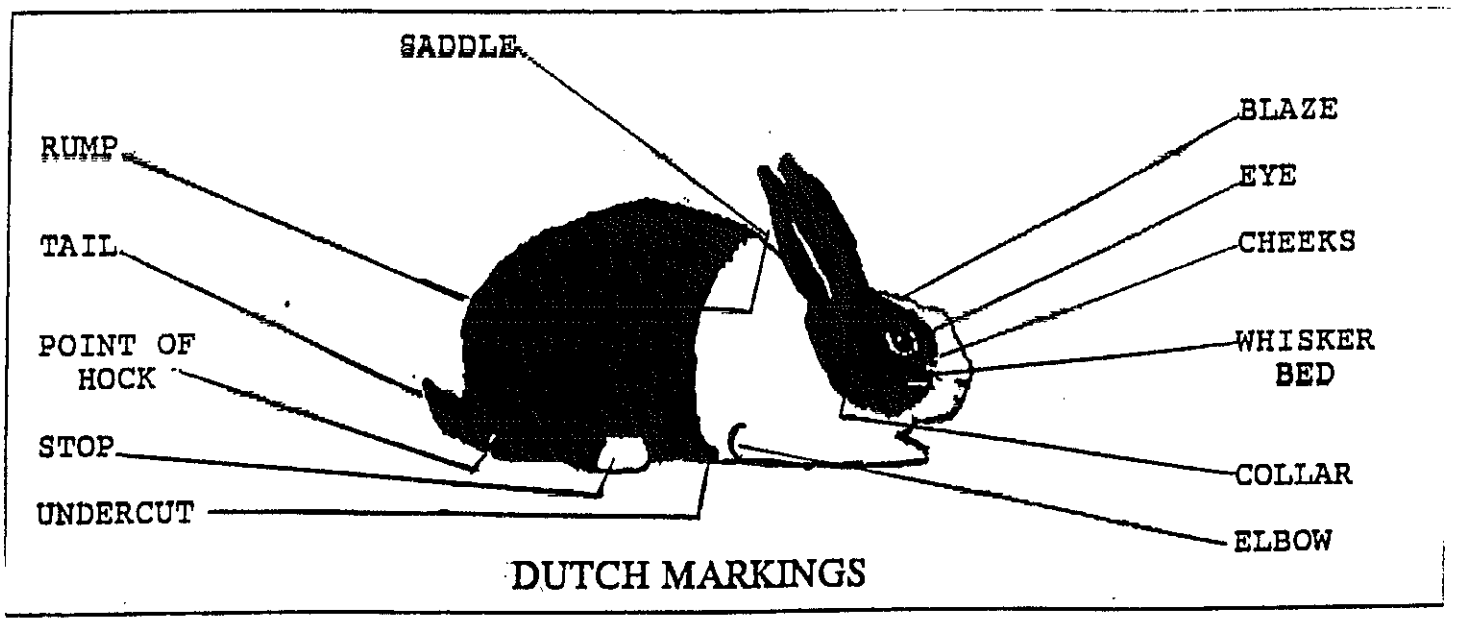
BODY MARKINGS

The "belt" around the middle of the Dutch is a very important marking (18 points). This marking is formed by the junction of the colored and white fur. The shape and placement is very important. It should be a circle around the body just behind the elbows. Imagine tying a string around the body just behind the elbows. This belt is divided into 2 distinct markings.

SADDLE - This is the visible, or top, portion of the marking when the Dutch is posed in the standard posing position. This should be straight and distinct. Any drags or runs of color into the white or white into the color must be faulted. The amount of the fault will depend upon its severity and the points allocated to the marking. This marking is allocated 10 points.

UNDERCUT - The undercut is a continuation of the saddle on the underside of the rabbit. This marking must be viewed as it would appear in the standard posing position. Great care must be taken when evaluating this marking. The Dutch must be turned over in the position that it is posed. Do not stretch the Dutch out and look at the undercut. Hold the rabbit in the position it was sitting in when posed in the standard posing position. The undercut should be placed as close to the elbows as possible without touching. Color extended below either or both elbows prevents the Dutch from competing for awards. Any deviation from a straight line must be faulted. This marking is allocated 8 points.

STOPS - These are the markings on the back feet created by the junction of the colored and white fur. The fore portion of the foot is white. The marking on each foot should be a circle, just like a string was tied around the foot. The placement should be 1/3 the distance from the tip of the toes to the point of the hock. When color runs between the toes and the top color connects with the bottom color, the rabbit cannot compete for awards. This is called a split stop. There is a top and a bottom to the stop marking. Any deviation of the straight line around the stop on either foot is incorrect placement and must be faulted.

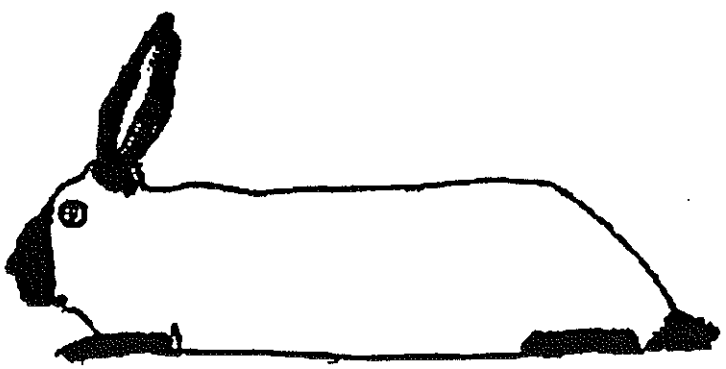


DUTCH MARKINGS

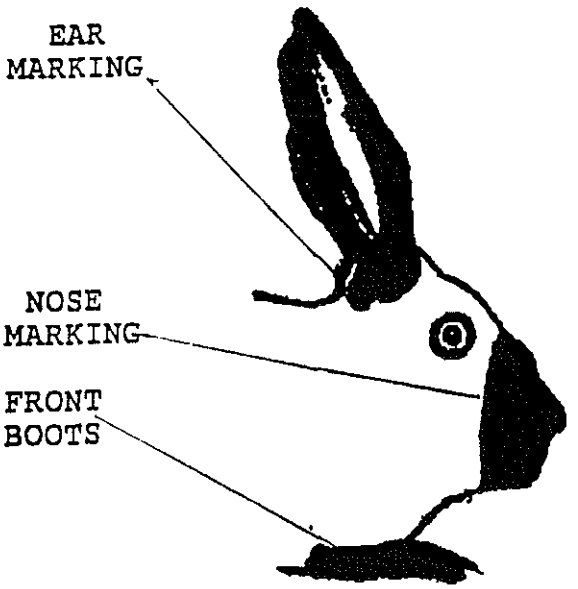
A Dutch rabbit with the correct compact body shape, good color and correct markings is beautiful. This breed enjoys wide spread popularity in the **Black** variety. The **Blue, Chocolate** and **Tortoise** varieties may be more difficult to locate. The **Gray** and **Steel** varieties are available only in certain regions. This rabbit is popular as a pet. Youth raising this breed should have supervision of an experienced adult.

HIMALAYAN

This breed has cylindrical body type and 43 points allocated to markings. They mature at 2 1/2 to 4 pounds. This is the only breed posed in a stretched out position.



The Himalayan is known for being very docile and they make an excellent rabbit for beginning youth projects. The breed is not extremely popular and some difficulty may be encountered locating quality breeding stock.



MARKINGS

HEAD MARKINGS - This may be called the "smut" or nose marking. This is a colored marking shaped like an egg with the small end up and placed high between the eyes. The edges are to be clean and distinct. This marking is allocated 10 points.

EAR MARKINGS - To appear as colored ears set on the white head. The base to be clear and distinct. The color to be clean, free of white hairs and uniform from the tip to the bottom. Ears are allocated 10 points.

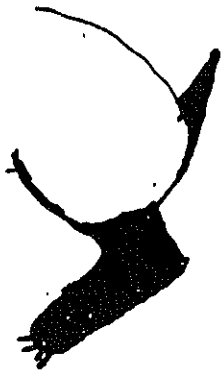
FRONT FEET AND LEGS - To be uniform clean color from the tip of the toes to a point as high on the front legs as possible. The length of color to be the same on both legs; and, to have a clean demarcation between the white and colored sections. The front feet and legs are allocated 8 points.

Good front leg markings. Good length, color and straight demarcation.

Front leg marking short, ragged and poor color.

Front leg marking of good color, but fails in uniform demarcation.

HIND FEET AND LEGS - To be uniform clean color from the tip of the toes to a high as possible on the rear leg. The length should be the same on both legs. the demarcation line between the colored and white sections is to be clean and straight without any raggedness or dilution of color. The foot markings are sometimes referred to as "boots".



Good hind boots. Good length, uniform color and demarcation.

Boots short. Ragged demarcation. Lacks uniformity of color.

Boots have good color, but fails in demarcation.

This breed is posed in a "stretched out" position to display the cylindrical type and markings. This is a very interesting breed to raise.

CHECKERED GIANT

This is a large (mature bucks - 11 pounds and over; does 12 pounds and over), active and elegantly marked breed of rabbits. this breed has full arched body shape; and, after the initial examination, are allowed to move about the table and pose in a natural position.

The unique features of this breed that differentiates it from the English Spot is the size, the side markings and the presence of an ear cap. The names of the head markings are similar but have different importance indicated by the variation in the point allocation.

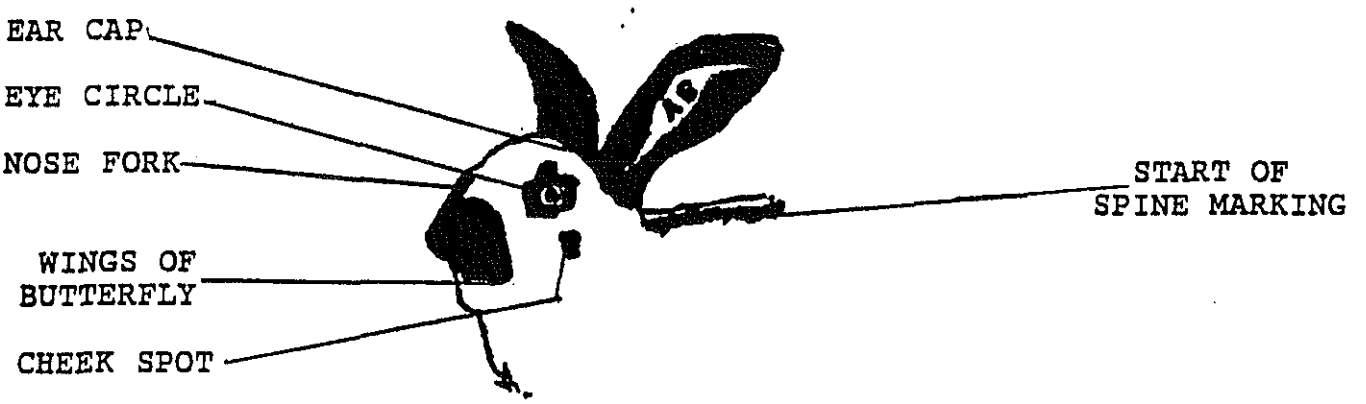
BUTTERFLY - Set on the end of the nose and is to cover the upper lip., The wings to be clean and distinct with a round tipped nose fork in the middle that is proportional to the wings.

EYE CIRCLES - Both eyes to be surrounded by a circle of color. The circles to be of the same size and shape.

CHEEK SPOTS - A round spot of color on each cheek that balances in size to the other head markings. All of the head markings should be will separated from each other.

EAR MARKINGS - The ears are to be colored from the tip

to the bottom where a cap is present to set on the head. The cap to be distinct and cleanly set on the head. The ears to appear to be attached to the head by a cap rather than having the ears set on the top of the head.



CHECKERED GIANT HEAD MARKINGS

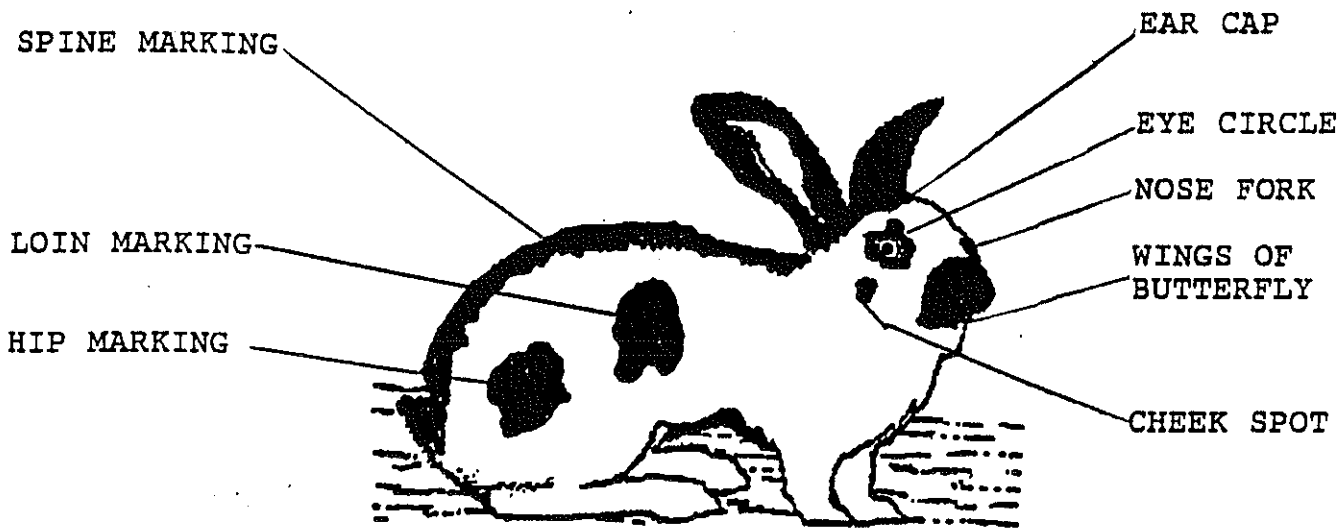
The head should be free of all stray colored spots and the presence of more than 1 stray spot will eliminate the Checker from competing for awards.

The body markings include:

SPINE MARKING - A colored strip from the back of the ears to the tip of the tail. The edges to be smooth and the width to be in proportion to the other markings. When other markings "heavier" (larger), the spine marking to be wider. The spine marking does not require the "herringbone" affect of the English Spot.

SIDE MARKINGS - These are the most distinct and important markings (12 points) of the breed. There is to be 2 spots, or groups of spots, on each side of the rabbit. The forward marking is the loin marking and the rear marking is the hip marking. These 2 markings should balance in size; and, the right side markings should look like and be placed at the same location as the left side marking.

LEG MARKINGS - The rear legs should be free, "clean" of all color. Any color on the front legs will prevent the Checker from competing for awards.



CHECKERED GIANT BODY MARKINGS

The Checkered Giant is a beautiful rabbit when the markings are correct on a fully arched body. Because of their size and activity, it may be necessary to give solid floors, or partially solid floors, consideration to prevent foot problems. This breed is bred in **Black** and **Blue** varieties. This is a true fancier's rabbit.

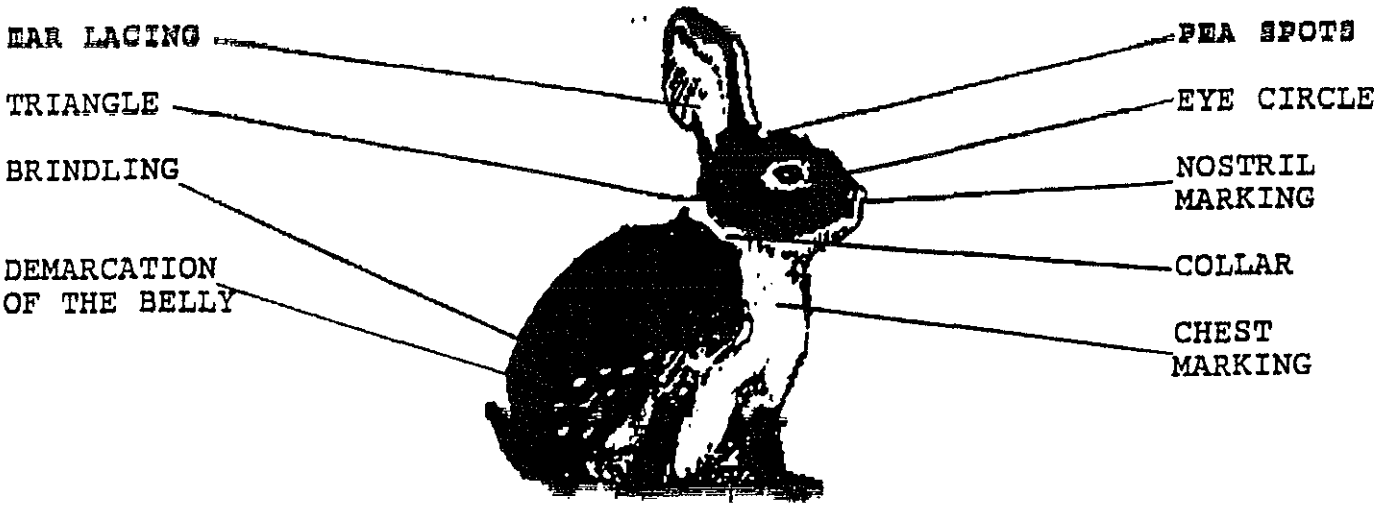
TAN

This is a small (mature bucks 4 to 5 1/2 pounds, mature does 4 to 6 pounds), active rabbit with full arched type that has great emphasis (35 points) on the tan pattern markings. The Tan has 25 points allocated to general type, 35 points combined on fur and color; and, 35 points on markings.

TRIANGLE AND COLLAR - The collar is the tan fur that extends from the chest along the jaw line to the back of the ears in a continuous line. The right and left collars meet at the center of the shoulders to form the **triangle.** The widest part of the triangle is at the base of the ears. The triangle should be very well demarcated.

CHEST, BELLY AND TAIL - The **chest** should be a continuation of the collar marking downward, at the outside chest area, to form a rich tan rectangular chest marking. The **belly** marking is to continue from the chest on to the lower chest, belly and to the tip of the underside of the tail.

The junction of the bright tan and the body color meets to form a sharp **demarcation line** on each side of the body. The demarcation line to be straight without any raggedness. When viewed from the side, the demarcation line should be just high enough to display the brilliant tan contrast to the body color. If too high, the demarcation line will not be straight.

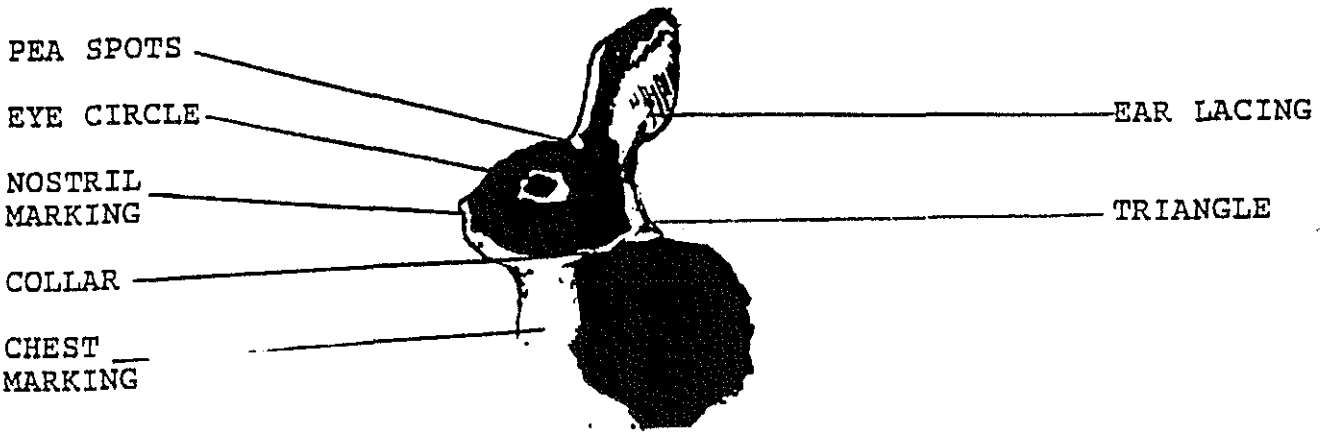


TAN

EYE CIRCLE - There is to be a complete uniform tan circle around both of the eyes. The tan to be uniform with the color of the other markings.

NOSTRIL MARKING - This marking is to be strictly confined to the nostril. The color is to be a bright, rich tan. Stray tan hairs outside the nostril are to be faulted.

EARS AND PEA (CROWN) SPOTS - Pea spots to be viewed from the front and is the extension of tan fur from the base of the triangle back of the ears. The outside of the ears is to match the variety color on the body. The inside edges, where fur exists to be brilliant tan from the tip to the bottom. This is called ear lacing.



TAN HEAD

BRINDLING - This serves to enhance the beauty of the rabbit. There should be long tan sipped hairs extending around the rump and up the sides of the Tan. The top portion (back) of the rabbit to be free of all tan coloration.

FRONT AND HIND FEET AND LEGS - All 4 foot pads to have a tan tint. The front portion of the front feet and legs to be the same color as the body and free of tan hairs. The rear portion, to be of the same tan shade as the belly. The rear foot should have a straight demarcation between the 2nd and 3rd toe. The outside portion of the rear leg to be the same color as the body and the inside to be tan and match the belly color.

The Tan rabbit is popular in some geographical regions; with the **Black** variety being the most popular. The **Chocolate, Blue** and **Lilac** are less popular. Youth should have knowledgeable adult supervision or be experienced to raise this breed

After the initial examination in the standard posing position, the Tan is allowed to move about and pose in a natural position. This allows one to more correctly evaluate the markings, dispersion of color; and, type.

RHINELANDER

This breed has a full arched body shape with golden orange and black markings on a white background fur. The Rhinelander is not a popular breed and is available only in regional areas. Mature bucks and does weigh 6 1/2 to 9 1/2 pounds; and, 7 to 10 pounds, respectively. After the initial examination, the animal is allowed to move on the table and pose in a natural position. This allows one to better evaluate type and distribution of color.

Markings on the Rhinelander are allocated 30 points; 18 on the body and 12 on the head.

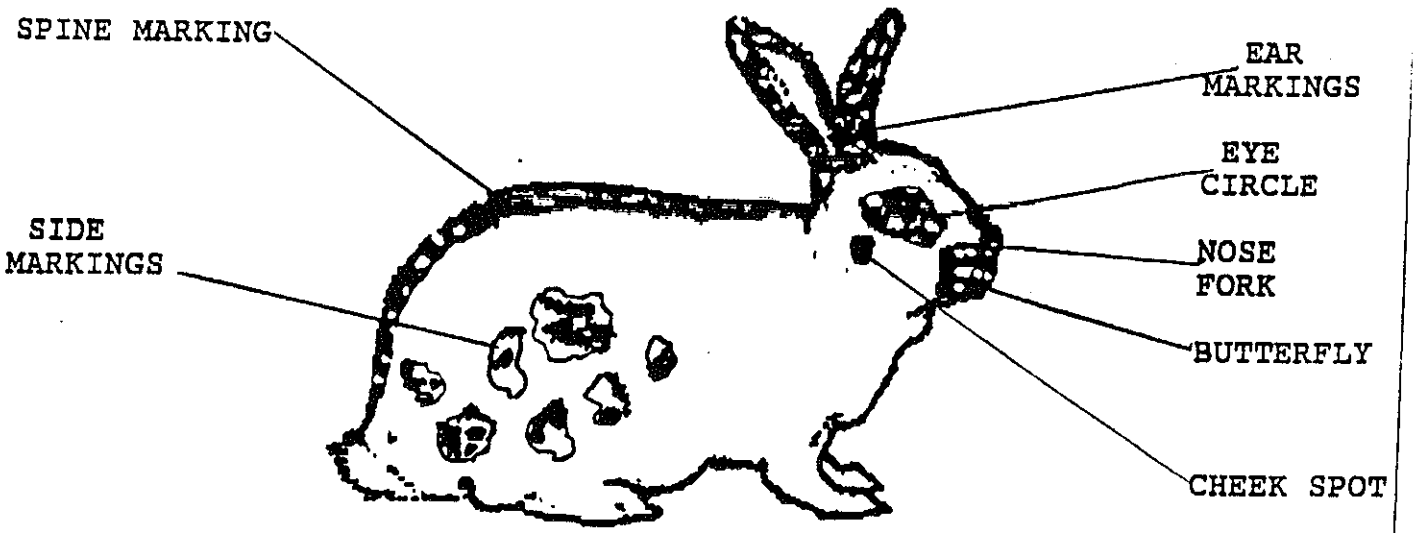
BODY

SPINE MARKING - A golden orange and black marking from the nape of the neck to the tip of the top portion of the tail. The marking to taper from the neck to a wider (3/4 inch) area over the back and then taper to a narrower area at the base of the tail. The top of the tail to be colored.

SIDE MARKINGS - There must be a minimum of 3 distinct spots, surrounded by white, on each side. The spot may be black, orange or a combination of black and orange. Ideally, there would be 6-8 distinct 1 inch round spots per side, evenly

distributed on the side and hindquarter. Each side should balance with the opposite side.

Rhinelanders with fewer than 3 spots on a side, more than 1 spot on either shoulder; or, a spot on the front leg will not be able to compete for awards. Each side marking must have both colors present.



MARKINGS OF THE RHINELANDER

HEAD MARKINGS

BUTTERFLY - This marking on the nose must have both colors present. The wings to cover the whisker bed and each wing to match the other. The outline to be clean and distinct. The nose fork to be round on the end, in the center of the face and extend 1/2 inch above the wings.

CHEEK SPOTS - The only marking that does not require both colors to be present. To be round and located on the side of the face.

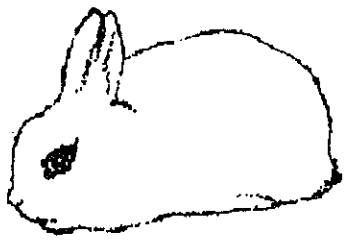
EAR MARKINGS - The ears to have both colors present and evenly distributed from the tip to the bottom of the ear. The ears to appear as they are set on the white head. The bottom of the ear is to be free from raggedness
EYE CIRCLES - Each eye is to be surrounded by a mixture of both colors. They should match and be free of the other head markings.

This is a pretty rabbit; but, youth should be an experienced rabbit breeder; or, have knowledgeable adult supervision to raise this breed. Quality breeding stock may be difficult to locate.

DWARF HOTOT

This is the "bandit" or "boxer" of the rabbit industry

because of the black band around each eye. The correct pronunciation of Hotot is "o-toe". This is a small rabbit where the mature bucks and does weigh 3 1/4 pounds or less.



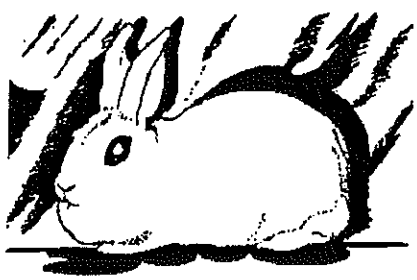
The Dwarf Hotot has compact body shape, a bold head and short ears. The distinguishing characteristic is the black eye band.

The markings on the Dwarf Hotot is allocated 15 points. The band should distinctly outline both the eyes. The width of the marking should be the thickness of 2 nickels laid on top of each other. There should be no "feathers" or drags of color into the white fur. Eye bands that are incomplete will not allow the Dwarf Hotot to compete for awards.

This breed is popular as pets and make excellent youth projects. the breed is available in mosts areas.

HOTOT

This breed is very difficult to locate because of the low numbers in the United States. The breed has commercial body shape and is noted for the thin black eye bands around each eye.



The eye band markings are allocated 15 points. The markings should be a uniform and continuous band around each eye that is 1/16 to 1/8 inch wide. There should not be any feathering or irregularity in the band shape. Hotots that have bands that are absent, incomplete or more than 3/16 of an inch cannot compete for awards.

This breed is posed in the standard posing position. One may gently blow into the eye and the Hotot will close the eye and allow more correct evaluation of band shape and width.

SILVER MARTEN

This is a popular breed of rabbits that are bred in 4 varieties, **Black, Blue, Chocolate** and **Sable.** They mature at 6 to 8 1/2 pounds and 7 to 9 1/2 pounds for bucks and does, respectively. Martens, as they are sometimes called, have commercial body shape and have 13 points allocated to markings. The markings are of the tan pattern.

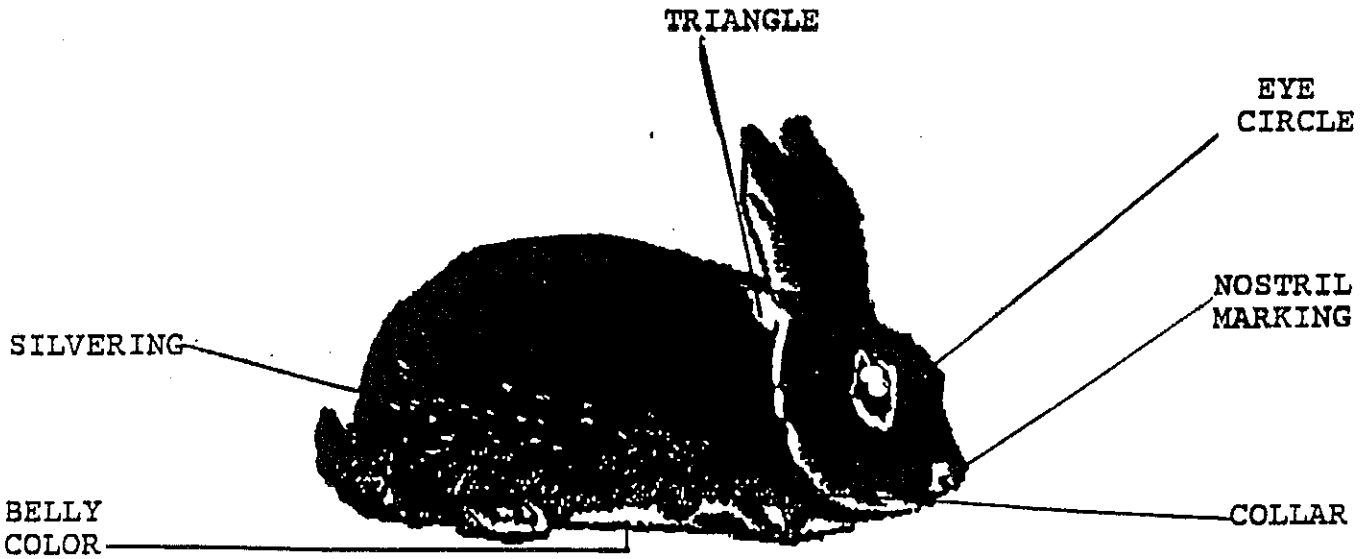
NOSTRIL MARKINGS - The white must be distinctly confined to

the nostril. White hairs that stray outside the nostril and give a mealy appearance to the nose is said to have a "putty nose".

EYE CIRCLE - A silvery white circle of the same size around each eye.

TRIANGLE AND COLLAR - The collar extends around the neck at the jaw line from an area of silver white under the chin to connect with the widest part of the triangle at the base of the ears. The triangle should be very distinct and extend to a point. This marking should not be over 2 1/2 inches in length.

SILVERING - This is a distinct characteristic of the breed. The silvering should extend from the belly up the sides and rump. The silvering is created by the silver tipped guard hairs and must be very distinct and uniform in the dispersion over the marked area. The back must be free of silver tipped hairs and white hairs.



SILVER MARTEN MARKINGS

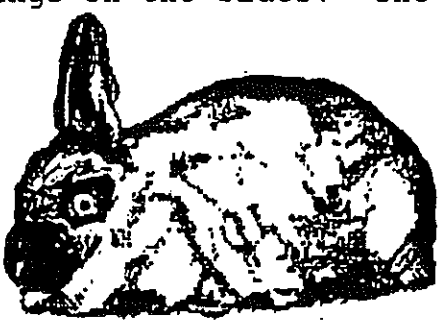
BELLY COLOR - The belly to be a silvery white. The presence of an under color is desirable; but, not required.

Markings only account for 13 points and caution must be used not to place excessive importance to markings. The Marten is bred in four varieties, **Black** (the most popular), **Blue**, **Chocolate** and **Sable** (the least popular).

Quality Silver Martens are available in most areas. They are posed in the standard posing position. This is a good marked breed of rabbits for youth.

CINNAMON

The color of this marked rabbit is unique. They are to have a gray ticked cinnamon color over the back, smoke gray shadings on the sides. The belly color to be a dark smoked gray color. The Cinnamon bucks mature at 8 1/2 to 10 1/2 pounds. Does at 9 to 11 pounds. They have a commercial body type and normal fur. Markings are allocated 11 points. The eye circles are to be dark, small and distinct.



The nose marking to be a distinct mask. All the extremities; all four feet and legs, tail and ears are to be dark. There are to be 2 rust colored lap spots on the inside of the hind legs.

The Cinnamon is posed in the standard posing position. the breed does not enjoy wide spread popularity. Quality breeding stock may be difficult to locate.

There are several breeds that have broken patterns as a group in the breed.

AMERICAN FUZZY LOPS

This breed has compact body shape, a bold head, lopped ears and has wool on the body. It is posed in the standard posing position. This breed is popular and breeding stock is available in most areas. This breed is popular as a pet and house rabbit.

The description of the markings, and allocated points, is included with the discussion on color. They are exhibited in 2 showroom classes; the solid or colored group and the broken group. The broken marked American Fuzzy Lops should have color on the nose, around the eyes, have colored ears and varying amounts of color on the body. The broken pattern may be spotted, in patches or in blanket form. The broken must be a recognized color in conjunction with white.

CALIFORNIAN

This is one of the most popular commercial body shaped rabbits used for meat production. It has a white pelt with black "points". The points are the four feet, two ears, tail and nose. This breed is posed in the standard posing position.

The color and markings are allocated only 5 points altogether. The intensity is related to the temperature. The lower the temperature, the darker the color. This predisposes the Californian to have "smut" on the usable portion of the pelt. Smut is a darker coloration of the surface portion of the fur fibers. This usually is a result of that portion of the skin being exposed to cold temperatures and the fur grows in dark. This will prevent breeding animals from winning awards. Smut on the pelt of Californians entered in the commercial meat classes is acceptable.

ENGLISH LOPS

This breed is characterized by the long ears (minimum 21 inches from tip to tip) and mandolin body shape. Mature bucks must weigh 9 pounds or more. Does must weigh over 10 pounds. The English Lop is posed in the standard posing position.

They are exhibited in solid (colored) and broken groups. The markings are allotted 2 points.

The head should have color on the nose, around each eye and colored ears. There is a wide variation of head markings. English with any of the head markings missing cannot compete for awards.

The "blanket" pattern is preferred for the body marking. The color to start at the base of the ears, cover the shoulder, gets larger and covers a major portion of the hindquarters. The feet and legs are to be white.

This breed has fair popularity and breeding stock can be located with effort. The ears are fragile and some special care is necessary to protect the ears from severe weather and from being injured. These are in much demand as pets.

FRENCH LOPS

This is a large boned, thick set massive rabbit with commercial body shape. The head is large and bold with a strong crown on top of the head. the ears drop from the crown and hang to the sides of the head like a horseshoe surrounding the face. Mature bucks weigh over 10 pounds and does over 11 pounds.

The French Lop is exhibited in solid (colored) and broken groups. The broken marking is allotted 2 points. It should follow the same description as the marking for English Lops given above.

The breed is posed in the standard posing position; but, allowed to rest lightly on the front feet. This allows for a better evaluation of the ear shape and carriage.

The French Lop is quite popular and quality breeding stock is usually available in most area. Because of their size, larger cages may be necessary. Some breeders find it necessary to keep the larger mature French on solid or partially solid floors to prevent sore feet. This breed is sensitive to extremely hot weather.

Youth smaller in size may find this breed too large to handle comfortably and may wish to choose a smaller Lop eared breed. The French Lops have excellent personalities and are in demand as pets.

MINI LOP

This is a small version of the French Lop and mature bucks and does weigh 4 1/2 to 6 1/2 pounds. This is an ideal rabbit for the beginner. Quality breeding stock is readily available, they are easy to raise, compared to some other breeds, have good personalities and there is good competition in most areas.

Mini Lops are exhibited in the solid (colored) and broken groups. Color and markings are combined for a total of 5 points. The head should have a nose

marking, eye circles and colored ears. The body to have a blanket pattern or patches of color. The broken colored marking must be an accepted color variety in conjunction with white.

This breed is posed in the standard posing position.

HOLLAND LOP

This is the smallest of the Lop eared breeds. Mature bucks and does cannot weigh over 4 pounds. Their head and body structure is different than the French and Mini Lop. They have a short compact body. The Holland is posed resting lightly on the front feet. This allows for better evaluation of the head, ear shape and carriage. It further raises the shoulder to nearly the same height of the hindquarters.

This breed enjoys wide spread popularity as a fancier's rabbit and is in much demand as a pet. Breeding problems and difficult kindling is a detraction from the breed for beginning youth, unless adult supervision and guidance is available.

Color and markings are combined and are of minimum importance. The head should have a nose marking, eye circles and colored ears. The body to have a blanket pattern or balanced patches of color over the body.

REX

This breed is sometimes called "standard" Rex to prevent confusion with the Mini Rex. The Rex is bred in 14 varieties and the broken group. It is noted for its very plush fur. The "plushness" is a result of the fur fibers being short and standing perpendicular (straight up and down) to the skin. Rex fur has the greatest demand of any type of rabbit fur. The unique fur is placed on a commercial body shape. This is a "dual" purpose type rabbit that may be produced for the edible protein and the fur.

Color and markings are combined for a total of 10 points. One-half (5 points) are allocated to the pattern on the broken group. The broken group Rex must have at least 10% color and no more than 50% color. The nose should be colored and both ears to be colored. The body may be blanketed or spotted. The markings should balance. Rex that have less than 10% color, more than 50% color, fails to have color on both ears or does not have a nose marking cannot compete for awards.

The Broken Pattern must be one of the approved varieties of the breed in conjunction with white. The Broken Rex is also bred in Tri-color. The Tri-color is white in conjunction

with Black or Chocolate with golden orange; or, Lavender Blue or Dove Gray with golden fawn.

Rex are posed in the standard posing position and the fur is "patted", instead of being stroked from the tail to the head, to determine density, texture and quality. This is a unique rabbit.

This breed is prone to "sore hocks". This is poor terminology as the hocks are not sore; but, the foot pad area is what becomes traumatized, ulcerates (gets sore) and become infected. The cause of this problem is that the body (weight) is too large for the size of the foot pad or the foot pad is not protected. Foot pads with poor fur density, think skin or being housed on floor surfaces that are rough, increases the incidence of this condition. some Rex must be raised on solid floors to prevent this condition from developing.

Rex are usually available in most areas. Some of the colors are not very popular and are difficult to locate. These rabbits are popular as pets because of their unique fur.

MINI REX

This is a small version of the Rex rabbit. This is not a Dwarf Rex. The breed has different approved varieties than the Rex. It is important to be sure the variety and/or group color is approved for exhibition. The Mini Rex has the same type of fur described in the Rex on a compact body and is posed in the standard posing position.

Color and markings are combined for a total of 10 points. The head markings include a nose marking, colored ears and color around each eye. The body may be spotted, patched or blanketed. There must be a minimum of 10% color and a maximum of 50% color. Absence of any of the head markings; or color less that 10% or more than 50% will prevent the Mini Rex from competing for awards.

This is a very popular rabbit because of the small size and unique fur. The Mini Rex is popular in most areas and breeding stock is readily available. Some of the specific approved varieties may be more difficult to locate. Youth find this rabbit very exciting to raise.

SATIN

This is an extremely popular breed of commercial body shaped rabbit. Quality breeding stock is available in most areas. Some of the varieties have limited distribution. They are bred in 9 varieties and 1 broken group. The Broken must be one of the recognized varieties in conjunction with white. This breed is characterized by the brilliant "sheen" that is due to the presence of clear guard hairs that reflects the light.

This allows the breed to have unique fur structure and intensifies the variety. The color and Broken pattern are combined for a total of 15 points.

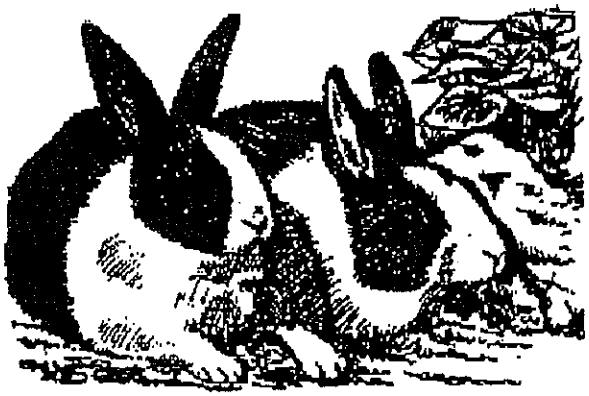
The head to be marked with color on the nose, around the eyes and both ears to have color. The body marking to be a balanced blanket or spotted pattern. Satins that have less than 10% or more than 40% color are to be faulted in accordance to the severity of the fault. Absence of color around the eyes, on the nose or on both ears will cause an animal to be ineligible to compete for awards.

This breed is to be posed in the standard posing position and one must have good natural lighting to truly evaluate the color and sheen. This is an exciting breed to raise.

SUMMARY

There is a breed of rabbits to fit every's desires. Rabbits are raised in a multitude of colors. They will range in size from 2 1/2 to over 18 pounds. Have ears that range from 2 inches to an excess of 26 inches; and, carry their ears in an erect, lopped or a "V" shape. Various breeds have commercial, compact, mandolin, full-arched and cylindrical body shapes. They have various types of fur/wool. They include Normal, Satin and Rex fur; and, various types of wool. In addition to the above variations, there are many breeds that are marked in many different ways. There is indeed a breed of rabbits to met the desires and need of anyone interested in raising rabbits.

VARIOUS USES OF THE



DOMESTIC RABBIT

USE OF THE DOMESTIC RABBIT

The domestic rabbit has many uses.

1. House pets
2. As an animal for hobbyists to exhibit at shows and fairs.
3. For youth projects (4-H, FFA, and Scouts).
4. Backyard production for those interested in self sufficiency.
5. Commercial meat production to meet the needs of an edible meat protein in a health conscious society.
6. Commercial fur production-Normal, Rex and Satin fur.
7. Commercial fiber production-Angora wool.
8. Laboratory animal production.
9. Production of biologics.

LIFE EXPECTANCY OF THE DOMESTIC RABBIT

The life span of a domestic rabbit will vary considerably depending upon the use of the rabbit and type of care that the animal receives. Animals that are used for production have a shorter life span than those that are utilized only as a pet.

The normal life span for a commercial producing doe that is raising all the young possible (6-8 litters per year) will have a productive life expectancy of two and a half to three years. Rabbits under less intense production methods will live longer. It is not uncommon for "house rabbits" and properly cared for pets to live to be 6 - 10 years old. There are instances of some rabbits living to be 12 years old or more. Under normal circumstances, one can anticipate that a well cared for rabbit will live from five to ten years.

The exhibition time for a rabbit is about 10 - 12 months. However, there are those exceptional rabbits that may be exhibited up to 2 years or more. Caution must be used not to retain a doe in exhibition condition too long after their sexual maturity as she may become very difficult to get bred. Obesity (too fat) is a common cause of breeding problems in rabbits.

Small rabbits mature at an earlier age than the larger breeds and bucks mature about 1 month later than does. Breeds that have mature body weights under 4 pounds sexually mature at 4 - 5 months; medium sized rabbits, that mature 9-12 pounds, sexually mature at 7 - 9 months; and, the giant breeds sexually mature 10-12 months.

Any rabbit that is not going to be used for breeding, and the show career is over, should be neutered. This will decrease

the sexual health problems associated with older rabbits; especially females.

THE HOUSE RABBIT

Domestic rabbits make wonderful pets? The house rabbit is the most rapid growing sector of all aspects of the rabbit industry. Many have nicknamed the rabbit the "condominium" pet. Rabbits no longer just receive attention during the Easter holiday; but, are popular all year.

Some of the reasons for the increased popularity are:

1. The availability in multiple sizes, shapes, ear carriages, ear size and types of fur/wool covering. There are 45 breeds and multiple mixed breeds available to meet the demands of any person.
2. The ability of the rabbit to adapt to an array of housing conditions.
3. Each rabbit has a unique and individual personality that responds to love and attention.
4. Low cost investment, compared to conventional pets, in the initial investment of the rabbit and necessary equipment needed to care for the animal properly.
5. Minimal cost in maintaining the rabbit compared to conventional pets (food, health care and etc.).
6. Rabbits are ideal pets for individuals on fixed incomes. They receive the majority of the same benefits of a pet at a much lower cost.
7. Most housing facilities that restrict conventional pets will allow the occupants to have a rabbit. The reason being that rabbits do not make noise to disturb neighbors and are usually not destructive.
8. Rabbits are easy to litter box train.
9. There is minimal public health significance.

SELECTING THE "PERFECT" RABBIT FOR A PET

This is a VERY IMPORTANT family decision! Make sure that there is total understanding that owning a pet rabbit; or any pet, the family must accept the responsibility for the total care of the animal. Select a rabbit that complements the family's life style and accommodations.

Do not obtain a rabbit on impulse. Think the decision over completely and give consideration to all ramifications of the responsibilities and what the rabbit will be at maturity. this is a long time commitment. House rabbits have a life expectancy of 6 - 10 years or more.

Consideration must be given to the following:

MATURE SIZE - Rabbits vary in size at maturity from 2 1/2

pounds to an excess of 18 pounds. It is important that the size of the rabbit at maturity is given consideration at the time the rabbit is adopted or purchased. An adorable little bunny can develop into a giant adult.

The United States Department of Agriculture Animal Health Inspection Service recommends the following floor space allocation for rabbits, excluding space for food and water receptacles.

3-5 pounds - 180 square inches - 14 inches high
12 pounds or more - 720 square inches - 14 inches high

Most owners find a larger cage more acceptable. When the rabbit has complete access to the house, or a room, it is advised to have a cage to restrict the animal's activity at certain times.

TIME REQUIRED FOR CARE - In addition to the daily chores of cleaning, feeding and watering; the rabbit will need daily attention and grooming. The fiber producing breeds need more grooming than others. Be sure that one has sufficient time and patience to care for the rabbit obtained.

FOOD AND WATER CONSUMPTION - The amount of food that a rabbit will eat each day will vary considerably depending upon several factors. Generally speaking, small rabbits will consume 3 - 5 ounces per day and larger rabbits will consume 6 - 10 ounces per day. It is essential that the budget will withstand this added expense.

One must have appropriate receptacles to feed and water the pet rabbit. It is essential that clean fresh water is available at all times.

THE INITIAL PURCHASE - This event is extremely critical and will be very influential in determining the amount of gratification received from owning a pet rabbit. There are many alternatives to where the perfect pet rabbit may be obtained. Local animal shelters, or organized groups that specifically care for rabbits, that have been obtained that do not have homes, are an excellent source of pet rabbits. Pet stores and purchasing from a local breeder are other alternatives in obtaining a pet rabbit.

It is important that the rabbit is healthy and free of abnormalities. If there is a problem present, the perspective owner must be advised of such. Young rabbits should be a minimum of 8 - 10 weeks of age and weaned from the mother at least 7 days. Some town and city ordinances dictate the age that pet rabbits may be sold. Follow those guidelines.

Rabbits that are ill or have abnormalities present will

require extra care and expense. Be aware of this commitment. Look the rabbit over very closely. Check the status of the digestive system and respiratory system as these are the systems most often affected by disease. If any doubts, seek a professional opinion.

A common abnormality in rabbits is abnormal placement of the incisor teeth. This is called malocclusion, buck teeth or wolf teeth. Rabbit incisors elongate about 1/2 - 3/4 inch per month. When not placed in the correct position (upper incisors in front of the lower incisors) they will not wear each other off from abrasion in the chewing process. This results in uncontrolled growth and the upper and lower incisors will grow back into the mouth like "rams horns". This interferes with food consumption. With this condition present, the incisors must be given attention every 2-4 weeks to prevent problems. This is time consuming and costly. Prospective owners should avoid purchasing rabbits with this genetic deformity.

HEALTH CARE

The annual maintenance cost of owning a rabbit is usually very low compared to the conventional pet. This is because the rabbit does not require vaccinations and are not susceptible to heart worms. Many owners do have annual evaluations as a method of preventive health care.

All pet rabbits should be neutered! This improves the aesthetic value of the rabbit to the owner and is in the best interest of the rabbit's health. Smaller rabbits reach sexual maturity at 4-6 months of age, medium sized rabbits mature at 6-8 months of age and giant rabbits sexually mature at over 8 months of age. Males mature 1 month slower than females.

At sexual maturity, male rabbits "mark" their territory for breeding. This is done, even when other rabbits re not present, by "spraying" urine at given locations. They also will attempt copulatory motions on various items in the household. These are all very undesirable traits. It is natural for rabbits to "chin" themselves on various items in the house or in the cage (water or feed crocks). There are scent glands under the lower jaw and "chinning" is a part of the territorial marking. On occasion these glands will be traumatized and abscesses develop. Castration will control the above undesirable situations.

The simple surgical procedure may be performed as soon as the testicles descend into the scrotal sac. Early castration does not cause problems, as in the cat, and is recommended to prevent the vices from developing.

Female rabbits should be spayed just before sexual maturity.

Does that are not spayed will oftentimes have false pregnancies from a hormonal imbalance. This condition is demonstrated by the doe making a nest and assimilating the kindling process. This includes pulling copious amounts of fur from the belly and chest; and, this can be very messy. This condition may be repeated multiple times.

Does that are not spayed have increased incidences of cystic ovaries, hyerplasia of the uterine walls, mastitis (mammary gland inflammation) and reproductive tract malignancies. It is essential for the best health interest of the female pet rabbit that it is spayed.

With any surgical procedure, in humans or animals, there are risks; but, when performed by a trained professional the risks are minimal. The risk of the various conditions that may develop in non-neutered rabbits far exceeds the risks of surgery.

LOCATING A HEALTH CARE PROFESSIONAL FOR RABBITS

Not all veterinarians will accept rabbits as patients. This is due to the fact that many veterinarians do not feel comfortable with the species due to the lack of professional training. Most all will give assistance in referring rabbits to professionals that specialize in the medicine of exotic species. It is important that one locate a qualified individual prior to the development of an emergency situation.

SUMMARY

Rabbits make wonderful pets and are available in all sizes, shapes and descriptions. They are increasing in popularity due to their many attributes that conform to the changing life of today's society.

Owning a pet rabbit demands responsibility. One should be aware of the time, cost and demands associated with this involvement.

MINIATURE DOMESTIC RABBITS AS PETS

All small rabbits are not Dwarfs! The American Rabbit Breeders Association, Inc., the only recognized "all breed" rabbit association in the United States, recognizes and maintains a Standard of Perfection for forty-five breeds of domestic rabbits. Only one of these breeds is a Dwarf and that is the Netherland Dwarf. The "smaller" recognized breeds are arbitrarily categorized as miniature rabbits and weigh less than 4 1/2 pounds mature body weight.

RABBITS AS PETS

Each domestic rabbit has an individual personality and will respond to handling and affection. Rabbits are dramatically increasing in popularity as "year-a-round" pet for the following reasons.

1. Physical attributes - domestic rabbits are available in many shapes, sizes, colors, fur lengths and a variety of physical features to suit each individual's needs and desires. The availability of the miniature rabbits are particularly appealing to individuals of very small physical stature and those with physical handicaps.
2. Household acceptance - many housing units in today's society prohibits the ownership of the conventional pet. They will make an exception for rabbits as they do not vocalize to disturb close neighbors, are exceptionally clean, produce little or no odor with limited housing efforts; and, are usually not destructive to the physical structure.
3. Relatively low cost investment - the rabbit(s) as well as associated equipment to house the animal(s) is relatively inexpensive as compared to other conventional pets. Rabbits can be housed in such a manner that they have complete access to the entire household, can be caged within the house, a combination of both; or, can be caged in an appropriate manner and kept in an outside shed, under a shade tree or in the protection of some physical structure. The only other necessary equipment is items to provide food and water that are inexpensive. Miniature rabbits are usually slightly more costly than medium sized rabbits.

4. Low maintenance cost - the domestic rabbit has a very low daily and yearly maintenance cost. This is particularly appealing to families with moderate incomes; as well as, those individuals on fixed incomes and still desire the benefits of a pet. The food utilized by the rabbit is of relatively low cost and can be purchased at local pet, grocery and feed stores. There are not any required prophylactic vaccinations for disease. In addition, when provided with proper care and diet, the rabbit has very few health problems to be addressed. With the above traits, the maintenance cost of the domestic rabbit is very small.
5. Public health significance - there are very few diseases that can be transmitted from rabbits to humans.
6. Acceptance of rabbits as youth projects - the care and production of domestic rabbits has become a very popular 4-H, FFA and scout project for youth in urban areas with an agriculture interest. The project is intended to educate the participant in

animal husbandry, responsibility, record keeping, economics and other essentials useful in adult life.

PURCHASING THE PET RABBIT

Without the knowledge of what to expect and what to do can be a mutually frightening and stressful experience for the new miniature rabbit owner and the rabbit itself. A newly purchased rabbit should be at least eight weeks of age at the time of purchase. (*NOTE: Some counties and cities have* ordinances restricting the sale of young bunnies until they have attained a given age). This allows for the young rabbit (kit) to have been weaned at four to six weeks of age; and, a sufficient amount of time to elapse (at least two weeks), to allow the young rabbit to have adjusted to the stressful weaning period and adapt to eating only solid food without being dependent upon the doe's (mother) milk.

The health status of a newly purchased rabbit is extremely important and will have a direct effect upon the success of the pet rabbit adventure. A healthy rabbit will move about the cage freely and will not show any signs of restricted movement. The eyes and nasal area should be clean, clear and free of any discharge. There should be absolutely no sneezing.

Discharge from the eyes or nose may indicate the presence of a respiratory disease that can be extremely difficult to cure in domestic rabbits.

The perspective pet rabbit must have fecal droppings that are firm and dry. *There should not be any evidence of loose* stool indicated by the presence of fecal material attached to the fur in the genital area. Diarrhea (enteritis) can be very devastating in young rabbits and is caused by stress, change in diet and volume of feed consumed; or, inappropriate type of feed.

It is extremely important that a good rapport is created between the purchaser and the breeder/pet store owner as this will be an excellent source for the breeder to have questions answered that will develop in the future. The pet store owner/breeder is very proud of the stock they are selling and want the customer satisfied as it will create future sales in supplies and other pet rabbits. As with other conventional pets, there is an obligation that the purchaser is educated to prevent any possible injury or unintentional abuse to the newly purchased rabbit, due to lack of educational instruction.

Miniature rabbits are prone to maladies of the incisor teeth (front teeth); and, it is important that the teeth be examined very closely for proper alignment. The domestic rabbit's incisors (upper and lower) elongate at the rate of

1/2 t 3/4 of an inch per month. The incisors must be properly placed in the skull so the upper and lower incisors continually wear each other off and do not elongate at an uncontrolled rate. Elongated incisors can create difficulty apprehending and masticating the feed. The proper alignment, when viewing them from side profile, is the upper incisors should overlap the lower incisors. If proper alignment is not present, it will be necessary to trim the nerveless incisors every three to four weeks to control the malady of the incisors so the animal will remain comfortable.

PROPER HANDLING OF THE MINIATURE RABBIT

Handling rabbits properly is extremely important to prevent injury to the handler and to prevent injury to the rabbit. Rabbits should **NEVER** be handled by the fur/wool, ears or any other extremity (feet, legs, tail). The domestic rabbits instinctive mechanism of protection is to escape when frightened. This is the reason that the handler will, on occasion, get scratched. The rabbit becomes frightened during handling and attempts to escape, in the process, the sharp toenails unintentionally scratch the handler.

The simplest method of handling the miniature rabbit is to place one hand under the belly and chest area while "cradling" most of the weight in the palm with the opposing hand placed under the rump. Rabbits can be moved about freely in this position. Or, if to be carried a long distance, they can be cradled in one arm with the head of the rabbit "tucked" securely in the curvature of the arm and the body of the rabbit supported in the crease created by the handler's arm next to the body. Another method of supporting the rabbit is to hold the animal securely to the body of the handler with the front and back feet against the torso of the handler and the body weight of the rabbit supported with the hands. As the rabbit becomes more accustomed to being handled, the owner will develop methods of handling the rabbit that are both suitable to the owner and the pet.

It is essential that the new miniature rabbit owner know the exact breed and variety of the rabbit; as well as, the approximate birth date, weaning date and the type and amount of diet that the animal is consuming at the time of purchase. This information will be important to your veterinarian and assist you from making dramatic changes in the rabbit's life style after purchase. In addition, the new owner should have a source of information concerning rabbits. It will be very beneficial for the new owner to be provided with the names of individual(s) that they can contact concerning questions that will develop in the future about their newly purchased pet. This also will give the new owner access to information about the many organized rabbit clubs for the owners of rabbits.

THE RIDE HOME

Traveling with the miniature rabbit can create some minor inconveniences. One use extreme care that the rabbit is securely confined, is not exposed to direct sun rays and has adequate ventilation while traveling. Use precautions that the wool/fur does not become soiled with urine, excretions or the provided bedding material.

The initial travel effort can be completed in well ventilated small cardboard boxes that has shredded paper added to the bottom. However, for future adventures, one must give consideration to carriers that have wire sides and an appropriate size floor wire to accommodate and provide comfort to the miniature rabbit's feet (1/2 inch x 1 inch). The carriers should be set on a "leak proof" tray to collect the various excretions and prevent the animal's fur/wool from becoming soiled. IT is common to place an absorbent material (shavings, kitty litter, shredded paper) in the tray to collect the urine. To assist in the prevention of odor, one can add one teaspoonful of baking soda to the bedding tray. Carriers can be obtained at relatively low cost at supply outlets and pet shops.

GETTING ACQUAINTED

After the initial four or five house of solitude with only fresh water to drink, it is time to introduce yourself, on a personal basis, to your new friend. Speak softly, move slowly, always handle the pet rabbit correctly and gently. Allow the rabbit to get to know you, and you to understand the rabbit's personality and behavioral patterns. At the conclusion of the introduction period, one can feed the rabbit. After the rabbit has become accustomed to the new surroundings, the bunny can be "played with" and handled considerably without causing undue stress and harm to the rabbit. It is extremely important that the rabbit is allowed to rest periodically.

CAGING

Miniature rabbits can adapt to a variety of housing conditions. It is recommended that the rabbit have some type of cage even though the intent is to let the animal have the run of the house most of the time. This allows the animal a place for security and solitude. Others may intend to keep the rabbit caged at all times. This is quite acceptable as the domestic rabbit readily adapts to total confinement in the proper sized cage.

There are a variety of cages that are suitable for housing rabbits. Rabbits can withstand extremely cold weather (sub zero) as long as they are protected from the direct wind and precipitation (rain and snow). However, temperatures in excess of eighty-five degrees Fahrenheit; especially with

high humidity (excess of eighty percent), can be very devastating to the rabbit. Particularly, the miniature rabbits that have wool (Jersey Wooly and American Fuzzy Lop) due to the wool covering preventing the loss of heat from the body. With the above knowledge, one can readily see that the cage can be placed in the house, in a garage, in an out building, under a shade tree; or, in the protection of a building depending on the local environment. The size of the cage for the miniature rabbit should be approximately 18 to 20 inches wide, from 24 to 36 inches long and 18 inches tall.

The type of floor utilized with the miniature rabbit is extremely important. The miniature rabbit can be housed in "wire bottomed" (1/2 x 1 inch) or solid floors. The wire cage floor is much more convenient and it is preferred, for those animals that have wool since it will prevent the wool from becoming soiled with urine and feces. It is extremely important that the appropriate side of the floor wire face the foot pads of the rabbit (the 1/2 inch side toward the rabbit's feet). If the floor wire is installed incorrectly, it can cause the animal's feet to become irritated, sore and become infected (sore hocks).

Young rabbits can be housed together until they are approximately 10 to 12 weeks of age. Housing rabbits together after that age increases the possibility of injury or unwanted pregnancies, if the occupants of the cage are of different sexes. Neutering rabbits will allow for successful co-habitation without the above named problems. Miniature rabbits become sexually mature as early as sixteen weeks of age. The female rabbits mature sexually earlier than males.

FEEDING THE MINIATURE RABBIT

This is a critical area confronted by all rabbit growers; but, particularly the miniature rabbit owner due to the fact that theres animals appear to be much more sensitive to the variation of caloric intake than many of the other breeds. The most common mistake made is that is a tendency to "over feed" the miniature rabbit and most beginners will want to add "variety" to the diet. Both of these practices enhance the possibility of diarrhea and associated death.

The rabbit's digestive system is such that it depends upon chemical digestion (like humans) combined with the bacterial digestion (like cattle and sheep). This is extremely unique and is the reason that the feeding of rabbits properly is important. The rabbit is a creature of habit and should be fed at the same time each day; and, there should not be any rapid changes in the amount or type of food consumed. Rabbits must have "particulate" feed so it can apprehend the pellets with the lips and teeth. It is very difficult for rabbits to eat finely ground foot or the fine portion of the pelleted feed. The ingestion of finely ground feed increases

the digestive problems an encourages the rabbit to waste feed.

The general nutritional requirements for rabbits are: Protein 15% to 17%, Fat 2% to 4% and Fiber 16% to 20%. Growing, gestating (bred) and lactating (milking) rabbits require slightly increased protein levels in relationship to the other constituents. IT is recommended that one give close attention to the fiber level of the diet. Diarrhea is a common and very serious malady i domestic rabbits. The condition is very closely related to rabbits consuming diets containing low fiber levels and excessive energy (calories). Therefore, it is recommended that one give attention to the fiber level and feed pellets that contain at least a **MINIMUM** of 16% fiber.

Experience has shown that most successful miniature rabbit owners utilize a commercially prepared pellet as the only source of food. some rabbit breeders add a small amount of hay on a daily basis to assist in the prevention of wool block. There is some very good scientific evidence that indicates that miniature rabbits do very well on only pelleted feed and it is not required that hay be added o the diet as long as the fiber level in the pellet is maintained. It is recommended that the miniature rabbits are fed only commercial pellets one time per day and that they are given only the amount of pellets that will be consumed in thirty minutes after feeding. Miniature rabbits will consume about two to six ounces per day. Young growing rabbits will consume more feed than the mature rabbit.

Most beginners want to feed a variety of "treats" to the rabbit, including various fruits and vegetables. This can be very detrimental to the miniature rabbit's health. It is for the best interest of the rabbit's health that one feed **ONLY** commercially pelleted feed. If the owner feels it is absolutely necessary to give the rabbit a "treat", those recommended are: an occasional teaspoonful of rolled oats, three or four sunflower seeds, three or four raisins, a piece of dried bred (1/4 slice); or, a small piece of apple. The animal should receive no more than one treat per day; and, ideally, no more than two treats per week. When changing brands of feed, it is desirable to make the change gradually, mixing an increased amount of the new feed with the old until the animal is entirely on the new ration. Rabbits are nocturnal and ideally should be fed at night. However, they can adapt readily to morning or mid-day feeding.

Access to clean fresh drinking water is essential. It is recommended that the water is supplied via water bottles or water crocks. Water bottles are preferred for the wooled animals to prevent the soiling of the wool around the mouth. When fed a commercially prepared pellet, as the only source of feed, it is not necessary to add vitamins to the drinking

water unless the animal is exposed to undue stress. The watering equipment should be sanitized at least once a week.

GROOMING

The miniature rabbit will lose portions of its hair periodically (molting). The amount of grooming required by the miniature rabbit will be directly proportional to the molting process. Grooming can be very easily done by slightly dampening the hands and rubbing the entire surface of the rabbit's body from head to tail to remove the dead hair. IT is important that the dead hair be removed from the rabbit's body regularly. During the self-grooming process, with the rasp-like tongue, they will ingest a portion of the loose hair. The rabbit's digestive system does not contain any digestive enzymes that will break down the hair. If an excessive amount of fur is ingested, it can occasionally accumulate in the stomach and cause a fur blockage that must be given attention.

The wool on the Jersey Wooly and American Fuzzy Lop will not have the tendency to matt as on the other types of fiber producing breeds. The wool on these animals can be very easily groomed with a large toothed comb 1 to 2 times a week. Rabbits are very receptive to grooming and the attention they receive during this process. It isn't necessary to bathe pet miniature rabbits.

In summary, domestic rabbits under four and a half pounds of mature body weight are arbitrarily categorized as miniature rabbits. These animals make excellent pets that can be housed in a variety of situations. It is mandated that the rabbit is properly handled to protect the rabbit from injury and the handler from becoming injured.

The domestic rabbit has a very unique digestive system and it is extremely important; particularly for the miniature rabbit, that it is fed appropriately and that the volume of diet and type of diet not be dramatically altered.

Having a miniature rabbit as a pet can be a very rewarding experience.

THE EASTER BUNNY

Purchasing an "Easter Bunny" can be a very important business transaction! The purchase is often made on impulse with only the thought of immediate care and love for the "cuddly" unique little creature. However, combined with this purchase are educational opportunities that consist of teaching responsibility, enhancing knowledge of various biological subjects, learning rabbit husbandry, and possibly even assisting in the explanation of the "facts of life". In addition, purchasing an "Easter Bunny" oftentimes has a

direct affect upon the future development of 4-H projects, FFA projects, the hobby of exhibiting domestic rabbits, a "backyard" commercial rabbitry; or, even a lifetime occupation concerning a type of rabbit production or associated activities.

The retailer has the responsibility to be "somewhat informed" about rabbits to afford answers to the varied questions of the new owner or perspective owner, of the pet domestic rabbit. This enhances sales, assists in assuring a good pet-owner relationship and reduces the possibility of the rabbit not receiving the proper care. Ironically, the rabbit has been utilized as a research animal for many years; but, there is very little good informative material available concerning care of the pet domestic rabbit. There are many information type books available; but, the majority of these materials for the novice contain information concerning husbandry of the rabbit that is not totally sound. It is recommended that individuals seeking more information concerning the domestic rabbit contact the American Rabbit Breeders Association, Inc., Box 426, Bloomington, Illinois 61704.

For the health and welfare of the animal, as well as for the fullest enjoyment of the pet rabbit, several items should be given consideration in making the business transaction.

PURCHASING THE PET RABBIT

Individuals should give serious consideration to several factors prior to the purchase of the pet rabbit. This will prevent many heartaches and disappointments in the total experience. It is extremely important that the animal purchased be compatible with the primary owner, the remaining members of the family and the facilities that are available to house the rabbit. There are approximately forth-five breeds of domestic rabbits that are recognized by the American Rabbit Breeders Association. Many of these breeds have been developed in a multitude of varieties (colors) and a variety of shapes and sizes. The size of the pet rabbit should be compatible to the individual, or child, that will be handling the rabbit regularly. If the rabbit is excessively large for a youngster, there is the possibility of the youngster or the rabbit becoming injured. This does not allow for an ideal pet-owner relationship.

Extreme care should be given in selecting an Easter rabbit; or, any other rabbit, to be sure that the individual rabbit is healthy. There is nothing more disappointing than to purchase a cute, loveable rabbit, become attached to the animal and then have the animal become sick and die due to a pre-existing condition. When making the purchase, one should give considerable attention to the following factors that influence the health status of the rabbit.

1. Age - most rabbits are weaned from the doe (mother) sometime between four and six weeks of age. Ideally, these young weanlings should be allowed approximately two weeks in the original rabbitry to mature and adjust to the weaned conditions prior to being "stressed" by changing to another environment. Therefore, one should purchase a rabbit that is approximately eight to twelve weeks of age. There are certain local city and county ordinances that prohibit the selling of pet rabbits until they attain a given age. This age restriction varies from city to city. A rabbit at approximately twelve weeks of age will have had the opportunity to adjust to routine feeding habits, the original owners will have had the opportunity to assure that the young kits are relatively free from parasites and to establish that the rabbit is healthy prior to the sale. Changing management practices on very young rabbits can be very stressful and should be avoided.
2. Attitude - prospective purchasers should take the time to stand away from the cage and watch the rabbit closely. The eyes should be very bright and alert, the ears, whether lopped or erect, should indicate that the animal is alert and interested in its surroundings; and, the rabbit should "frolic" about the cage and be attentive. One should avoid the purchase of rabbits that are lethargic and appear to be sick.
3. Condition - the rabbit should appear to have bright, brilliant fur that is relatively free form molt. The entire furred area, including the bottoms of the feet and the area round the genitals, should be free of any caked or matted fecal material. Look closely at the bottom of the cage to see that the fecal material that has been excreted is round and firmly pelleted rather than lose, sticky and foul smelling.

   When handling the rabbit, the flesh condition should be relatively firm and there should not be any indications of the bones being easily palpated (felt). One should avoid animals that have a large stomach in comparison to their body size. Any time there is an indication of soft stool or a large belly, in comparison to the body, there is the possibility of the rabbit suffering from parasitism or other digestive disturbances.

4. Teeth - examine the teeth of the perspective pet rabbit very closely. There are conditions in domestic rabbits where there is an abnormality of the tooth growth that affects the health of the rabbit. When examining the front incisors, one should be assured that the upper incisors (2)

overlap the lower incisors (2). This is the normal position of rabbit incisors. This becomes extremely important due to the fact that the incisors of a rabbit grows at the rate of approximately 1/2 to 3/4 of an inch per month. If these incisors do not meet at the above prescribed angle to wear each other off on a continued basis, the upper and lower incisors will elongate at an uncontrolled rate and will oftentimes interfere with the normal eating habits of the rabbit. If these teeth are not maintained on a regular four to six week interval, they oftentimes will curve backward and grow into the skull. This can oftentimes cause fatalities. Therefore, it is of extreme importance that the teeth on the pet rabbit have the correct structure to avoid problems and disappointments at a future date.

HANDLING

Handling the newly purchased pet is extremely important to insure that the animal is not injured and that the owner or handler is protected from the sharp toenails of the rabbit.

The appendages of the rabbit; feet, ears, tail; as well as the skin in the middle of the back, are not for the intended purpose of lifting or carrying the rabbit. If the rabbit is lifted by these areas, there is the possibility of injury; as well as the rabbit will be frightened. Handling the rabbit securely and firmly provides comfort and reassurance; therefore, the tendency to struggle and scratch is minimized. Prior to handling, one should get the attention of the rabbit through some manner (voice communication) to afford them the awareness of your presence.

Rabbits can be easily picked up by placing one hand under the chest and stomach area while supporting the rear portion of the animal with the opposite hand. The rabbit can be very easily removed from the cage in this position and then gently caressed to the torso of the body, the lap or the large portion of the are to be carried. One will find that the animal adapts to this type of handling procedure quite readily. One can utilize the area just behind the ears to assist in lifting and controlling the animal while supporting the major portion of the weight with the opposite hand. However, caution should be used to utilize the skin just behind the ears to control the animal and not pick the animal up by the fur or skin in the middle of the back.

Rabbits are very receptive to proper handling. Once they become accustom to the procedure and are assured that they are not going to be injured, their attempt to get away (scratch) will almost be eliminated.

Initially, one may wish to handle the young kit while wearing

a long sleeved garment to protect the arms from accidental

scratching. Always keep in mind that the rabbit usually does not scratch intentionally; but, only scratches when it is frightened. Scratching is their normal defense mechanism in their attempt to protect themselves and to get away from a frightening situation.

Care should be utilized in setting the rabbit down. The rabbit should not be dropped or roughly handled in any manner. Avoid placing the animals on tile, linoleum type floors, or other slick surfaces due to the fact that when the animals attempt to hop, oftentimes their feet will slip out from under them and there is the possibility of injury to the spinal column that can cause permanent damage and paralysis. When grooming the animal, it should either be placed on the individual's lap or on a rough surface so slipping, of the hind feet in particular, can be kept to a minimum.

Grooming the rabbit should be done on a regular basis to continually remove the molting fur. The grooming process requires only a minimum about of time and no particular grooming tools. The amount of time required in grooming the rabbit will entirely depend upon the inherited molting process. The animal will need to be groomed more frequently when in a molt as compared to the regular grooming process. Rabbits can be easily groomed by slightly dampening the hands and repeatedly stroking the animal from the tip of the nose to the tip of the tail, in the direction that the fur lies. Pet rabbits are usually very receptive to the grooming process and enjoy being handled and petted.

After the rabbit has been accustomed to the new owner and surroundings, they can be frequently handled, if handled properly, without stressing the health of the rabbit. Oftentimes, rabbits are handled repeatedly throughout the day by youngsters dressing them up to play "doll baby" and so forth without any signs of ill effects.

NUTRITION

Proper feeding of your pet rabbit and providing good clean drinking water at all times is of extreme importance. It is the general tendency for most pet owners to "over feed" the rabbit. There are many misconceptions about feeding rabbits that must be given strict attention. Rabbits **CANNOT** be successfully fed like the cartoon characters raiding the garden.

It is recommended that the pet rabbit be fed commercially manufactured rabbit pellets. There are many excellent commercial pellets available and the pellets should contain at least 15% protein and the fiber content should be a

minimum of 16%. Fiber is important to the rabbit! If the food that the rabbit consumes is deficient in fiber, there will be a tendency for the rabbit to have various digestive disturbances, which include diarrhea, that can oftentimes be fatal. It is recommended that the rabbit **NOT** be fed lush green vegetables even as treats. The feeding of these types of materials will enhance the possibilities of fatal diarrhea.

It is recommended that the rabbit be fed the amount (volume) of pellets that they will consume in approximately twenty to thirty minutes twice a day during the growing stages; and, only once per day when the animal is mature in age. If one desires to give "treats" to the rabbit, the treats should consist of very small amounts of rolled oats, an occasional piece of toasted bread (or dried bread), two to six raisins; or, a small piece of apple. Rabbits like treats and it is very important that one discipline the animal to refrain from providing excessive amounts of treats for the health and benefit of the animal. Commercial rabbit pellets are balanced in the nutritional requirements of the rabbit. If excess treats are provided, the diet will no longer be nutritionally balanced.

The rabbit should always be supplied with an ample amount of good, clean drinking water. There are many types of feeding and watering devices available. One should choose a device to water the rabbits that keeps the water fresh and clean; and a feeding device that does not allow for spillage and keeps the feed free from fecal material. "Fouled" drinking water and contaminated feed enhances the possibility of parasites and disease in the rabbit.

Anytime the stool of the rabbit becomes soft; or, a diarrhea exists, the nutritional practices should be scrutinized very closely. It is recommended that at the first signs of loose stools, one reduce the amount of feed intake to the animal dramatically (50% or more). If the condition exists for more than twelve hours, professional advice should be obtained. Gastrointestinal upsets in the rabbit can be very critical and is one of the major causes of death in developing rabbits.

ENVIRONMENTAL REQUIREMENTS

TEMPERATURE

Rabbits can withstand very cold weather (in excess of zero degrees Fahrenheit) as long as they are kept dry and have protection from the wind. However, if one is going to raise young kits, it is necessary to have enhanced protection from the various environmental elements. Hot weather, with excess humidity, is more critical to the health and welfare of the rabbit than the cold weather. Rabbits must be protected from

the direct sunlight and cannot withstand temperatures in excess of eighty degrees Fahrenheit without allowing for continued air movement. Temperatures that exceed eight degrees Fahrenheit can cause distress to the rabbit that can readily result in acute heat exhaustion. Elevated temperatures mandate close monitoring of the rabbit.

HUMIDITY

As the humidity increases, the more dramatic the affect of elevated temperatures upon the rabbit. Ideally, it is the goal to keep the relative humidity at approximately 40% to 60%. However, rabbits are able to withstand dramatic variations in the humidity as long as there is sufficient air movement and the temperatures can be controlled within manageable limits.

AIR QUALITY

Air quality is extremely important to the rabbit. If one can detect the odor of ammonia in the air, the concentration is sufficient to cause irritation to the respiratory system of the rabbit that may enhance the respiratory disease known as "snuffles". This is a major concern when there is an increased number of rabbits in a small enclosed area.

Air quality can be properly maintained through adequate ventilation and frequent removal of the excreta from the housing area.

SUNLIGHT

It is not necessary for the rabbit to be exposed to any predetermined amount of daylight hours each day. However, it is extremely important that the rabbit not be placed in the direct sunlight due to the effect of the elevated temperatures. The total daylight hours becomes more critical if the rabbit is to be mated, as the increase of the total daylight hours to which the animal is exposed enhances production in the domestic rabbit.

CAGING

The rabbit adapts to a variety of caging situation that may be available. Suggested cage sizes for the various sizes of rabbits are as follows:

Dwarf breeds (Netherland Dwarf, Dwarf Hotot, Polish, Britannia Petite, Holland Lop)
18" x 24" x 18" high
Small breeds (Florida White, Dutch, Havana, Himalayan, Mini Lop)
18" x 30" x 18" high
Medium breeds (New Zealand, Californian, Satin)
18" x 36" x 18" high

Giant breeds (Checker, Flemish, French Lop)
24" x 36" x 18" high

The type of flooring is extremely important. It is generally accepted that the giant breeds should NOT be housed on "wire bottomed" floors due to the fact that this oftentimes enhances sore and irritated foot pads (sore hocks). Therefore, it is recommended that these breeds of rabbits be raised on solid floors utilizing appropriate bedding.

Wire bottomed floors enhances the cleanliness of the rabbit and reduces the incidents of disease. There are many types of wire bottom floors available. However, the most common type of floor utilized is galvanized wire that the wire is 1/2 by 1 inch spaced. It is important to check that the cage floor is properly installed! The 1/2 inch side of the wire should be toward the rabbit's feet. Cage wire that has been improperly installed will enhance the irritation of the feet and cause foot problems (sore hocks).

The individual cages provided for the rabbit should have protection from the various environmental elements; such as the wind, rain, extreme temperatures and sunlight. It is important that the cage be placed in an area that has adequate ventilation to provide quality air without direct drafts on the individual rabbit.

Some individual owners allow the rabbit the "freedom" of the house. This can be a satisfactory method of housing the pet rabbit as most can be easily trained to a litter box. One must use caution that the rabbits do not chew the various electrical cords; as this can be very hazardous to the health of the animal and the occupants of the house. Most rabbits can be disciplined to prevent this and other vices that may develop.

Rabbits can be easily trained to the litter box. To initiate the training, the excreta should be placed in a small box that has been filled with various types of absorbent material ; such as, cat litter, shredded paper or shavings. It is necessary that the litter box be changed periodically when it becomes fouled. This is usually necessary two to three times per week to maintain proper sanitation and to control odor.

HEALTH MAINTENANCE

The pet domestic rabbit requires very little, if any , health maintenance as long as they receive proper care and a good nutritional program. There is not any required vaccinations necessary and the rabbit is a relatively healthy pet. Rabies vaccinations (killed vaccine) are usually not given except in situations of high exposure risk. The only area that needs consideration is the care of the teeth, if there is an abnormality present, and periodic trimming of the toenails.

The low maintenance cost of the rabbit is one of the factors that allows the rabbit to be an ideal; and, increasingly popular house pet.

PUBLIC HEALTH SIGNIFICANCE

The domestic rabbit does not carry any diseases that are readily passed from the animal to humans. The only diseases that have been incriminated as to having a minor public health significance are Salmonellosis, Tuleremia, tuberculosis and toxoplasmosis.

Although the rabbit does have some public health significance, it is very minor.

In conclusion, the domestic rabbit affords a tremendous opportunity as a pet, whether it is an individual purchased during the Easter season or nay time of the year. The domestic rabbit has almost nil public health significance, requires very low maintenance cost to the owner; and, can adapt to a variety of caging and environmental conditions.

It is extremely important, when selecting a pet rabbit, that one select an animal that is healthy and has the physical characteristics to suit the needs of the owner's size and available housing.

Domestic rabbits make outstanding pets that respond to affection; but, it is mandated that they be handled properly to insure the handler's safety. More information concerning the domestic rabbit can be obtained from the American Rabbit Breeders Association.

RABBIT SHOWS - WHAT'S THAT?

The mention of the words rabbit show or rabbit exhibition will usually cause a "raised eyebrow" in many individuals when discussed outside the "rabbit community". There are approximately 2,500 sanctioned, and many more 4-H and county fair shows, throughout the United States each year. The American Rabbit Breeders Association is the only national association that sanctions official rabbit shows in the United States, licenses official ARBA judges, maintains a merit registration system and maintains a Standard of Perfection for all breeds (45) of rabbits recognized in the association to be judged. This Association has a total membership of approximately 40,000 individuals, which is estimated to represent less that 10% of the rabbit enthusiasts and rabbit pet owners in the United States; and, approximately 0.0001% of the total population. Rabbit hobbyists are a minority group.

Rabbit shows are competitive, educational and gala events

that are staged at shopping malls, fairgrounds, community centers and other suitable facilities that protect the animals and exhibitors from the environmental elements. Exhibitors are charged an entry fee to exhibit their animals and the owners of the winning animals receive monetary, ribbons, medals, trophies and other awards for their accomplishments. Visitors are always welcome and are usually not charged admission to view and enjoy a rabbit show.

The total number of rabbit shows, and the total number of rabbits exhibited at each show has dramatically increased during the past ten years, indicating a tremendous increase in the interest in the rabbit hobby. The entry at shows will range from less than one hundred to more than twelve hundred rabbits per show. Local show entries usually are smaller and the total entry will depend upon the geographical location and the popularity of the rabbit in that specific area. Two areas that are considered the "hot beds" of the rabbit exhibitors are the entire West Coast and the Ohio-Indiana-Michigan area. Each year a national convention is held (planned two years in advance) somewhere in the United States. This event will usually attract more than ten thousand rabbits and in excess of fifteen hundred exhibitors. Separate competition is held for adult and youth exhibitors.

Local shows are usually termed "carrying case" shows and are only one day events. The rabbits are brought to the exhibition in small, comfortable, well-ventilated carriers that are usually constructed of galvanized woven wire with "leak proof" sanitizable bottoms. The rabbit is removed from the carrier by the owner and placed on the judging table at the appropriate time for comparison and awards. the national convention and other special shows that last more than one day are usually termed "cooped shows". These rabbits are brought to the show site in carrying or travel cages, then placed on display in larger coops. The "cooped show" is usually two to five days in duration. The advantage of a "cooped show" is that the exhibitors and visitors are allowed a better view of the animal for comparison of one specimen to another and the quality of the animals can be freely observed and discussed.

Rabbit shows are considered a hobby by most involved, due to the relatively small monetary investment involved and the small returns on the investment. However, the competition can be fierce. This hobby attracts individuals from "all walks of life" to match their breeding, management and conditioning skills, involving a living animal, against each other in a local show area; or, at a national competition.

The rabbit is an ideal "animal model" for this type of competition due to the fact that the rabbit has a short gestation period (28-30 days), rapid sexual maturity (four to six months), allowing for a rapid "generation turn over" to

evaluate the progress, or regression of the various genetic traits (type, fur and color). Other facts concerning the domestic rabbit that enhances this position are:

1. Small initial investment in stock
2. Small initial investment in physical facilities to house, maintain and reproduce stock.
3. Relative ease in reproduction.
4. Small numbers can be housed in garages and small out buildings in urban or a rural setting.
5. The animal is loveable and usually accepted by the entire family.
6. Markets are available for excess production to compensate the cost of the hobby.

Each breed and variety (color) of rabbit is specifically described in the American Rabbit Breeders Association Standard of Perfection in great detail. It denotes the exact shape and structure of the body, head, ears, feet and legs, tail, color of fur (wool), eye color and toenail color; and, markings, if present. Each of the above characteristics are allocated points depending upon the importance of that characteristic for the given breed. Some breeds may have fifty (50) points on fur and others only ten (10) points, depending upon the importance of fur to that particular breed.

The breeds are further subdivided into exhibition classes depending upon sex and age of the animal with some references to weight stipulations for the various classes. The smaller breeds (under 9 pounds senior weight) are divided into juniors (under six months of age) and seniors (over six months of age). Therefore, the smaller breeds have classes of senior bucks, senior does, junior bucks and junior does. The larger breeds (ideal senior weight 9 pounds and over) are divided into three age categories; juniors (under six months of age), intermediates or 6/8 - six to eight months of age) and seniors (over eight months of age). In addition, there are specific weight requirements for the various classifications. Does are usually larger than bucks.

In addition to the above break down in classes, some breeds are further broken down in the various varieties (colors), if they are bred in more than one color. The varieties are divided into classes in the same manner described in the breed breakdown about (seniors, intermediates, when appropriate; and juniors).

The rabbit is transferred from the carrying case, or coop, to the judging table at the appropriate time to be evaluated by the judge. At the judging table, the rabbits are placed in small, temporary holding coops to await evaluation and placing by the judge. The entire class is placed in the judging pens at one time. The licensed judge will then very closely examine each animal in the class. Animals that have

permanent deformities undesirable breed traits (example: bad teeth), are disqualified; animals with temporary abnormalities are eliminated. Any animal with a disqualification or elimination (example: under weight or over weight) cannot compete for placement or awards. After the above rabbits are removed from the class, the remaining animals are compared to each other and placed in accordance to their quality as per the demands of the **Standard of Perfection.**

Rabbit judging differs from most other animal species judging in that the animals that are placed lower in the class are removed fro the table first and each and every animal that is entered is commented upon by the judge. These comments are recorded for the convenience and benefit of the exhibitor. There is a permanent record of the animal's placings and the judge's comments on every animal entered. Rabbits are permanently identified with a tattoo in the left ear to insure proper identity.

Awards in rabbit judging are different and can be confusing, as compared to other species. In sanctioned rabbit shows, the commonly used awards of Grand Champion and Reserve Champion are replaced with Best of Breed and Best Opposite Sex.

When judging of the various age groups in each the bucks and does of the breed or variety, the first place animals are retained at the judging table. At the conclusion of all the classes, in that breed or variety, each of the class winners (bucks and does) are compared to each other, the rabbit that adheres closest to the Standard of Perfection is made Best of Breed (B.O.B.). This can be either sex and of any age group. The Best Opposite Sex (B.O.S.) is then selected from those age group winners in the opposing sex of the animal that was Best of Breed. A buck or doe can be Best of Breed; but, the Best Opposite Sex must be of the opposite sex of the Best of Breed.

At the conclusion of each sanctioned rabbit show, all Best of Breed animals are returned to the judging table and a Best In Show is selected. This is the rabbit that adheres closest to the Standard of Perfection for its breed.

In addition to the competition, there are many other activities that take place at rabbit shows. There usually is the sale of stock, or the trading of stock, between breeders and new individuals interested in becoming breeders, at some of the organized rabbit shows there are educational booths and seminars that take place for the benefit of the breeder. At all sanctioned shows there is an American Rabbit Breeders Association registrar present to register animals for the various breeders. There are usually rabbit supply companies present for the breeders to purchase the needed rabbit cages,

supplies and other materials. For the enjoyment of those present, there is usually food concession present as well as various raffles and other entertainment.

In summary, rabbit shows are exciting, interesting, educational and competitive; but, the procedure and awards can be very confusing.

The American Rabbit Breeders Association sanctions all official rabbit shows and maintains a Standard of Perfection that describes, very specifically and in detail, the exact shape of the body, head, ears, eyes, feet and tail, color and markings. Rabbit shows range in length from one to several days and have from a few to several thousand entries.

Rabbits are judged in classes that are determined by the age and sex. The best animal in the breed can be of any age or sex and is determined Best of Breed. A Best Opposite Sex is selected in each breed and it must be of the opposing sex of the Best of Breed animal. A Best In Show is selected from all the Best of Breed animals and is considered to be that rabbit that comes closest to its own breed standard of perfection.

COMMERCIAL RABBIT PRODUCTION

The American Rabbit Breeders Association, Inc. is the only nationally recognized all-breed rabbit association in the United States. The Association receives many questions concerning various aspects of raising rabbits commercially for profit. It is the intent of the following information to answer some of the most frequently asked questions concerning commercial rabbit production.

BREEDS OF RABBITS UTILIZED IN COMMERCIAL PRODUCTION

The breed of rabbits that one selects to raise commercially depends entirely upon the purpose of production and the demands of the market the grower intends to supply. Commercial rabbit production is arbitrarily categorized as follows:

1. Commercial rabbit meat production
2. Fur production
3. Fiber production
4. Laboratory animal production
5. Pet or companion animal production
6. Breeding stock supply for the above producers

A brief discussion of various breeds used for the above uses of domestic rabbits follows.

COMMERCIAL MEAT PRODUCTION

The most popular breeds of domestic rabbits for this purpose are the New Zealand White and the Californian. These breeds are most desirable because they have white bodies and have growth characteristics that are desirable to both the processor and the grower. The Red and Black New Zealand, colored Satins, Champagne d'Argent and Palomino are the most popular breeds of colored furred rabbits raised for meat production. Recent studies show cross breeding various specific breeds to be used as terminal crosses may be advantageous. Interested individuals should investigate these practices.

The fur and other various tissues are "by-products" of harvesting the edible meat from fryer rabbits during processing. The by-products are very important and can be very valuable.

FUR PRODUCTION

The Rex rabbit is the most desired breed for fur production. The reason being that Rex fur is very unique in its fur structure and this differentiates it from the normal and Satin furred breeds. Due to this fur structure, the Rex fur is highly desirable and demands elevated market prices. The Rex rabbit has several varieties (colors). This also increases its popularity for utilization in garment production and trim for garments produced from other materials. Normal fur and Satin fur can be used for the production of various fur items and trims in various fashions. Normal and Satin fur has not received the attention by the various fur markets that the Rex fur has received. All rabbit fur markets are rather unstable and is in the infancy of development. There are regional Rex fur markets that are very strong. These are small garment manufacturers, craft makers or toy manufacturers. Prior to producing rabbits for fur, one should establish the demand for the products and locate the markets available.

FIBER PRODUCTION

This is an area of commercial rabbit production that has gained a renewed interest and is receiving considerable attention. All breeds of Angora rabbits (English, French, Satin and Giant) may be used in fiber production. The various breeds of Angoras produce wool in varying quantities and each has its own individual breed wool characteristics. The breed one selects will depend upon the market demands.

This type of commercial rabbit production is very attractive to some individuals because the animals do not need to be terminated for successful commercial production.

LABORATORY ANIMAL PRODUCTION

Mosts laboratories prefer either a pink-eyed white or a small colored rabbit for investigative purposes. Tradition has limited commercial production for this use primarily to the New Zealand White and the Dutch. The smaller size of the Florida White is increasing its popularity as a laboratory rabbit. This may increase as the United States Department of Agriculture mandates cage size based upon weight.

The demand of the market will determine the breeds of rabbits raised for laboratory purposes. the excess rabbits produced for this purpose can be used for meat consumption.

This type of commercial rabbit production requires that the facilities meet ridged standards and the producer be licensed by the USDA. Assembling the necessary information, and meeting the requirements, prior to producing rabbits for this purpose, will prevent many problems.

PET OR COMPANION ANIMAL PRODUCTION

There are more than forty breeds of rabbits recognized by the American Rabbit Breeders Association in varying varieties (colors), ear carriages and marking designs. All breeds can be produced for pets. However, the smaller breeds; such as Netherland Dwarf, Polish, Dwarf Hotot, Dutch and Holland Lop are generally the most popular and are in the greatest demand.

The commercial pet producer has considerable competition for this market from the fancier and the hobbyist. There may be state, county and city ordinances that may need to be complied with to produce pet rabbits.

BREEDING STOCK PRODUCTION

Raising rabbits commercially for any purpose requires the manager to have considerable business expertise to make financial gains. Many commercial managers conclude that it is more cost effective to maintain each cage in the rabbitry in production for the intended purpose. Using a portion of the cages for replacement animals is not cost effective. The producing does must be periodically replaced. This creates a market for rabbits that are immediately ready to breed and reproduce for their intended purpose.

There is an increasing number of commercial operators that produce replacement breeding stock for the various intended purposes. Production record keeping is a very important function of this type of commercial rabbit production.

An individual interested in commercial rabbit production should consider "diversified production". This reduces the risk of market trends and failures. One should consider growing rabbits for multiple markets to assist in assuring a

constant gross income.

Joining the American Rabbit Breeders Association keeps one abreast of the trends in the industry and updated on the latest management techniques. The **Domestic Rabbits** magazine, a bi-monthly publication, contains considerable advertisement allowing the producer to have access to the availability of stock and equipment.

COMMERCIAL RABBIT RAISING AS AN OCCUPATION

This is a very interesting and challenging occupation that is in its infancy in the United States. To be successful, one must be knowledgeable in rabbit husbandry, ba a progressive business person, energetic, possess the necessary skills in marketing and adjust to ever changing circumstances. Most geographical areas do not have readily accessible processing plants for the fryer or markets for fur. This creates some hardships for the individual that just wants to produce rabbits in large numbers.

One person, working full time, can care for 250 to 500 working does, necessary bucks, offspring and replacement animals. The variation depends upon the amount of mechanization and type of equipment used. Commercial rabbit raising is labor intensive and demands attention 365 days per year. When not totally familiar with commercial rabbit raising and when there are not markets available, one should consider starting with small numbers. This allows the manager to "grow' into the business as one gains experience and establishes markets.

Consideration may e given to raising rabbits commercially to supplement the family income on a part-time basis. These growers are confronted with the same demands and must possess the same skills as the full time grower; but, usually on a smaller scale. This type of operation maybe the ideal operation that involves the entire family. Regardless of the size of the operation, it is imperative that the proper facilities must be maintained to provide the rabbit stable environmental conditions. This is essential for the rabbit to reproduce themselves and grow to their maximum inherited efficiency. It is of utmost importance that the manager determines the correct extent of environmental control that is financially feasible for the amount of year around production desired.

There are excellent demands for domestic rabbits for meat due to the nutritive content of the meat in our health conscious society. Rabbit meat is all white, low in fat, high in protein, relatively low in cholesterol, highly palatable and easily digested. It can be substituted in most recipes for red meat and poultry. Processing plants are not readily available to all growers. Most processors complain that they

are unable to obtain a constant supply of rabbits for their markets on a year around basis. Production of fryers in the spring and summer cannot be maintained in the fall and winter; therefore, their market potential suffers.

ECONOMICS OF RABBIT PRODUCTION

The earnings are of extreme importance in any business! The same is true with the commercial rabbitry. What are the investments necessary? How many working does must be utilized to make a "comfortable" living? What are the production parameters necessary for a profitable business?

These are some very difficult questions that have a variety of answers and solutions, depending upon many variable factors and upon one's individual circumstances and desires. For the perspective commercial rabbit producer to initiate a business plan, it is necessary to have some ideas of cost and possible return. It should be fully understood that the following information is an estimate and can vary considerably depending upon a variety of circumstances.

The individual investment and facilities, not including breeding stock or real estate, are about $30.00 to $2.00 per individual hole (cage) in the rabbitry. The wide variation in cost is due to a variety of housing and environmentally controlled facilities available. It is essential that one considers the type of housing that is most financially feasible for the individual location. The type of housing selected will not always be the type that allows for the most production. One must select the type of housing that allows for the most production and net profit for the dollars invested. The total number of cages should be approximately two times the number of working does that one anticipates to incorporate in the facility. This is to accommodate breeding males, growing and developing offspring to market, and housing animals to replace the current breeding stock.

The net profit per doe varies considerably depending upon the total production per doe and the fixed expenses of the operation. One should anticipate a net profit of $18.00 to $35.00 per working doe per year. This will vary considerably depending upon the production, management factors and the ability to market the product. The fixed cost will remain approximately the same for a given number of does. The net return will depend upon the total production per doe and the price received for the product(s) sold.

To attain a superior net profit per doe per year, it is extremely important that outstanding production parameters are attained. Fryer producers must have breeding stock that produce offspring that has the ability to attain a market weight of 4 1/2 pounds at eight weeks of age.

They must be able to convert 3 1/2 pounds of feed into 1 pound of body weight. In addition, one must be able to market 40 or more fryers per doe per year. This mandates that the doe has excellent production capabilities. The doe must produce the year around, breed back readily two to three weeks after kindling, lactates in abundance for maximum growth. She must have the genetic constitution to withstand a rigorous production schedule so she can be maintained in the herd for a minimum of twenty to twenty-eight months.

With the above information, a perspective commercial rabbit producer can project the initial investment necessary to obtain the size of production desired. This will allow an estimation of net income per year. After marketing the primary product consideration must be given to marketing the by-products of production. This will supplement the income.

Financing a commercial operation can be very difficult. One should explore the possibilities of low interest loans that may be available for various business ventures from local, state and federal governments.

To enhance your knowledge concerning rabbits, rabbit production and the commercial production of rabbits, join the American Rabbit Breeders Association.

MEAT PRODUCTION FROM THE DOMESTIC RABBIT

The domestic rabbit's ability to multiply has been the subject of cartoonists and jokes for many years. this unique trait "to multiply" may be called upon in the future to assist in providing a source of edible animal protein to the public. The desirable traits of this protein in our "health conscious" society (low fat, relatively low cholesterol, high digestibility, low sodium, high protein content) has been thoroughly discussed.

The productivity of this species has great potential; although, this potential has not been consistently achieved. The potential is there waiting to be utilized. This will assist in feeding the growing population from our ever decreasing area of land that is available to produce food. The domestic rabbit has the ability to utilize forage, rather than total grain rations, to produce this edible animal protein. Therefore, they will not compete with grain production that can be utilized to assist in feeding humans. In addition, due to the size and productive ability, the space needed for this production is very small compared to some of the other species of livestock. It is not the intent to replace the popular species that produce edible animal protein; but, to **ASSIST** this production to feed the population on the least amount of feed possible.

PRODUCTIVE POTENTIAL OF THE DOMESTIC RABBIT

The domestic rabbit has a short gestation period, will remate within seventy-two hours after kindLing (giving birth), grows rapidly, has a high dressing percentage and a relatively good feed conversion. The female rabbit has the potential to kindle 8 to 10 kits per litter after a 28 to 32 day gestation period. The doe may be remated within 72 hours after kindling and is ready to kindle again 24 hours after the litter has been weaned at 26 days. This allows the potential for the individual doe to produce eleven litters of 8 to 10 kits per litter per year; or, about 100 fryers per doe per year. This is a tremendous productive potential for an eight to twelve pound commercial producing doe.

Fryer rabbits have the ability to attain a 4 1/2 to 5 pound market weight at approximately 70 days of age utilizing 12 to 17 pounds of feed to attain this growth. Thus, producing a feed conversion of approximately 2 3/4 to 3 1/2 pounds of feed per pound of growth. A realistic potential is that a single 8 to 12 pound producing doe can produce 500 pounds of meat per year utilizing 7,500 pounds of feed in a limited amount of space. The type of feed used to produce this edible protein by the rabbit is not the same type of feed that humans use as a food source. The dressing percentage of the domestic rabbit is 55% to 65% with an excellent meat to bone ratio, allowing for an abundance of usable edible animal protein.

The above are potential parameters of production in the domestic rabbit. Very few commercial rabbits can meet these parameters in today's production. The reason being that most of the commercial does, in production today, do not have the inherited traits needed to withstand the rigors of this intensive production. Further, management technology is not consistently available to meet the demands of this accelerated production.

REALISTIC PRODUCTION PARAMETERS IN DOMESTIC RABBITS IN THE 1990'S

Most commercial rabbitries find that it is necessary to produce a minimum of fifty fryer rabbits per doe per year to make a profit. Anything less than that amount of production is **NOT** acceptable. One must raise 8 litters of young per year. To attain this goal, the commercial doe is remated 14 to 28 days after kindling and the litter is weaned at 4 weeks of age. This allows the doe 2 o 3 weeks "rest" prior to the next kindling. Assuming the above mating practices, the commercial doe will kindle between 60 to 80 kits per year. One must anticipate that not all does will mate successfully on the first mating and there will be some death losses of kits from kindling time to market. With appropriate management, rearing of 50 kits per doe per year is an attainable goal.

Today's rabbit can readily attain the growth potential of a 4 1/2 pound fryer in seventy days; as well as achieving a sixty percent dressing percentage. Most commercial producers attain a ratio of 3 1/2 to 4 pounds of feed for each pound of life fryer meat produced.

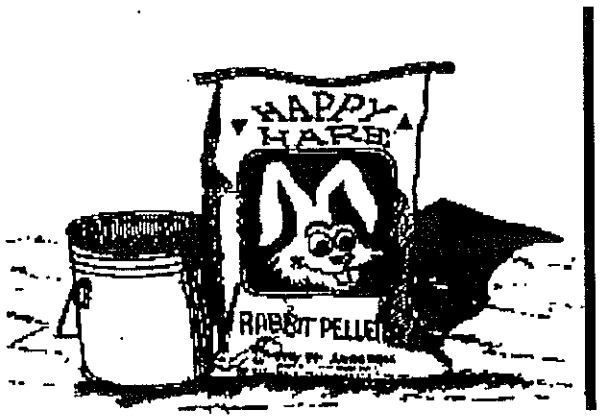
Utilizing the above realistic production parameters of one doe producing eight young per litter, the doe can produce sixty four 4 1/2 pound fryers; or, 288 pounds of live meat per year. Therefore, four does and one buck can produce more live meat per year than one beef cow on less feed and in a much smaller space. If one considers the potential production that the rabbit has, this can be considerably increased. The domestic rabbit must be given consideration as a future production animal for excellent quality edible protein.

Rabbit production is rather "labor intensive", depending upon the management practices employed. It is anticipated that one family can readily care for 400 to 600 does and their offspring produced each year. One can easily determine that the gross income from a family rabbit farm will totally depend upon the production of the doe. This will depend on the number of rabbits sold per doe per year.

One also should consider that in addition to meat, rabbits are utilized for bio-medical research, wool and fur production, hobby and pets. There are many breeds of rabbits available to accommodate the various desires and production parameters.

In summary, the domestic rabbit has a tremendous production potential that may be utilized to assist in feeding the future population of the United States and other countries. Although rabbits cannot consistently meet their production potential at this time in commercial rabbit raising, one can readily raise 50 kits per year per doe. It is anticipated that four does and one buck can produce as much meat as one beef cow per year on less feed and utilizing less space. Rabbit production is labor intensive and the average rabbit farm, with today's management practices, can manage four hundred to six hundred does and their offspring per year.

NUTRITION OF THE



DOMESTIC RABBIT

NUTRITION OF THE DOMESTIC RABBIT

This section will include various articles related to nutrition and formulation of rabbit feed. To understand the nutritional needs of the rabbit, one must understand the anatomy (structure) and physiology (function) of the digestive system. This is included in this section for the readers information and understanding.

RABBIT NUTRITION

Most persons that are masters of conditioning rabbits for show realize the importance of the fiber content of the feed. Most persons use the addition of fiber to the diet as a method of controlling and regulating the energy level of the feed.

Fiber is very important in controlling enteritis in the rabbitry during the growing stages of the rabbit; and, is used to control enteritis when the animals are stressed due to various reasons (such as traveling to and from shows). The source of fiber for the diet is varied but most use roughage such as hay for the source of fiber. This is where confusion in conditioning animals is initiated. There is a vast difference in the nutritional qualities of hay, depending on the type of hay, the quality of forage prior to preparation and the type of and manner of the curing process of the hay.

ROUGHAGE	DRY MATTER	DIGEST. PROTEIN	DIGEST. ENERGY	TOTAL DIGEST. NUTRIENTS	FAT	FIBER
ALFALFA	90.5%	10.9%	998KCAL	50.7	1.9	28.6%
GRASS HAY	89.0%	3.5%		51.7	2.5	30.9%
TIMOTHY	98.0%	3.0%	664KCAL	49.1	2.3	30.3%
WHEAT STRAW	92.6%	0.3%		40.6	1.5	32.0%
ALF. MEAL	92.7%	12.4%	1184KCAL	54.4%	2.5	24.0%

from Feeds & Feeding, Morrison

From the above chart, one can see that the fiber content of grass hay, Timothy hay and alfalfa hay have about the same amount of fiber. However, there is a great variation in the protein content of the three types of roughage. They vary from 3.5% in grass hay to almost 11% i alfalfa hay. this is of considerable importance when one uses the roughage to extend, or decrease, the amount of protein in the diet. It is going to take almost three times as much alfalfa hay to reduce the protein content of the same amount as it would grass hay. This is a very important consideration that most rabbit persons have not comprehended. Also, one must always be aware that the total amount of food that the rabbit can

consume is limited by the size of the rabbit's digestive tract.

ENERGY

Carbohydrates and fats from various sources provide the majority of the energy in the rabbits diet. The energy demands of the rabbit during the growth stage, gestation and lactation is considerably greater (1,134 kcal/pound) than necessary for maintenance of the rabbit along (953kcal/pound> High quality legume hay, supplemental concentrates, heavy grain, milk products, fats and sugar products are sources of energy in the rabbit ration.

Energy levels of commercial pellets can be lowered by supplementing the diet with quantities of grass hay, rolled oat products, and other high fiber containing substances. Energy can be added to the diet by supplementing the ration with "energy rich" food stuffs. One of the common methods of increasing the energy of the diet is through addition of "milk type" pellets.

The energy level of feed is very important. Excessive energy fed to young rabbits can increase the incidents of enteritis, increase the incidents of or induce molt. High energy levels increase the growth rate, increase the deposition of fat throughout the body, has a tendency to produce soft flesh condition and may enhance the incidents of molt, depending upon the stage of maturity of the fur.

Relatively low fiber content in the feed decreases the incidents of enteritis from enterotoxemia. With adequate protein, it allows the animal to develop to maturity with a lower ratio of fat to body substance. This lowers the incidents of forced molt because of the lower metabolism in the fur follicle. The nutritive value of some of the increased energy feeds are listed below.

CONCENTRATES	DRY MATTER	DIGEST. PROTEIN	DIGEST. ENERGY	TOTAL DIGEST. NUTRIENTS	FAT	FIBER
Barley	89.4%	10.0%	1,510	77.7	1.9	5.4%
Corn #2	85.0%	7.0%	1,791	80.0	3.9	2.1%
Oats	89.8%	9.9%	1,338	68.5	4.1	12.1%
Oats roll	90.8%	14.5%	1,390	91.4	5.5	2.6%
Soy bean oil meal	90.4%	42.0%	1,710	78.1	1.3	5.9%
Wheat (soft win.)	89.2%	8.6%	1,669	80.1	1.9	2.1%

from Feeds & Feeding, Morrison

OIL FEED	DRY MATTER	DIG.	TDN	FAT	FIBER
Cod liver oil	92.5%	41.3%	108.7	28.9	0.7
Flax oil	93.8%	21.8%	108.3	35.9	6.3
Linseed oil	91.1%	30.6%	75.5	4.6	8.9
Dried milk	96.8%	22.3%	118.7	26.2	0.2
Molasses	80.2%	4.7%	60.4		
Peanut oil	94.0%	42.4%	84.5	6.3	5.5
Sunflower seed hulled	95.5%	25.2%	116.1	41.4	6.3
Wheat germ oil	89.1%	26.8%	78.5	4.9	2.6

from Feeds & Feeding, Morrison

ANATOMY OF THE RABBIT'S DIGESTIVE SYSTEM COMPARED TO THAT OF OTHER SPECIES

After apprehension, mastication (chewing) and swallowing of the food, it is the function of the digestive system to convert the nutrients to a form that may be used by the body. The anatomy (structure) of the digestive systems of the various animals differs considerably. This is the reason for the variation of the diets of the different species of animals.

```
                (enzymatic &
                 microbial
   FOOD-----digestion)----->amino & fatty acids + sugars
 (protein, fat
  & fiber)                      metabolism

                              cellular growth
                                    +
                                 water
                                    +
                              carbon dioxide
```

For the rabbit owner to understand the nutritive needs and the reasons for the sensitivity of the digestive system, it will help to be aware of its unique structure. The following discussion will greatly simplify the anatomy of three different types of digestive systems (human/pig, ruminants and rabbit) for easy understanding. Note the difference in:

1. The development (size) of the cecum of the rabbit in comparison to the human/pig and the ruminant.
2. The presence and location, of microbial fermentation (digestion) in relationship to the small intestine of the various species discussed.
3. The rabbit is the only digestive system of those discussed that includes cecotrophy.

The lips, teeth and mouth are the first anatomical parts of the digestive system. These structures function to apprehend, masticate (chew) mix the food with saliva to prepare for swallowing. The rabbit consumes only particulate food and normally will not eat mash (fines), and the consumption of fines may be detrimental to the health of the rabbit. The other species in consideration are able to apprehend and consume mash feed without difficulty.

The teeth of the rabbit are of special concern. The rabbit's dental formula is 2 (2/1 incisors; 0/0 canines; 3/2 premolars; and, 3/3 molars). This means that on each side of the mouth there are 2 upper and 1 lower incisor, no canines; 3 upper and 2 lower premolars and 3 upper and 3 lower molars. There is a total of 28 teeth in the rabbit's head. The small residual incisors just behind the primary incisors re called "peg" teeth.

The incisor teeth grows 1/2 to 3/4 of an inch per month (open rooted). It is essential that the upper incisors overlap the lower incisors to wear the daily growth off regularly. When this does not occur, the primary incisor elongates uncontrollably and grows back into the mouth like "rams horns". This is termed malocclusion, buck teeth or wolf teeth. This situation must be of genetic concern to all rabbit breeders.

The food then passes from the mouth through the esophagus and into the stomach for further digestion to take place. The esophagus extends from the very back of the mouth, through the neck and thoracic (chest) cavity to the stomach located in the abdominal cavity.

The stomach of the rabbit and human/pig (figure 1) is an enlarged area of the digestive tract in the abdominal cavity. The purpose is to store the food for a short period of time and continue the digestive process on the ingested food.

The stomach of ruminants (example: sheep, cows and goats) is large and very highly developed into four distinct compartments. A very important and complicated process of microbial digestion occurs in this area. Complex nutrients are broken down to simpler forms by the microbes. There is a rapid proliferation of the microbial numbers that will later be digested for the various nutrients that they contain.

In rabbits, during the nursing process, the stomach content is slightly acid (pH 5.6 - 6.0). At the conclusion of the nursing process, and the initiation of solid food consumption, the stomach content rapidly becomes very acid (pH 1.6 - 1.9). This is an extremely important physiological factor. The very acid content has an effect upon materials and elements that the rabbit may ingest or is administered orally. This may alter the intended use compared to other

species. The stomach of the rabbit will hold about 36% of the total volume of the digestive tract.

The ingesta then passes from the stomach into the small intestines. This is the area where chemical digestion takes place as a result of the added digestive enzymes and other substances from the various digestive organs (liver, pancreas and etc.). As the complex elements are digested into simpler forms, they are absorbed through the small intestine wall into the blood stream via a very complex procedure.

Food (proteins, fats and carbohydrates-------enzymes---> amino acids + fatty acids + simple sugars + carbon dioxide and water.

The function of the small intestines is similar in all animals discussed. The ingesta received from the stomach does vary. The small intestine of the ruminant receives an abundance of microbes from the stomach. These are digested for the nutrients in the cell and cell wall. The small intestine of the rabbit holds about 10% of the total volume of the digestive system.

The digestive system of the human, pig and rabbit are anatomically very similar up to this location. The ruminant differs in that the stomach is very well developed and microbial digestion precedes the small intestine.

The cecum of the rabbit is very large, well-developed an has a very important and complicated function in the digestive process. It holds about 42% of the total volume of the digestive system. The cecum of the human, pig and ruminant is much smaller in comparison and has a lesser function.

The ingesta passes to the large intestine in most of the species. In the rabbit, a major portion of the ingesta passes to the cecum for further digestion. This is done by various microorganisms that are in a very strict balance. Note that the microbial digestion occurs after the chemical digestion in the small intestine in the rabbit. In the ruminant, microbial digestion occurs before the small intestine. This is a totally different procedure and has dramatic effects upon the digestive physiology (function) of the two types of digestive system. Via a complicated muscular process, the content of the cecum is separated. A portion is expelled to the large intestine to be excreted with the other materials from the small intestine. The remainder will be retained for further microbial digestion and excretion as soft feces (cecotropes). These will be ingested by the rabbit directly from the anus for recycling.

The primary function of the large intestine is to reabsorb the water from the ingesta and form the feces. The shape of the large colon will reflect the fecal formation. Rabbit

feces are formed into distinct round balls that are dry and contains a considerable amount of coarse fiber. The large intestine holds about 12% of the total digestive system volume in the rabbit.

Cecotrophy is unique to the rabbit of the species discussed. This is done by bending the neck and back toward the rectum between the front legs, with one front foot raised, while resting on one hip and raising the other hind leg. The rabbit then consumes the cecotropes directly from the rectum. The cecotropes, sometimes called soft feces or night feces, are a direct excretion from the cecum and must not be confused with the dry feces.

Soft feces may occasionally be observed when the cecotrophy process has been interrupted. They will be soft, due to the increased moisture content; be clustered together like a bunch of grapes, is bright green in color and will be covered with a thin mucus membrane. Hard feces will be round, individual, very dry and dark in color.

This habit allows for the rabbit to be more efficient in the digestion of some of the nutrients from the ingested food stuff. The soft feces contains an abundance of microorganisms from cecal fermentation. These organisms are protected, to some degree, by the mucus membrane surrounding the cecotropes. This allows the organisms to pass the very acid stomach and re-enter the intestinal system.

From the large intestine, the excreta enters the rectum for evacuation. The volume and frequency will depend upon many factors.

In summary, there is vast variation in the anatomical structure of the digestive systems of the species of animals discussed. The rabbit's digestive system is quite unique. Microbial fermentation occurs in a very well developed cecum located after the chemical digestion in the small intestine. This is very important as it allows a variation of elements reaching the cecum for action by the micro flora in the cecum. Alteration of the elements reaching the cecum can have a dramatic effect on the flora balance and this will have an effect upon the performance and health of the rabbit.

WATER

Water is an extremely important item for the rabbit person to consider when conditioning show rabbits. An ample supply of good, clean water is essential for maximum growth and the best quality of fur. Some of the excellent "conditioners" have been quoted that one breeds and culls for animals that drink consistently due to the fact that these animals will be very easy to condition the fur.

Animals that will not drink, or are not supplied with an ample amount of water, will not eat to their potential; therefore, will not perform to their maximum. Total water consumption can be increased by certain types of feeds and nutrients. Increasing the salt content of the feed, or adding molasses to the feed increases the total water consumption of the animal. It is imperative that when increasing the salt concentration above the recommended levels, the animals must have access to all of the water they desire. If the water intake is limited or there is an elevated salt content in the ration, there is the possibility of salt poisoning.

Rabbits are very sensitive to "water taste" and oftentimes will fail to drink "strange" water. Even short durations without adequate fluid intake can cause an increased metabolism of the fur follicle and enhance the possibility of a molt. Therefore, excellent conditioners are always particular about not changing the source of their animal's water supply and take an ample supply of the regular drinking water to the shows or when they are traveling. Many consider not changing the water supply more critical than not changing feeds fed to the animals.

Another common method of assessing constant consumption of water is to place substances such as jello, vinegar or household bleach in the water at home, as well as to the strange water at shows. This will "cover" the flavor of the foreign water and the animals will consume nearly the same amount of water when traveling as when they are at home.

Fresh root type vegetables and fruit can be used while traveling to assist in assuring that the rabbit has a constant supply of fluid intake. Such root crops as carrots, rutabega, potatoes and fruits such as apples are often used.

A constant supply of fluid is also very important in maintaining the normal bacterial flora in the gastrointestinal tract and preventing the occurrence of enteritis while traveling. When the rabbit is deprived of fluid intake, there can be a change in the bacterial flora of the gastrointestinal tract and an enteritis develops that elevates the body temperature; and thus enhances the metabolism of the fur follicle, enhancing the possibility of a molt. Continued ample water supply is extremely important in conditioning and maintaining the condition of show rabbits.

THE PHILOSOPHY OF CONDITIONING RABBITS FOR SHOW

It is extremely important that one has adequate physical facilities and management to condition rabbits to their fullest potential. One must have animals that have the potential to be conditioned and to be free of disease and

parasites. The animal should be fed a diet that allows for maximum growth potential and firmness of flesh.

Most individuals that are excellent conditioners agree that the young weaned animals should be fed an initial diet that has adequate protein, high in fiber and low in energy. While the animal is growing, one does not want excess amounts of fat to develop in the flesh. This produces softer flesh condition than is desired.

To accomplish the above, one can use most of the commercial rabbit pellets that contain 16% protein, 2-3% fat and a minimum of 16% - 18% fiber. Added to this "base ration" one can feed free choice or limited grass hay. One can add rolled oats and/or barley mixed with molasses and/or a vitamin/mineral mix. These additives can be mixed with the pellets; or, the pellets can be fed in the morning and the supplemental feeds twelve hours after the feeding of the "base ration". One must be cautious not to "over feed" the rabbits. Over feeding is probably the number one mistake that most non-experienced show persons make. This is particularly true during the growing stage of the rabbit. Many experienced conditioners feed the animals only the amount of feed that they will consume in twenty to thirty minutes after feeding. During the growing stage, it is very important that one does not "push" the animals to gain weight rapidly; but allow the animals to develop their skeletal structure and muscles before the animals are conditioned for show.

One can see that there are a lot of variations allowed in conditioning rabbits. The prime objective being to allow the animal to grown and progress through the "awkward stage" prior to "finishing" the animal for show.

All sections of anatomical parts of the rabbit's body does not develop at the same ratio. Many excellent specimens have been culled due to the fact that the owners are not familiar with the development of a given strain. Rabbits do not "enlarge" at the same proportion that exists when weaned or at four weeks after weaning.

After the prospective "show rabbit" has been allowed to mature and the date of the desired "prime" is noted, one can alter the ration of the animal for the desired traits. One can usually want to maintain the protein levels at about 16% and increase the energy levels of the feed. Also, this is the time that one will add supplements to the ration to enhance the fur condition.

The above can be accomplished through adding more carbohydrates to the diet in the form of heavy grains or milk pellets, increasing the fat content to the feed by adding linseed oil, peanut oil, cod liver oil and so forth.

Substituting legume hay for the grass hay will also increase the energy level and the protein level of the diet at this stage of the conditioning process. At this point, one may wish to increase the salt content of the feed; or, add molasses to the feed to increase the water consumption of the animal. Caution should be taken when increasing the salt content that the animals have an ample and free supply of clean drinking water to prevent salt toxicity. Also, the amount of molasses added to the feed should be limited as there is the possibility of initiating loose stools.

Again, it is recommended that the amount of feed be limited to what the animal will consume in twenty to thirty minutes after feeding; and, that the supplements be offered twelve hours after feeding the basic ration.

One must always remember that EACH ANIMAL IS BEING CONDITIONED INDIVIDUALLY AND THAT THE FEEDING REGIMEN WILL VARY WITH EACH ANIMAL, DEPENDING UPON THE NEED OF THE ANIMAL AND THE RESPONSE OF THE ANIMAL TO THE VARIOUS CHANGES IN NUTRITION.

The increased energy diets will usually be initiated twenty to sixty days prior to the intended or desired "prime" time. An excellent way to add oils to the diet is to place them on a piece of dried bred an give to the animals at a specific time of day for a treat. The oils may also be added to the grain ration. The manner in which the oils are added to the ration will depend upon the convenience of the manager.

When the animals approach "prime" condition of flesh and fur, the ration should be changed to insure that the animal finishes in fur, maintains flesh, maintains firmness of flesh, an maintains fur condition. One needs to maintain a protein content of the ration of only about 14%, the energy level needs to be reduced dramatically to the maintenance level; but, the fats and oils need to be maintained to assure the finishing and maintenance of the fur condition.

To do the above, one should reduce the total volume of the basic ration, reduce the high energy supplements, add barley and/or rolled oats to the ration, and change the roughage from legume hay to the grass hay. One will maintain or increase the oils in the diet to maintain the fur condition. One must reduce the energy so that the increased metabolism of the fur follicle, that was desired in the priming process, is reduced so the molting and forcing of the fur fibers from the fur follicle is prevented.

This is the stage of the conditioning process that most show persons fail. They continue the high energy feed, particularly the milk pellets, and the rabbits are forced into a molt. The high energy feeds are maintained with the intentions of enhancing flesh condition; but, the elevated

energy at this stage enhances a molt, softens the flesh and oftentimes allows the animal to become "rough over the spine and hips".

"Milk pellets" have long been used as a conditioning feed. However, one should use extreme caution with these substance, and many times it would be advisable not to use these products due to their sensitive nature and the problems that an be caused in the conditioning process.

During the conditioning process, it is very important that the loose hairs be removed from the coat by periodic grooming. The removal of the dead hair should be done by stroking the fur repeatedly from the head to the tail over all over the entire body; and, not over just the back portion of the body. Repeated stroking of the fur from the tail to the head will cause a "breaking" of the guard hairs; especially, as the fur starts to dry out.

Hormones produced by the body; especially the estrogenic hormones, have a vast effect upon the fur and flesh condition of the animal. Estrogens cause an enhancement of the glossiness of the fur and improve the "life" of the fur. Estrogens cause an increased deposition of "fat pads" beneath the skin, giving the desired "feel" to the flesh. The total condition of does enhanced after they are about two weeks into the gestation period. Due to the above fact, many show persons will breed their "show does" two weeks prior to important shows to get the effect of the increased estrogen level associated with pregnancy.

When a rabbit starts a complete molt (the time of molt is controlled to some degree by heredity), unless induced by increased body or environmental temperatures; it will be totally impossible to get the animal into flesh and fur condition until the molt is completed. Rabbits can be forced into molt by increasing the energy of the diet dramatically for ten to fourteen day sand increasing the environmental temperature substantially, if possible. After the fur is totally loose from the follicle, the entire conditioning process can be repeated as described above. The common mistake that is made is that the animal initiates a molt, loses flesh and fur condition, and the rabbit person adds energy to the diet to correct the roughness. At the same time. the metabolism of the fur follicle is increased and the animal continues to milk and make new fur at various stages in the various areas of the body. The fur growth is never synchronized over the body for the rest of the animal's show life.

One should keep in mind that as the environmental temperature decreases, the more energy from the diet is needed to maintain body heat. Thus, one must alter the energy levels of the diet from season to season and even on a daily basis

as the environmental temperature varies during the conditioning process.

Condition show rabbits is an "art". Show rabbits must be conditioned on an individual basis. It has been attempted to provide information in the above to demonstrate the various requirements of each of the nutrients (protein, fat and fiber) at the various stages of growth; and, at the various stages of the conditioning process. It has been attempted to provide information of how one can alter the ratio of nutrients by adding different available food additives to provide the desired effect. If the above guidelines are followed, the conditioning of show rabbits should be improved; or, your present conditioning methods understood.

COPROPHAGY - CECOTROPHY IN THE DOMESTIC RABBIT

Coprophagy is defined as: "the eating of dung". This is a disgusting habit, or vice, in some species of domestic animals; but, is a part of the normal digestive process in the domestic rabbit. The domestic rabbit consumes only a very specific portion of the daily excreta that is excreted directly from the cecum. Due to this fact, the process is known as cecotrophy.

Anatomically the cecum is a large well-developed structure, in the domestic rabbit, located at the juncture of the terminal end of the small intestine and the beginning of the large colon (intestine). The cecum, in combination with the large colon, is collectively known as the "hind gut". This structure is extremely important in the digestive process of the rabbit. This is the area where fermentation and microbial digestion of the ingested food stuffs take place and where the development of the soft feces is initiated that will be excreted.

The rabbit eliminates two basic types of fecal material.

a) **Hard feces** - this is the type of fecal material that is most commonly noticed in the fecal collection area. They are formed in the terminal portion of the lower digestive tract and are firm, dry, individual fecal balls that are rather round in shape and black to dark brown in color.

b) **Soft feces** - this is the excreta that is normally consumed directly from the rectum. This is accomplished by the rabbit leaning to one side or the other on the back leg and hip, raising the opposing front leg to the side, bending the head, stretching the neck and thorax to allow the mouth access to the rectum. The feces that is excreted directly from the cecum, is soft and pliable, has a distinct greed coloration, is excreted in small clusters (similar to a bunch of grapes) and the cluster is covered with a very thin shiny mucus membrane-like material. The

presence of this membrane has an important function in that it protects the cecotrope, after ingestion, in the very acid stomach (pH 1.6) This allows fermentation to continue and protects the cecotropes form being digested in the rabbit's stomach. The soft feces are higher in moisture and protein and lower in fiber than the hard feces.

The soft feces are sometimes referred to as "night feces". This is misleading as the soft feces may normally be produced during the daylight hours as well as during the darkened portion of the day. It is generally accepted that during the first four hours after feeding hard feces are eliminated, and during the following four hours the soft feces are eliminated. Only rarely will one observe this natural act in progress.

Housing rabbits on wire bottomed cages does not interfere with cecotrophy due to the fact that the cecotropes are consumed directly from the rectum. If the cecotropes are accidently dropped, the rabbit will not consume the material. On occasion, one will observe the soft feces attached to the floor wire. When this is seen in abundance, it usually indicates that something is frightening the rabbit, interrupting normal cecotrophy. this may indicate the presence of predators in the rabbitry and the manager must investigate further to insure that there is not an impending disaster waiting to happen.

The domestic rabbits are hind gut fermenters and utilize microorganisms in the cecum to digest the ingested food stuffs. Due to this characteristic, and association with the cecotrophy, this allows for some extra fiber digestion, the synthesis of some amino acids (building blocks of protein), and the synthesis of B-complex vitamins. These facts are extremely important as it relates to determining the nutritional requirements of the rabbit.

Cecotrophy does not proliferate] infections in the rabbit! Oocyst (eggs) of the adult protozoan parasite coccidia (Hepatic or intestinal type), pass in the fecal material and <u>must</u> be exposed to the air for 48-72 hours before they are infective to themselves or other rabbits. Therefore, since the cecotropes are ingested directly from the rectum, any coccidia eggs that may be present are not infective due to the lack of air exposure.

In summary, cocrophagy does take place in the rabbit; but, it is a very specialized normal physiological (functional) process that is termed cecotrophy. This involves the consumption of the soft feces, which are excretions from the cecum, and is consumed directly from the rectum.

This process allows for some increased fiber digestion,

enhanced amino acid synthesis and vitamin B-complex synthesis that becomes very important to understanding the nutritional needs of the species.

VARIATION IN THE TYPES OF HAY USED TO FEED THE DOMESTIC RABBIT

There is tremendous confusion about the type, quality and reasons for feeding hay to the domestic rabbit. The original ration for successfully feeding rabbits was feeding free choice high quality alfalfa hay, shelled or cracked yellow corn and whole oats. The rabbits would be housed on solid floors, bedded with oat or wheat straw, provided all the fresh water they desired and a salt spool.

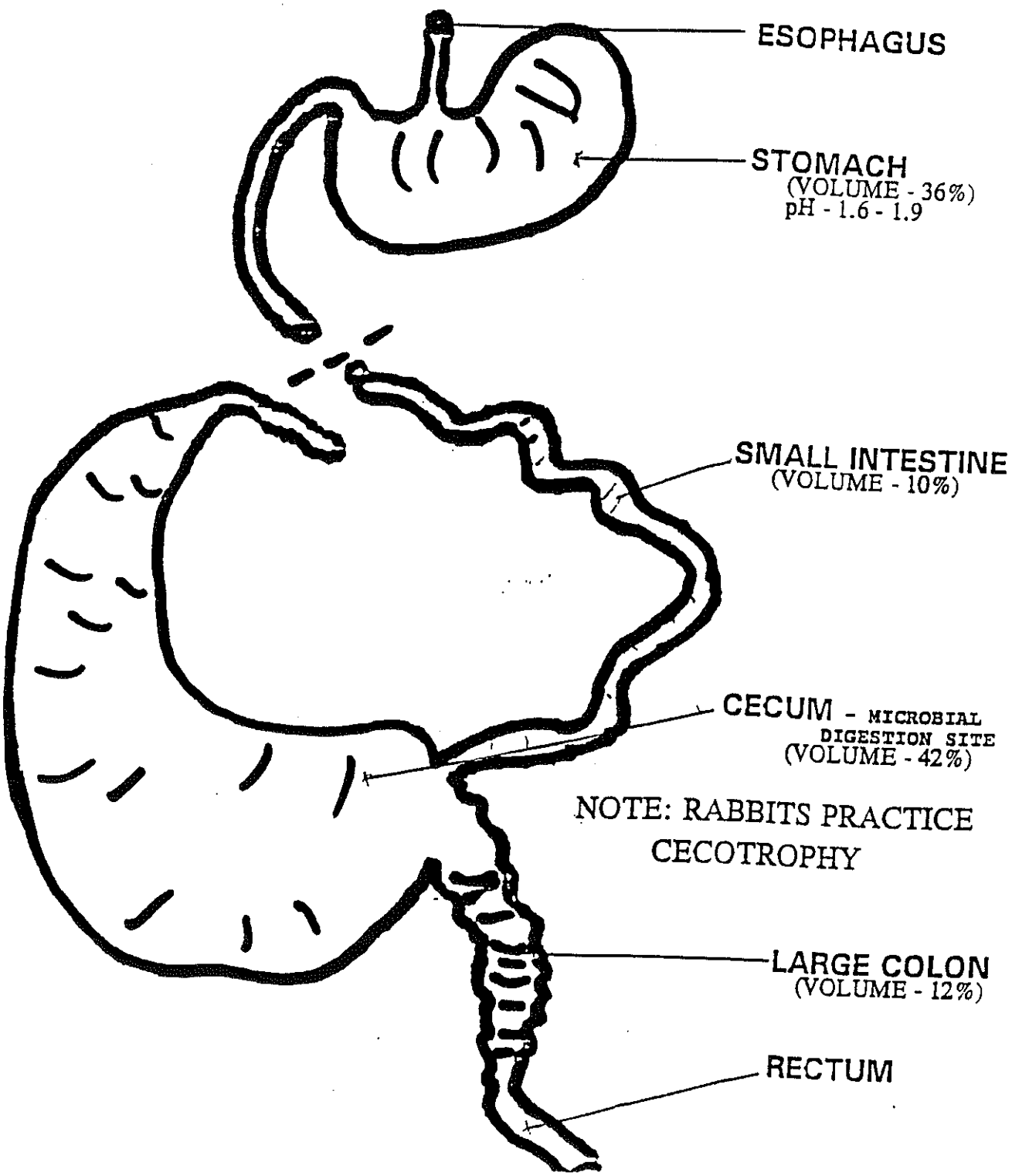
The alfalfa hay was the source of fiber, protein and multiple vitamins and minerals. The corn provided a source of carbohydrates, carotene and other nutrients. The oats would be fed for the fiber and other micro nutrients. The primary ingredient was the alfalfa hay. Rabbit managers wanted the hay to be as green as possible. This would indicate a short curing tie without any rain after cutting and before harvesting. They also desired the stems to be very small in diameter and a high ration of leaves to stems. This would suggest a high ration of nutrients to fiber. This mandate can only be met by using the 3rd and 4th cutting of the crop from the field that season.

High quality alfalfa has always been associated with rabbit raising! Commercial rabbit pellets were developed using dehydrated alfalfa meal as the base ingredient. Many problems have developed because there is a tendency for commercial pellets to be low in fiber content. It is much easier to pellet a ration with fewer "fines" when the fiber content is low as compared to a high fiber content. Fines, or dust, are not desirable in a rabbit pellet. Using rations with low fiber increases the carbohydrate content; and, this increases the incidence of diarrhea and resulting death losses.

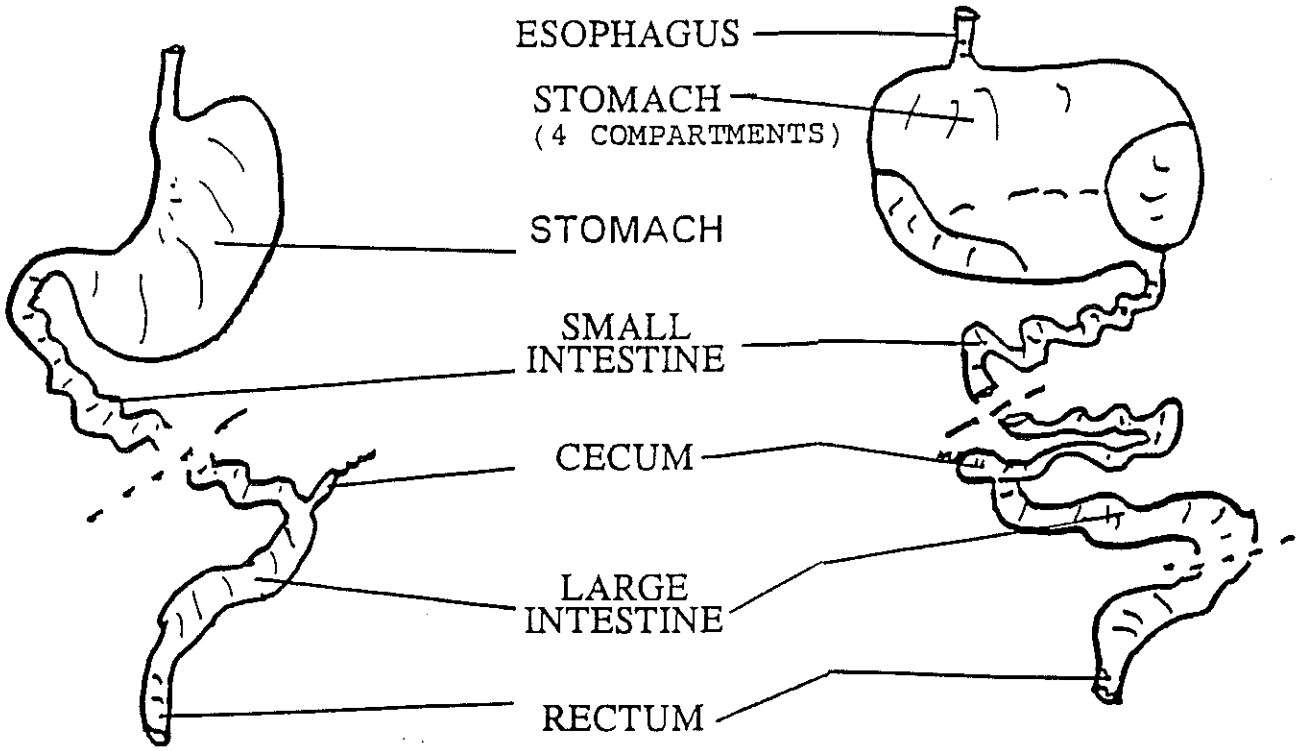
It was reported that adding more fiber to the diet would decrease the incidence of these problems. This is where many rabbit owners got very confused. Hay is associated with fiber and many did not realize there is a vast nutrient difference between legume hay and grass hay. Also, there is a great variation in the nutrients in the hay depending upon the harvest time and the conditions of harvest.

Legume hay (example: alfalfa and clover) has a much higher protein and energy content in relationship to the fiber content than the grass hays (examples: Timothy and bromegrass). First cutting hay, grass and legume, is much coarser and has a higher fiber content than all succeeding harvest for the year. Forages harvested for hay for rabbit

DIAGRMATIC ANATOMY OF THE RABBIT'S DIGESTIVE SYSTEM

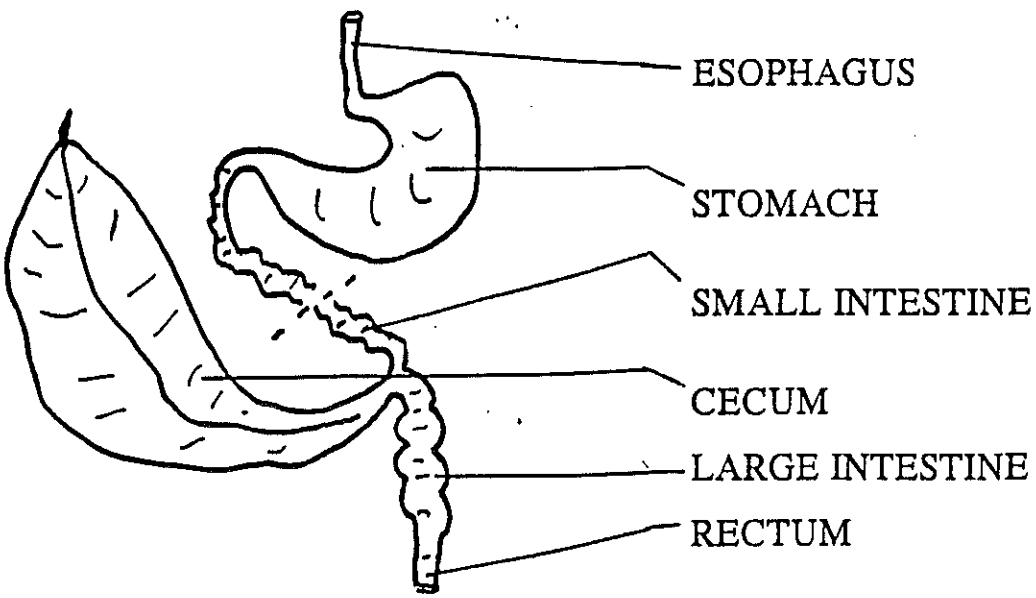


COMPARATIVE ANATOMY OF VARIOUS DIGESTIVE SYSTEMS



HUMAN/PIG DIGESTIVE SYSTEM

COW/SHEEP DIGESTIVE SYSTEM



DOMESTIC RABBIT DIGESTIVE SYSTEM

feed must be free of insecticides, pesticides and herbicides. appropriate curing and storage to prevent the formation of mold in the hay is of essence.

A comparison of the nutrient content of legume and grass hay and at various stages of growth is compared below.

HAY TYPE	DRY MATTER %	ASH %	CRUDE FIBER %	CRUDE PROTEIN %	DIGESTIBLE ENERGY MCAL/LB.
Alfalfa all analysis	90	4.6	28.2	16.0	0.90
Timothy all analysis	91	4.6	30.3	6.1	0.81
Alfalfa 1st cut	91	6.7	36.2	12.5	0.76
Alfalfa 3rd cut	90	8.3	20.7	20.2	0.92

Table No. 1 **FEED & NUTRITION** BY Ensminger, Oldfield, Heinemann

From the above, one can readily see that there is a great variation in the nutrient value of various types of hay and when the crop is harvested. With this information, one may determine the type of hay one wishes to feed the rabbits to achieve the goals intended.

To add nutrients to the rabbit's diet, one would want to feed the good quality legume hay. This would add protein, carbohydrates, vitamins and minerals. To add fiber to the diet, one would use the grass hay or a poor quality legume hay. It is important to understand that hay alone will not meet the minimum nutritional requirements of the rabbit. Also, when adding hay to a balanced commercial diet, there is the possibility of unbalancing the diet and not meeting the minimal nutritional requirements of the rabbit.

It is very important that one totally understands the nutrient composition of the commercial pellet that is being used and what one intends to accomplish by adding hay to the diet. If one has available a good quality pellet that has a guaranteed minimum fiber content above 16%, it may not be necessary to add hay to the diet. Commercial pellets that have a guaranteed 16% minimum of coarsely ground fiber will be sufficient in fiber producing rabbits (Angora) to keep the wool blockage at a minimum.

The reasons for adding hay to the diet are as follows:

1. To add nutrients to the ration; thereby, reducing the amount of commercial pellets used and the total cost to feed the rabbit.
2. To add fiber to the ration with the purpose of lowering the total caloric consumption to reduce the incidence of enteritis.
3. To provide enjoyment to the rabbit and decrease boredom.

The disadvantages of feeding hay are as follows:

1. The process is very time consuming. This may be of little importance to the hobbyist with a few rabbits. Time is money to the commercial grower and feeding hay daily is time consuming and costs money in labor.
2. It must be fed daily to insure that the rabbit consumes approximately the same amount of calories each day. Alterations of daily feed intake enhances the incidence of enteritis.
3. Hay is messy to feed. Placing the forage on the bottom of the cage allows a portion to be wasted. There is also an accumulation of fecal material on the hay and this increases the exposure of the rabbits to infective coccidia eggs.
4. The wool of the fiber producing rabbit becomes contaminated with the forage and this increases the need for grooming.
5. Hay of good uniform quality that is free of insecticides, pesticides, herbicides and mold is difficult to locate and may be expensive.
6. Hay may be contaminated with infective coccidia eggs or other pathogenic (disease causing) bacteria during the storage process prior to being purchased.

Rabbit growers with available land may wish to grow their own forage. The type of hay crop to plant will depend totally upon the intended use of the harvested hay. Alfalfa crop is difficult to get established and is subject to "winter kill" and a variety of insects in certain areas of the United States. Grass hay may be planted in various mixtures. IT would be suggested that one contact the local county extension office for specific information on area forage crops prior to undertaking this endeavor. Machinery necessary to harvest the crop is costly. It may be more cost efficient to cash crop the acreage and purchase the necessary hay or just purchase a high quality rabbit pellet that does not need supplementation.

In summary, hay has been an integral part of rabbit nutrition through the years. With time and housing, management practices, uses of the rabbit and the quality of the commercial rabbit pellet available, has changed. This has altered the function of hay in the rabbit's diet.

It is essential that one is aware of the nutritional content of the commercial pellet used, know the nutritional values of the various hays available and develop a diet that is functional and cost efficient. Understanding the advantages and disadvantages of feeding hay is essential.

PROBIOTICS

The balance of the multitude of microorganisms in the cecum of the digestive system of the rabbit is extremely critical. Anything that disrupts this balance may place the future health and welfare of the rabbit in jeopardy. This may include minor food changes, changes in daily activity, disease or the treatment of the rabbit with antibiotics.

The adult rabbit's stomach is extremely acid. Most microorganisms that pass through the stomach are destroyed in the acid environment. This is one of the natural methods of disease control in the rabbit.

Probiotics by definition are substances with living organisms present. Due to the very acid stomach in the adult rabbit, the greatest percentage of the organisms in the common probiotics (Probicin, Bene-bac, Fast-trac and etc.) are destroyed in the stomach and are totally ineffective. They never have the opportunity to reach the cecum where they are needed to stabilize the micro flora growth. One will find the use of encapsulated probiotics much more effective than those that are not encapsulated.

Encapsulated probiotics are manufactured by ALLTECH INC.; 3031 Catnip Hill Pike; Nicholasville, Kentucky 40356; phone number - 606-885-9613. These products are available to veterinarians in tow forms. LACTO-SACC may be added to the ration of the rabbits diet and ACID-PAK-4-WAY maybe administered through the drinking water. Both are very effective and it is recommended that a form of encapsulated probiotic be used anytime the rabbit is medicated with an antibiotic.

These products are not only very beneficial as discussed above; but, may be used in other common maladies of the rabbit. The importance of the microorganism balance in the cecum of the rabbit cannot be over emphasized. The cecum is inoculated with the resident microorganisms during the nursing stages of the life cycle. The acidity of the stomach at that time has a pH of about 5.6. As the young rabbit starts to consume solid food, the acidity increases very rapidly (pH 1.6 in adults) and the number of microorganisms passing to the cecum is minimal. Therefore, it is extremely important that the correct balance is created early in life and that they be maintained.

Anytime the rabbit goes "off feed", one must give consideration to an imbalance of the organisms in the cecum. Administering the encapsulated probiotics can assist in returning the balance to the cecum and assist your medical care to the rabbit. When supporting an anorectic rabbit, one must always be conscious of the micro flora balance in the cecum. administering high energy substance orally may allow excess carbohydrates to reach the cecum. There certain bacterial flourish, produce toxins and further complicate the problems that already exist.

AMMONIA INHIBITORS

Odors associated with rabbits are offensive to the owners and may be dangerous to the animal's health. Research shows that ammonia in the environmental air, even at low levels, decreases the productivity of the rabbit herd. Increased incidence of respiratory disease, wry neck and abscesses are associated with elevated ammonia levels in the environmental air. This air contaminant is most always present where animals are housed. Increased ventilation, frequent cleaning and decreased density are the management practices recommended to control the exposure of the animals to ammonia in the facility.

The addition of substances to the feed to control ammonia production is a common practice in other species over the past several years. This is now being used in rabbit feeds with excellent results. As with any new technical advancement, this practice has created many questions. This is due to the lack of understanding of the basic principles involved. The basic consideration of ammonia production will be explained below without exact detail that may confuse the total view.

Ammonia forms in the intestinal tract and in the collection area for urine and feces. The primary source of ammonia is from the urea that is excreted in the urine and from the ammonia that is formed in the lower intestinal tract. The conversion may be represented by the following formula.

```
                urease
URINE/UREA------------------->AMMONIA + CARBON DIOXIDE
                enzyme

              produced by
              bacteria in
                feces
```

For ammonia to develop the urea must be acted upon by the enzyme urease. This enzyme is formed primarily by fecal

bacteria. Controlling, or inactivating, the urease production will prevent ammonia from being formed in the lower gut and in the urine and fecal collection area. This entire chemical process is enhanced by increased temperatures. This is the reason ammonia is more of a problem in the summer than when the temperatures are lower.

The extract of the Yucca Schidigera plant inhibits the activity of the urease and reduces the ammonia formation to be released in the environmental air. The ammonia formation is also reduced in the lower gut. this becomes very important as the ammonia produced in the gut is transferred to the blood stream through the intestinal wall. This is a toxic material to the rabbit and must be detoxified in the liver. The ammonia is converted back to urea in the detoxification process in the liver to be picked up by the blood and be excreted from the body by the kidneys.

Another source of ammonia in the blood stream is the breathing of air high in ammonia. The ammonia is absorbed into the blood stream from the lungs and must be detoxified in the liver as explained above.

Detoxification of ammonia in the liver, requires extra energy and may act as stress decreasing the productive potential of the animal. This also allows the rabbit to be more susceptible to other disease. This is a subliminal condition that has a serious affect on the rabbit without any noticeable signs.

The yucca extract is a natural product and is available in several forms. The substance is non-toxic to warm blooded animals and is biodegradable in feed, soil and water. Extensive testing reveals no adverse effects upon the rabbit. No withdrawal time is required prior to harvesting for human consumption.

Odor blocking agents re very effective in reducing the amount of ammonia produced in the rabbitry. It will not completely eliminate the problem; but, the effect is noticeable. The reduction of the effect of the ammonia in the blood is very subtle but is probably more important than the effect of the environmental ammonia. Use of these materials with enhanced ventilation will greatly reduce the incidence of respiratory diseases in the rabbitry.

FUNCTION OF PROTEIN IN RABBIT RATION

Needed for all growth and production; although, rabbits have

microbial digestion of some food stuff, unlike the ruminant,

rabbits must have certain amino acids present in the ration (essential amino acids).

-all proteins contain nitrogen (crude protein - 6.25 xN)
-feed intake varies with digested energy level; therefore, protein content must be adjusted accordingly
-optimum protein to energy ration 1.55
-need more during hot weather

1. Higher percent of protein needed during growth, gestation and lactation. Exceeds protein utilized as energy source (costly)
2. Factors that alter the protein requirements in rabbits.
   a. the lower the digestible energy in the diet, the more feed consumed and a lower percent of protein needed. Higher energy diets must have elevated percent of protein for the animal to receive the same total amount of protein.
   b. normally, when fiber levels increase, the protein content of the fed must increase due to the loss of tissue cells from the intestinal lining by the action of the lining. THIS IS NOT TRUE IN RABBITS. Due to the coprophagy habit, the amount of night feces consumed is increased to compensate.
   c. elevated environmental temperatures - increase the percentage of protein due to a decrease in the food intake to maintain body temperature.
3. Excess protein in ration causes:
   a. increased feed cost
   b. increased amount of nitrogen production in the fecal material to be freed in the environment as ammonia and cause a need for enhanced ventilation
   c. increased urine volume adding humidity to the rabbitry.
   d. increase in the nitrogen in a form of ammonia thus making cecum more acid allowing pathogenic bacteria to grow in cecum.
4. Source of protein
   a. legumes
   b. oil seed; especially, soy bean oil meal
5. Inadequate protein causes:
   a. poor growth
   b. poor production

FUNCTION OF ENERGY IN THE RABBIT RATION

1. Requirements vary with function of animal
   a. increased amount of growth -lactation - cold weather
2. Excess energy in the diet can:
   a. enhance enteritis (enterotoxemia)
   b. increase turnover rate of fur (molt)
   c. cause obesity (breeding problems)

3. Inadequate energy can cause:

a. poor rate of gain
b. poor flesh condition
c. breeding problems
d. poor milking performance

4. Sources (fats - carbohydrates - protein)
   a. fats - vegetable - animal
   b. grains - corn
   c. oils
5. As size increases, the metabolic rate per unit of body weight decreases (smaller rabbits have higher rates of metabolism than larger rabbis; therefore, they (smaller rabbits) need more energy per pound)
   a. 100% increase in body weight - a 75% increase in metabolic rate (Example: if a ten pound rabbit requires 100 grams of feed, a two pound rabbit would require 200 grams of feed as anticipated)
   b. Relative feed intake
      -a smaller animal needs more feed compared to a large animal to <u>maintain</u> itself. Therefore, costly to maintain rabbit compared to cow.
      -rabbit compensates and balances by rapid growth rate - this is the reason commercial rabbits must maintain production. Production cost much less in rabbit while producing compared to cow.
      -rabbits have a high energy cost of maintenance o body but relatively low energy cost while in production due to rapid growth to maturity.
      -doe much more efficient raising 60 kits per year as compared to 30 kits per year

FUNCTION OF FIBER IN THE RABBIT RATION

Structural components of plants made of cellulose, hemioellulose and lignin. The more mature the plant, the greater the lignin content, decreasing the digestibility.
-roughage makes up a large percentage of the rabbit diet
-digestibility not as high in rabbits as horses
-non-producing animals should have high fiber (16%-22%)

1. Requirements
   a. vary depending upon functional state of the rabbit
   b. utilized to estimate energy value of feed.
   <u>Usually</u> the higher the fiber content, the lower the energy content and vice versa. NOTE: feed tag only required to give **<u>MAXIMUM</u>** content. **<u>MINIMUM</u>** not required.
2. Effects of excess or high fiber
   a. slow growth rate
   b. decreased productivity
   c. more difficult to pellet
3. Inadequate fiber associated with
   a. high energy levels
   b. fur chewing
   c. increased incidents of enteritis
   d. increased incidents of fur blockage

4. Source of fiber in the diet
   a. roughage - varies in digestibility
   b. grain by-products
   c. oats
5. Particle size is of extreme importance in relationship to the incidents of enteritis (how fine the feed is ground prior to pelleting)
   a. protective effect upon gut lining - larger fiber clean and protect mucosa
   b. alters rate of passage through gastrointestinal tract - the larger the particles, the slower the "gut" movement
6. Larger breeds of rabbits able to utilize higher fiber diets than dwarf breeds. Probably due to larger retention time of feed in the gastrointestinal tract in larger rabbits.

VITAMIN E

Literature review 10/93

Function

-many other functions than those related to reproduction.

-functions with selenium to prevent peroxide, formed during normal metabolic processes, damage to tissues. (antioxidant)

Natural sources

-green forages (alfalfa meal), vegetable oils, and cereal grains.

-1 IU of vitamin E equals 1 mg of dl-alpha-tocopherol

Signs of deficiency in rabbits

-muscle damage at four weeks, lacks coordination, paralysis and death.

Hidiroglou and Jenkins, 1972

-death of young kits, entire litter at 3-10 days of age with no other clinical signs. Does were unaffected except fertility declined. Red blood cells hemolyze readily. Ringler and Abrams, 1970. Deficient diet used 16.7 mg/kg.

NOTE: Death of kits at 3-10 days and breeding problems has increased dramatically throughout the United States in the past two years. This has been common in all brand named commercial pellets. Supplementation of the diet with Vitamin E appears to decrease, or prevent the situation on many occasions, but not all. Where this is not effective a metritis can usually be diagnosed.

Dr. Thacker and others at Purdue University (1992) is of the opinion that this is a severe problem for the rabbit industry. Their opinion is that even though an abundance is present in the rations, something (?) is binding the material and preventing availability.

Requirements

Vitamin E

Labas (1980) recommends 50 ppm for all stages of the rabbits life cycle (growing, lactation, gestation, maintenance and the doe and litter)

The NCR (1977) recommends 40 mg/kg of diet feed ad libitum for the growing, gestating and lactating rabbits. There is a dietary need for maintenance rations but the amount not determined.

MAGNESIUM

literature review - October 1993

Function in rabbits

-cofactor for many enzymes associated with energy metabolism.

Signs of deficiency in rabbits

-excessive nervousness, hyperexcitability, muscle twitching, convulsions and death. (grass teaching) Kunkel and Pearson-1948.

-poor growth, hyperexcitability and convulsions. Kunkel, 1948. No level or exact effect on growth rate.

-alopecia, blanching of color (ears), altered fur texture and loss of luster and sheen to coat. This effect was observed with magnesium levels of 5.6 mg/kg. Woodward and Reed, 1969.

-fur chewing stopped by adding 5 pounds/ton Magnesium oxide to feed. No supportive evidence. Reported by Gaman 1970.

Availability and digestibility

-Magnesium about 50%. Cheeke 1985

-Magnesium oxide about 75%. Cheeke 1985

NOTE: Very concerned about the availability with use of some of the present probiotics and enzymes used in ration. Discussed at 5th World Rabbit Congress with Lebas and Martens.

Normal blood plasma levels

-about 2mg/100 ml. Barlet 1980, Cheeke 1985, and Swick 1981.

Growth rate

-increased significantly when given at rate of 0.35% compared to 0.17%. Evans, 1983.

Requirements

-Evans 1983 recommends 0.25% to 0.34% for New Zealand fryers. NCR recommendation (1977) is 0.003%.

REQUIREMENTS	LEBAS 1990	NCR (PER LB. OF DIET) 1977 (FED AD LIBITUM)
growing 4-12 weeks	0.03%	136-181 mg
lactation	0.04%	136-181 mg
gestation	0.04%	136-181 mg
maintenance	--	136-181 mg
doe & litter	0.04%	--

MANGANESE

Function in rabbits

-primarily in formation of organic mucopolysaccharide matrix of bone.

-involved in amino acid metabolism

Signs of deficiency

-crooked legs, brittle bones and decreased bone density Smith and Ellis, 1947.

-reproductive failures in ruminants fed diets low in manganese.

Hidiroglou 1978.

-Deficiency more acute in sheep than rabbit feed diets containing 0.67, 56, and 1167 ppm. as related to Mn content in various organs.

Hidiroglou 1978.

Requirements

	LEBAS 1990	NCR (PER LB OF DIET) 1977 (FED AD LIBITUM
growing 4-12 weeks	8.5 ppm	3.9 mg
lactation	2.5 ppm	1.1 mg
gestation	2.5 ppm	1.1 mg
maintenance	2.5 ppm	1.1 mg
doe & litter	8.5 ppm	--

FIXED FORMULA VERSUS LEAST COST FORMULATION

The health status of the digestive system of the rabbit is dependent upon maintaining a good healthy balance of the microorganism in the cecum. Ideally, most owners would like to feed the rabbit the same quality of feed, the same quantity of feed at the same time each day. when necessary to change diets, many will gradually mix feeds for several days to prevent any disruption of the micro flora in the cecum to prevent digestive upsets.

Fixed formulation is where the manufactures develops each batch of feed over the same formula always using the same ingredients. There is not any alteration of ingredients as it relates to cost that may change from day to day. Least cost formulation is developed by a computer to meet the

analysis of a ration. Various designated ingredients may be used depending upon the cost of the ingredient at the particular time the batch of feed is mixed and pelleted. The ingredients may vary from batch to batch but the analysis will remain the same.

The advantage of fixed formulation is that the ingredients remain the same from batch to batch of feed pelleted. The only change will be the minimal alteration of the quality of the products used. Testing of ingredients prior to mixing and pelleting to insure minimal variation is very important. The disadvantage of fixed formulation is that the price may be slightly higher due to the cost of the ingredients.

The advantage of least cost formulation is that this allows the manufacturer to produce a guaranteed analysis at the lowest price possible. The list above includes the disadvantages.

FEEDING NEWLY WEANED KITS

The weanling rabbit's gastrointestinal system is more susceptible to various types of pathology than at any other time in its life. This is due to the fact that the animal is consuming more volume of feed per pound of body weight than at any other time, the digestive bacteria in the cecum is relatively unstable and there is a tremendous amount of stress placed upon the young weanling. It must be assumed that most rabbit managers full feed the doe and litter. Therefore, the young kit, when weaned, has been able to consume as much feed as it desires. due to the stress factors of weaning, some managers will reduce the feed consumption of the doe and litter twenty to fifty percent twenty-four to forty-eight hours prior to weaning to assist in the prevention of enteritis. In addition, many individuals will reduce the feed consumption of the kits post weaning, twenty to fifty percent for twenty-four to forty-eight hours to enhance the prevention of enteritis or enterotoxemia.

The feeding program that one will pursue will depend upon the intended use of the rabbit. Growth rate and feed conversion is extremely important to the commercial producer and they will wish to feed the animal for the greatest growth rate possible. Other individuals that are going to utilize the kits for show, pets or individuals that have had increased incidents of enteritis, will not be as interested in the growth rate and will feed the animals so they will continue to grow and attain their maximum inherited weight; but, will not be as interested in the actual growth rate.

To achieve the maximum growth rate, it is imperative that the animal consume as many calories per day as possible and that they be of the appropriate protein content to achieve maximum growth rate. However, the limiting factor will be that it

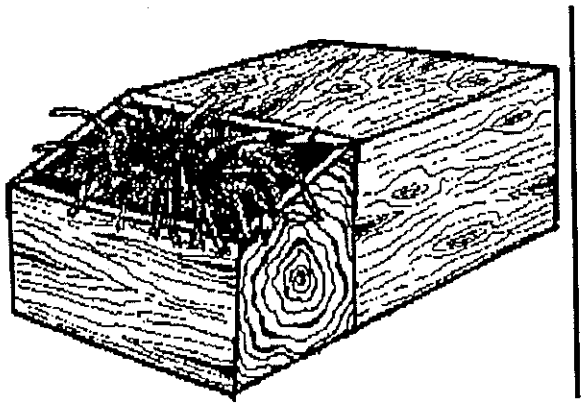
may be necessary to limit the number of calories consumed to prevent the condition of enterotoxemia. Therefore, it will depend on the manager and the intended purpose of the kits how the animals are fed.

It is accepted by most rabbit growers that at this particular period in the rabbit's life, one needs to feed a protein that is approximately 16% to 17%, the fat level approximately 3% and the fiber levels of at least 16%. It should be noted that one makes the assumption that the higher the fiber level in the feed, the lower the energy level and vice versa. The higher the energy level, the more rapid the rate of gain. However, one must be extremely cautious that the energy level does not reach such a level that fatal enteritis occurs in the herd.

It is generally accepted that individuals that are raising fryer rabbits will full feed their weanlings from the time of weaning until they are marketed. While individuals keeping the animals for replacement or show stock will tend to limit feed the weanlings from the time of weaning until they reach the adult age. This is particularly important for the replacement animal so the does do not have an excessive amount of fat in their abdominal cavity to cause breeding problems. Some managers limit feed their animals the amount of pellets they will consume once a day in approximately twenty to thirty minutes. The volume of pellets supplied to each of the weanlings can be determined by monitoring the flesh condition of the animal and feed accordingly./

Feeding the weanling rabbit is of extreme importance in that one is able to maintain the maximum growth rate; but, control the enteritis in the herd. The actual amount will depend on the concentration of the commercially pelleted feed available to each individual grower.

REPRODUCTION OF THE



DOMESTIC RABBIT

MATING RABBITS

Mating is a term that is used in the "rabbit community" to denote the exposure of the female rabbit (doe) to the male rabbit (buck) sexually in anticipation that the two will copulate (breed) and present the rabbit owner, or manager, a nest full of kits at the end of the gestation period (28-32 days). The termination of the gestation period that ends in the birth of a various number of kits is known as kindling.

The domestic rabbit is known for its reproductive capacity and many jokes and cartoons re printed each year relating to the rabbit's reproductive habits. However, to the individual seriously raising rabbits, the mating process is very important and will determine the success, or failure, of the individual's rabbit endeavors regardless of their purpose.

The objectives of this article will be:

1. Discuss the factors that affect sexual maturity in domestic rabbits.
2. Discuss the affect of the animal's physical condition upon the success or failure of the mating act.
3. Discuss the importance of nutrition as it relates to successful mating.
4. Discuss the various mating systems and the advantages and disadvantages of each.

AGE OF SEXUAL MATURITY IN RABBITS

At maturity, domestic rabbits vary in size from two and a half pounds to more than sixteen pounds. Due to the tremendous variation in size, various breeds of domestic rabbits become sexually mature at various ages. It is a generally accepted fact that the smaller breeds of rabbits mature sexually earlier than the larger breeds of rabbits. Also, does usually reach sexual maturity thirty to sixty days earlier than their male counterparts.

Applying the above information, one can expect the miniature breeds of rabbits (Netherland Dwarf, Dwarf Hotot, Polish, Britannia Petite, Holland Lop and etc.) to sexually mature at 125 to 150 days of age. Various strains within the breed will also cause a variation in the age of sexual maturity. The medium size rabbits (Florida White, Dutch, Mini Lop, Havana and other similar breeds) will sexually mature at 150 to 180 days of age.

The commercial breeds of rabbits (New Zealand, Californian, Champagne d'Argent, Palomino and other similar sized breeds) are sexually mature at six to seven months of age. Many commercial breeders will mate young does when they reach a predetermined weight rather than breeding by chronological

age only. Commercial breeds, depending upon the strain and other factors, will mature when approximately nine to ten pounds body weight.

The giant breeds (Giant Chinchilla, Checkered Giant, Flemish Giant, French Lop and so forth) do not become sexually mature until they approach eight months or more. The reason for the delayed maturity is that these animals will not attain their overall physical development until approximately this age.

Most animals will continue to mature and grow physically after the doe has been mated and conceives. Placing the animals in production at an early age will decrease the maximum size and development to some degree. However, it does not interfere with the inherited size potential or growth rate of the offspring.

Males mature thirty to sixty days slower than females. Caution should be used when mating young males that they do not initially become frightened or intimidated by aggressive does. This may ruin or decrease the effectiveness of a buck for life. It is very important that the young buck be introduced to the mating act properly and to the method of mating that will be used in the herd.

Young males should not be utilized excessively until they reach total maturity. Most males, when totally mature, can mate one to two times per day for several days in succession; or, seven to eight times in one day if allowed five to seven days rest after the extensive utilization.

CONDITION OF THE ANIMAL AT MATING

The physical condition of the doe is one of the most critical factors in the success or failure of the mating act. Excessive accumulation of body fat within the abdominal cavity and around the reproductive organs (ovaries) is one of the most common causes of female rabbits not to conceive. This is particularly true in virgin does; or, those does that have been in production that have been removed from production for one reason or another. It is thought that the accumulation of the fat around the reproductive organs acts as a mechanical barrier to keep the sperm and egg from uniting. The above factor is one of the primary reasons for mating the does as young as possible so they do not have the time for the excessive fat to accumulate around the reproductive organs. This problem is very common in does that have been exhibited as juniors, intermediates or young seniors.

It is imperative that the caloric intake of the doe be controlled so the body condition will be proper for successful mating.
Lack of, or poor, body condition is usually not seen in

virgin does; but, can be relatively common in multiparous does (more than one litter) where the manager is mating the does seventy-two hours to twenty-eight days after kindling while the does are still nursing a litter. Various "breed back" schedules, with the advantages and disadvantages of each, will be discussed later. When the doe is in "poor" physical condition, the conception rate and litter size will decrease proportionally.

Physical condition has a very important affect upon the male rabbit. It is extremely important that males do not become excessively fat. With excessive fat accumulation, the buck will become "sluggish" and tend to lose their libido (sexual drive) and fail to mate with the doe. Bucks that are extremely thin in flesh condition can lose semen quality and the conception rate and litter size will decrease.

The excessive fat condition is very detrimental in hot weather to both the male and female. The incidents of heat prostration increases in the males during mating and at kindling in the females.

AFFECT OF NUTRITION UPON MATING

It is very important that all rabbits be maintained on an excellent level of nutrition for the greatest success in mating and raising rabbits. Increasing the nutritional level (flushing) just prior to mating to enhance the number of eggs ovulated has not been verified as beneficial in most practical applications in the rabbit as it has in some of the other animal species.

Excellent nutrition throughout the rabbit's life is very important; however, the adjustment of the diet will not become critical until about the fifteenth day into the gestation period; or, immediately after the doe has been palpated pregnant. These various management techniques involving various nutritive intake will be discussed later.

METHODS OF MATING

The doe should <u>always</u> be taken to the buck's pen for mating. Does have a tendency to become very possessive and domineering in their own pen and if the male is taken to the doe's pen, the buck oftentimes will be injured or intimidated due to the aggressiveness of the doe.

NATURAL MATING

This is a mating method where the doe is taken to the male's pen and the doe turned loose in for mating to occur. The foreplay, where the buck "chases" the doe varies in length of time. Also, this may include the process where the male will mount the head of the rabbit. This is totally normal and

considered foreplay. After varying amounts of foreplay, the male will properly mount the doe from behind and rapid copulatory thrusts made. In response to this activity, the female, if receptive, will raise her hindquarters for copulation to take place. The buck will violently thrust his hindquarters forward and will fall off backward or to the side. Copulation has not occurred unless the male "falls off' or "falls to the side". After copulation has occurred, the doe should be removed immediately form the buck's pen. Urination of the doe after the mating act will not affect the conception rate or the litter size. A second mating at that time will not significantly increase the conception rate or the litter size. If copulation does not occur after the male has attempted mating for several minutes, the doe should be removed and mating attempted again in twenty-four hours.

Remating the doe approximately six to twelve hours after the initial mating (copulation) will increase the conception rate and litter size.

RESTRAINED MATING

Restrained mating is a method of mating where the doe is placed in the male's cage; but, is restrained by the head and ears by the manager with one hand. While being restrained, the male animal is allowed to mount the doe from the rear and the same mating practices takes place as described in the natural mating procedure. The advantage of the restrained mating technique is that it: 1) reduces the chances of the doe injuring the male; and, 2) reduces the amount of time necessary for the mating process due to the elimination of the foreplay.

The disadvantage of the restrained technique is that some male swill refuse to mate does that are restrained. This usually occurs in older bucks that have ben "schooled" in the natural mating technique. However, with time and effort, most of the older bucks can adapt to the restrained method of mating.

FORCED MATING

Forced mating is a method where the doe is taken to the male's pen and inserted in a manner similar to restrained mating. After copulatory motion has been started by the male, the female's rear quarters is gently lifted into a receptive position by the manager. The male is then allowed to copulate with the doe. The advantages of this type of mating is that the doe can be mated whether she is receptive or not. Again, this is a very time efficient method of mating.

The disadvantages of forced mating are: 1) the conception rate is somewhat decreased; 2) males must be schooled to the forced mating technique; 3) litter sizes are often smaller;

and, 4) one can expect difficulty due to the doe's tail obstructing the breeding angle.

It is suggested that for a successful mating program, one utilizes one or more of the techniques mentioned to the fullest advantage of those conditions in the rabbitry.

COLONY MATING

This is a mating method that has particular value in mating virgin does and does that have become "problem breeders". There are various methods of colony mating; but, the basic method is that one buck is allowed with five to twenty does in a very large communal cage. After the colony has been established for a minimum of fifteen days, it is imperative that the manager palpate each doe every five days to remove those does that are pregnant. After the does have been removed, they are placed in individual pens to kindle.

The advantage of colony mating is that it is very labor saving and gives an opportunity to mate does that are oftentimes difficult to mate and are not receptive to other mating methods. Also, there is a relatively high conception rate in this type of mating and the litter size is average.

The disadvantages of colony mating is that there is a tendency for: 1) does and bucks to become injured; 2) it is mandated that the manager be very proficient at palpating does at twelve to fifteen days of pregnancy; and, 3) one cannot be as selective in mating for specific traits.

Colony mating can be very effective as one type of mating source in conjunction with one of the other mating practices in many rabbits. Colony mating should be restricted to those individual does that are very difficult to breed due to obesity or lack of receptiveness.

ARTIFICIAL INSEMINATION

This method of mating should be restricted to the larger commercial rabbitries. Artificial insemination is a mating method that is very rapidly changing from one day to the next due to the advent of various technological aspects of the insemination process. If one is interested in artificial insemination, more specific information can be obtained.

One is advised to select a mating process that best fits the need of one's individual rabbitry, depending upon the number of animals to mate and the time that one has available.

In summary, mating is a very important aspect of rabbitry management. There are several factors that will determine the age of sexual maturity in domestic rabbits. There are various mating methods that are available to the rabbit

manager and one should select one or more of these methods that will fit into the program of each person's rabbitry.

PHYSIOLOGY OF REPRODUCTION

Physiology is a term that related\s to "function" of the various parts and organs of the living animal. All rabbit growers, even those young in age, must understand the principles of reproduction for efficient and effective rabbit production. This is particularly true due to the fact that the rabbit's reproductive system, both physiologically (function) and anatomically (structure), varies greatly from the other common species of animals.

The female rabbit (doe) does not have periodic "heat cycles", where the doe is receptive to the buck every so many days and ovulates ovum (eggs) in relationship to these cycles like many other domestic animals. The female rabbit ovulates (produces eggs) after copulation (mating) in response to the stimulation of the female's reproductive tract by the male's penis during the successful mating act. The ovum (eggs) are ovulated approximately ten hours after successful mating of the doe and are ready for fertilization by the male spermatozoa (sperm) a short time (approximately two hours) after ovulation. The ovum (eggs) will survive for six to eight hours after ovulation when maintained in the female reproductive tract. These ovum (eggs) are susceptible to being fertilized by the spermatozoa that are deposited by the male in the doe's reproductive tract at the time of copulation.

Successful mating (not conception) is indicated when the buck, after rapid copulatory efforts, falls to the side or backward and clings to the doe with this forefeet; and, oftentimes, grasps the fur at the nape of the neck with his teeth. It is not uncommon or abnormal for the buck to elicit an audible "scream" during this process. The entire mating act lasts only a few seconds. During this process, the male deposits a small volume (0.5 ml - 2.5 ml) of semen in the vagina that contains many sperm (1.5 - 2 million per ml). It is necessary for the sperm to mature (capacitate) for six to eight hours before they are capable of fertilizing a receptive ovum (egg) that has been ovulated by the doe. The doe usually ovulates about two times more ovum than the number of kits kindled. Fertilization usually occurs in the small tube (oviduct) that connects each of the horns of the uterus to the vicinity of the ovary in the doe. The sperm have a life expectancy of approximately thirty to thirty-six hours.

When proper conditions exist, approximately ten to eighteen hours after mating, there will be a union of only one of the many sperm with each individual ovum (egg) in the oviduct. The union results in an embryo that will transcend the

oviduct and attach to the uterine wall at various locations, approximately seven days after mating. The embryo continue to develop within the uterus of the doe throughout the gestation period (time from mating until kindling) of twenty-eight to thirty-two days. At the termination of the gestation period (kindling), the young feti (embryo in the later stages of development) are expelled from the uterus via contractions of the uterine muscles into a nest that has been prepared by the doe.

From the above rather technical information, one can readily see that there is a dramatic difference in the function of the rabbit reproductive system compared to other domestic animals. It is very important to understand that : 1) the female rabbit ovulates (produces eggs) in response to stimulation of mating; 2) ovulation occurs about ten hours after mating; 3) the sperm that is deposited in the female at the time of mating is very large in number compared to the ovum (eggs) that are ovulated by the female; and, 4) the sperm is not capable of fertilizing the ovum until they have matured at least six hours in the female reproductive tract and that the sperm live a relatively long period of time as compared to the egg.

ANATOMY OF THE FEMALE REPRODUCTIVE TRACT

The gross anatomical structure of the female reproductive tract varies considerably from other species and this is related to some of the special "reproductive problems" that are encountered in rabbits. The major difference is that the "horns" of the uterus are individually connected to the cervix in a "V" shape rather than being connected to the cervix through a common "body" in a "Y" shape; thereby, allowing a "communication" (connection) between the two horns of the uterus.

The significance of this anatomical structure to "applied" rabbit raising is that if one ovary fails to function (ovulate), that entire side of the uterus (horn) will be non functional due to the fact that the ovum that are ovulated and fertilized in one side cannot communicate (travel) to the opposite side (horn) to attach and develop. Therefore, the reproductive capacity will be dramatically reduced. This can readily explain the marked variation in litter size from litter to litter in the same doe. Due to the anatomical structure of the rabbit uterus, an individual animal may have suffered from past conditions (infections) that alter the lining of one of the individual horns of the uterus (non capable of supporting the growth of a mature feti) while the opposing horn is not affected. Again, this allows for complications and a vast variation in the litter size from litter to litter.

RECEPTIVENESS OF THE DOE TO MATING

From the above technical discussion, it can easily be concluded that the doe would be receptive to mating with the male at any time. However, in applied rabbit production, this is not true. Does are much more receptive to mating in the spring and summer as compared to fall and winter. This is attributed to the warming trend of the environmental temperature and length of the daylight hours. Possibly this was Nature's way of preventing wild rabbits form producing kits that could not survive during the cold winter weather. However, as the rabbit has become domesticated, it is the desire of the rabbit producer; and, mandated by commercial rabbit production, that the does produce on a year around basis.

To enhance uniform production throughout the year, the rabbit managers must select breeding stock that has the trait to be receptive to mating on a year around basis; and, retain replacement animals that have the inherent ability to be receptive to mating during the winter months. It is an absolute necessity that producing animals be kept in excellent physical breeding condition and be provided the best possible nutrition. If these mandates are conformed to by the manager, it will not be necessary; or, advantageous to add supplemented vitamins or Vitamin E for maximum reproductive efforts. It is of extreme importance that the does do not become excessively fat as this is one of the greatest detriments to the receptiveness of the doe and the number one cause of breeding problems of rabbits.

It is recommended that the doe be maintained in an environment that has a minimum of fourteen to sixteen hours of light per twenty-four hours. This will necessitate the use of artificial lighting, florescent or incandescent, during the fall and winter months when the total daylight hours are shortened.

Does are much more receptive to mating at an elevated or increased environmental temperature. Therefore, it is recommended to attempt to mate does during the warmest part of the day during the winter months, as well as attempting to mate during a warming trend when the average daylight temperatures are increasing rather than during "cold snaps" when the average daily temperatures are declining. To encourage receptiveness during the winter, some breeders are successful in increasing the receptiveness of the doe by placing them in carrying cases and setting them in a heated area for eighteen to twenty-four hours; or, setting them in an area where the sun shines through the window (to get the greenhouse effect), and then attempt to mate the animal in twenty-four to forty-eight hours.

Forced mating can be used to mate non receptive does. This is a management procedure that the hindquarters of the doe is

manually raised by the hand of the manager, from the underside of the doe, while the male is attempting the copulatory effort. With the external genitalia of the female rabbit placed in the proper position, the male will mate the doe. This procedure is very successful in the hands of some individuals and totally useless in the hands of others. The conception rate and litter size is decreased by some degree in forced mating as compared to natural mating; but, it can initiate the production process for a more successful mating in the future.

Due to the normal reluctance of the doe to be receptive during the fall and winter months, it is recommended that the manager give consideration to adding replacement animals to the herd during the spring and summer months.

Does that are in production (lactating) are generally more receptive to mating; particularly, within the first twenty-eight days after kindling, than those does that are not producing. Therefore, it is recommended that the doe be rebred and palpated pregnant prior to weaning the litter. If a doe loses a litter during the kindling process; or, shortly after kindling and there has not been injury to the reproductive tract, as well as the doe does not show any signs of illness, it is recommended that she be remated seventy-two hours after kindling. The doe will usually be very receptive to the male and the conception rate will approach seventy percent, which is very close to the average conception rate when mating the does for the first time.

THE MALE REPRODUCTIVE TRACT

As discussed earlier, the male rabbit matures sexually at various ages depending upon several factors. Young males should be used cautiously until they chronologically mature. Excessive breeding of young males may cause permanent damage to the future reproductive performance of that animal. Young male scan be used once a day, two to three times per week when their reproductive career is initiated. When the male has matured in chronological age, the animal can be used daily for extended periods of time; or, the male may be used five to seven times per day. A five to seven day rest period must follow in order that the male rabbit can retain an adequate sperm concentration for future breeding.

Males should have two well formed, rather turgid, testicles that descend into the scrotum when the youngster is from six to ten weeks of age. If the male has only one testicle descended into the scrotal sac, it is an abnormality and is called cryptorchism. This condition is a disqualification on the show table and the animal should not be used in the breeding program as this condition appears to be what most individuals interpret as highly inherited. Mature male rabbits with one testicle will mate with does and they are

capable of getting the doe pregnant. These animals should not be used in the breeding program.

If neither testicle has descended into the scortal sac, the male rabbit may be capable of completing the mating act; but, the male will not be capable of settling does (getting does bred) due to the fact that these male animals do not produce viable sperm.

The purpose of the testicles descending into the scortal sac is so they will be located at an area that is one to three degrees Fahrenheit lower than the normal body temperature (102.5 degrees Fahrenheit). At the lower temperature, sperm are capable of development (spermatogenisis.)

Environmental temperatures in excess of eighty-five degrees Fahrenheit may have a very serious and long lasting detrimental affect upon the male rabbit due to decreasing quality and quantity of sperm produced. When adult males have been exposed to environmental temperatures in excess of eighty-five degrees for five days in succession, total sterility may occur in some adult males. The sterility will last for sixty to ninety days. These animals will mate with the does; but, the does will not become pregnant due to the lack of viability or presence of sperm. This can be very devastating to the total production within the herd.

To prevent this situation from occurring it is recommended that adult males be kept in the coolest (closer to the floor) portion of the rabbitry and the fur and wool be trimmed from the scortal area. Young, developing male are not as susceptible to the affect of heat upon spermatogenisis as is the adult male rabbit. Therefore, it is a good management practice to retain young male sin the herd to be utilized for breeding purposes after periods of prolonged heat in the fall to assure continued production in the herd. The same principle, as described above as related to heat, can be applied to the male animal that has undergone or recovered form some type of systemic disease (pneumonia, abscess, etc.) that has produced an elevated body temperature for an extended period of time.

PRE-MATING EXAMINATION

Prior to mating, the genitals (penis and testicles of the male and vulva in the female) must be examined for any abnormalities or infections. This should be done in virgin does and bucks; as well as, does and bucks that have been successfully used for previous breeding. The genital membranes and structures should be examined for shape, color, presence of scabs and various discharges.

Due to the frequency of the occurrence of Vent Disease and the seriousness of this venereal disease in rabbits, a brief

description follows:

VENT DISEASE

CAUSE - SPIROCHETE ORGANISM - TREPONEMA CUNICULI

TRANSMISSION OF THE DISEASE - Transmission usually occurs during the mating process (true venereal disease); but, signs have been seen in virgin does and bucks. It is anticipated that an infected doe can transmit the infective organism to the offspring during the kindling process. These organisms are maintained within the kit's body until a later time (adulthood) when the visible signs of the disease are expressed in the rabbit.

SIGNS - "Scabby" inflammation of genital membranes in both sexes. "Scabby" incrustation can be seen on the nose and mouth structures in the later and prolonged stages of this disease. Males will refuse to mate due to pain. There can be possible lowered conception rate and abortions in the doe.

TREATMENT Topical application of Penicillin G ointment to external genitals of both the male and female daily for five consecutive days; or, a systemic intramuscular injection of Penicillin G for three consecutive days at the rate of 150,000 International Units per ten pound of body weight. Support the cecal bacteria during the time of systemic antibiotic therapy (microencapsulated probiotic) is recommended.

PREVENTION Do not mate rabbit showing active signs of the disease.

The status of the productive stages of the doe are reflected in the size, color and surface appearance of the vulva and this information can be utilized to enhance the efficiency of the mating process. The changes in the vulva are usually cyclic (repeat in same order); but, the duration of the various stages are not totally predictable as they are determined by varying factors including daylight length, temperature, nutrition and other factors. The receptiveness and conception rate can be predicted in the doe at the time of attempted mating. The various vulva stages are as follows:

APPEARANCE OF VULVA	ANTICIPATED RECEPTIVENESS OF THE DOE	ANTICIPATED CONCEPTION RATE
STAGE 1		
Small in size, light pink, dull surface color	Usually not receptive (less than 10%)	Poor - usually less than 10% of receptive does
STAGE 2		

Small, light pink glistening (shiny) surface	About 50% receptive	Fair concept-tion 40%-70% of receptive does
STAGE 3		
Small to slight enlarged, bright pink to red, very glistening (shiny) appearance	Good 70% - 90%	Good 60%-80% of receptive does
STAGE 4		
Very large to reddish-purple very dull in appearance	Excellent - approaches 100%	Poor - less than 30%

Cycle repeats - time duration of various stages vary.

From the above information, it is obvious that the ideal time to mate the doe for the most successful conception rate is when the vulva appears to be slightly enlarged, red and very glistening in appearance. However, this does not always coincide with the time that the doe is the most receptive. When the doe is most receptive, the vulva is very large and reddish-purple and the conception rat is relatively lower. One can utilize the above information in making the determination of when to mate the doe and if the doe should be mated again eight to twelve hours after the initial mating.

The "pre-mating" examination should be completed just prior to; or, within, twenty-four hours of the mating process. Upon completion of this "pre-mating" process, the mating procedure can then continue.

MATING

The mating of the domestic rabbit should be done with a minimum amount of stress to the animals involved. This includes selecting a time during the day that is as close to the ideal environmental conditions as possible, a time when the activities (feeding, watering, sorting and etc.) within the rabbitry are minimal (to prevent disturbance); and utmost care should be utilized to prevent excessive excitement to the rabbits that are to be mated.

Following the "pre-mating" examination, the doe should be placed in the buck's cage for mating. Due to the doe being very possessive to her cage, introducing the male to the

doe's cage may result in excessive fighting. In addition to the possible physical injury, the doe can intimidate the male to the degree that the male's libido (sex drive) may be suppressed and he may show reluctance to mating in the future.

Immediately upon placing the doe in the buck's cage, the male will "chase" the doe about the cage attempting to establish a mating position. When the cage is large and the doe is active, this "foreplay" can consume a considerable amount of time and the male may become exhausted prior to the mating act. The manager can be of assistance by restraining the doe when placing her in the buck's pen; or, restraining the doe very shortly after placing her in the buck's pen to allow the male to position himself for mating. This is termed "restrained mating" as compared to the natural mating method.

The male will mount the doe and the copulatory effort will be initiated. Does that are receptive to mating will position their rear legs and raise their hindquarters to a receptive position. Successful mating cannot occur until the hindquarters of the doe have been raised. In the receptive position, the buck will mate the doe (deposit sperm within the female's reproductive tract) and "fall" backwards or to the side, clinging to the doe with the forelegs and oftentimes grasping the fur and/or skin with this mouth. It is not uncommon, or abnormal, for the participants to elicit an audible sound or "squeal" during the mating process. The above ritual indicates a successful mating, even though the time span is relatively short (fifteen to thirty seconds). Approximately seventy to eighty-five percent of the successful matings result in conception and kindling of kits. The receptiveness and conception rate can be predicted from the appearance of the vulva (see chart).

It is not uncommon for the doe to urinate shortly after mating. This can be a concern to the novice that this activity will reduce or prevent conception. Urinating after mating has little or no effect upon the conception rate due to the fact that the spermatozoa (sperm) are deposited in front of the urethral (urinary) opening and very little productive semen is lost when the doe urinates.

Does that are not receptive will refuse to raise their hindquarters and just "sin" during the buck's copulatory efforts. The does should be removed from the buck's cage after tow to three minutes of aggressive copulatory efforts by the male and returned to the male every forty-eight to seventy-two hours until successful mating has occurred. An alternative that may be utilized with non-receptive does is for the manager to intervene during the buck's copulatory efforts and manually raise the doe's hindquarters, with the palm of one hand, to a receptive position for successful mating. This is termed "forced mating". Though forced mating

can produce a successful mating, the conception rate is much lower when compared to natural and restrained mating methods. However, this is an extremely important management technique that all rabbit persons should have at their disposal for utilization in various situations.

Utilization of the restrained and forced mating are valuable techniques; but, the male rabbit must be trained to become accustomed to having assistance during the mating procedure. Young males usually adapt to these procedures quite readily. However, older males that are accustomed to natural mating may be slower in accepting the assistance of the manager and it may require considerable patience from the manager until the male accepts these new procedures. Young males that are trained to "restrained" and "forced" mating will usually accept the procedures quite readily.

Mating the doe a second time immediately (within thirty minutes) after the first mating is recommended only if the male has not been mated within a two week period of time. Remating immediately is not needed if the buck is used regularly as research (at our laboratory) has shown that this procedure does not sufficiently increase the litter size or conception rate.

Remating the doe six to ten hours after the initial mating is recommended. This practice will usually increase the litter size about on kit per litter and increase the conception rate approximately 8% to 10%. This is a particularly beneficial practice in the smaller size breeds of rabbits that normally produce small litter.

Adult males can be used one to two times per day regularly; or, five to seven times per day then allowed a six to seven day rest. Young males (5 to 7 months) must be used conservatively (1 to 2 times per week) until they reach maturity (8 to 10 months.)

It is extremely important that the buck be kept in appropriate flesh condition and not be excessively fat. Males that are exposed to environmental temperatures in excess of 85 degrees Fahrenheit will usually have a deterioration of the semen quality. Bucks exposed to environmental temperatures of 85 degrees Fahrenheit or more for five days or more in succession can develop temporary sterility for 60 to 90 days.

These bucks will moat with the doe; but, the semen quality is so low that the doe will not conceive. This is called summer sterility. The effect of elevated temperatures on semen quality is more prominent in the adult male than in young growing males. IT is recommended to use young bucks (six to seven months of age) in the fall and winter months to prevent summer sterility from effecting total production in the

rabbitry.

Mating the doe is of extreme importance to maximize the production of the rabbitry. This procedure is also one of the most time consuming and frustrating management chores in the rabbitry, due to the non receptive doe. Particularly, during the normal no n receptive periods during the fall and winter months. The more effective the manager is at employing the various mating methods at the appropriate time, the more successful the rabbitry.

GESTATION

The gestation period is the amount of time necessary for the development of the new individual within the uterus - the time period from conception to birth (kindling). The gestation period in a domestic rabbit is normally twenty-eight to thirty-two days. Most does kindle at approximately thirty to thirty-one days after mating. This can vary from twenty-four to forty-eight hours in individual strains with a given breed.

Pregnancies that terminate (end) earlier than twenty-seven days; and, after fourteen days, with the passing of an undeveloped and/or partially degenerated feti is termed an abortion. On occasion, the doe's gestation period will exceed thirty-three days. This is usually seen in does that are carrying only one or two feti, the kits will be excessively large, fur development has been enhanced, and usually the kits are born dead. This condition is termed "fetal giantism".

The major portion of the growth and development of the feti occur during the last trimester (last ten days) of the gestation period. This fact is extremely important in considering the management practices necessary in the gestating doe.

It is important that the "working" doe be in proper flesh condition prior to mating and be provided the appropriate nutrients during the gestation period to allow her to kindle a good sized, strong and healthy litter of kits. Does that are excessively fat may be difficult to get bred (usually non receptive and low conception rate) and difficulties at kindling (hard labor and acute death from ketosis) are enhanced. does that are in extremely poor flesh condition have a lower conception rate, increased incidents of abortion and absorption and enhanced incidents of infant mortality in the nest box.

Does that are in proper condition at mating should be maintained on that same nutritive level throughout the first fourteen days of the gestation period. However, does that are in thin flesh condition, particularly does that are on

rapid "breed back" schedules (less than 28 days) and have just weaned a litter, must have increased nutritive supply. This can be achieved by increasing the volume of commercial feed provided in a twenty-four hour period; or, increasing the caloric concentration of the feed. (Using a pellet lower in fiber content).

Fourteen days after mating, all does should be palpated to determine if the doe is pregnant. Palpation is a technique where the rabbit manager "feels" the developing feti in the uterus through the skin and abdominal wall with the thumb and fore fingers. The feti are most easily palpated at the fourteenth day of the gestation period and will resemble the size of a grape within the abdominal cavity of the doe. This technique will be described and discussed later.

Does that are palpated "not pregnant" should be mated immediately. Does that are palpated pregnant will require a gradual increase in the volume of pelleted feed consumed until twenty-four to forty-eight hours prior to kindling to supply the additional nutrients required by the rapidly developing feti.

Some pregnant does will go "off feed" or reduce their feed intake the last twenty-four to forty-eight hours of pregnancy. If this is not automatically done by the doe, the manager must limit the feed consumption of the doe to approximately 50% to reduce the incidents of mastitis and ketosis in the doe (pregnancy toxemia).

PREPARATION FOR THE KINDLING PROCESS

Kindling is the termination of the gestation period in the rabbit; and, the term is given to the process of giving birth to young kits. This is an extremely critical time in the production cycle of the domestic rabbit and the proper management of the kindling process will determine the success, or failure, of the rabbit project.

Preparation of kindling is initiated approximately forty-eight hours prior to the due date. This includes:

1. selection of appropriate size and style of nest box to be utilized
2. sterilization of nest box and selection of nest box material
3. reduction of total caloric intake to the doe approximately 50%

STYLE AND SIZE OF NEST BOX

The primary purpose of the nest box is to provide the doe an area to build a nest and to assists in confining the kits to a small area to protect the kits form the environmental elements and maintain the temperature of the nest for the

kit's comfort at approximately 99 to 100 degrees Fahrenheit. Nest boxes can be of many styles, shapes, sizes; and, can be made from a variety of materials.

The nest box size is extremely important and should vary depending upon the size of the doe. Ideally, the nest box should be one to two inches longer and one to two inches wider than the doe. Larger nest boxes may encourage the doe to stay in the nest box longer than necessary and enhance the possibility of the doe "fouling" the nest with urine and feces. Excessive moisture in the nest is detrimental to raising kits and enhances nest box mortality.

Covered and non covered nest boxes have been successfully utilized an the actual style will depend upon the manager's preference and success. The entrance of the box, regardless of the style, should be approximately six inches high and the edges of the entrance free from rough surfaces to prevent injury to the doe's mammary gland as she enters and exits the box.

Consideration must be given to the material utilized in the construction of the nest box. The type of material used will determine the east of sanitation, the ability to maintain the temperature within the nest and the cost of the nest box. Wooden nest boxes are usually the most economical and has a tendency to maintain the temperature more uniformly; but, are much more difficult to sanitize than metal or plastic boxes due to the cracks and crevices present. To assist in keeping the nest dry, the bottom of the nest box should have several small holes (approximately 3/6") to allow the excess moisture to escape.

STERILIZATION OF THE NEST BOX AND NEST BOX MATERIALS

Prior to placing the nest box with the expectant doe, the receptacle for the kits must be as sterile as possible to prevent transmission of disease and parasite to the new born kits. IT is important that the nest boxes and nesting materials be as free from germs as possible. This mandates that the nest box be sterilized in some manner. Prior to sterilization, all organic material (straw, feces, dried feed, etc.) must be manually removed from the nest box to enhance the effectiveness of the disinfecting agent. Meter and plastic nest boxes are easier to sanitize than wood boxes due to the porous nature of wood and the cracks and crevices created in constructing the wood nest box. These areas are very difficult for the disinfecting material to access. Some individuals utilize disposable nest box liners (cardboard); however, these can be expensive and the framework of the nest box still needs to be properly sanitized.

There are many acceptable methods of sanitizing the nest box and one should utilize the one, or combination, that is

easiest and most efficient of that particular situation. The most economical method of sanitation is to place the nesting materials in the sunlight for long periods of time. However, this method is very time consuming and exposing all areas of the nest box is very difficult and sometimes impossible. There are other methods of sanitation that includes heat and chemical disinfection. Most rabbitries are not properly prepared to utilize heat as an effective method of disinfection due to the fact that the temperature required in sanitizing is rather high and simple "flaming" with a torch is not an effective sanitizing method. There are many types of chemical disinfectants that are very easy to use and effective. One must use caution that the disinfecting agent does not leave residues or odor that are offensive or toxic to the rabbits.

A common effective chemical disinfectant is household bleach (active ingredient: Sodium Hypochlorite 5.25% by Wt. (gallon mixed with water). This should be diluted in water at the rate of one part household bleach per five parts water. The "contact" time of the disinfecting agent with the nest box is extremely important. For complete effectiveness, the surface must be kept wet with the disinfectant for at least twenty minutes. Ideally, the materials should be submerged in the disinfectant for twenty minutes; especially, wood boxes that have cracks and crevices. All materials disinfected should be completely rinsed following the disinfecting process and appropriately dried. Nest boxes that are not going to be used immediately should be stored in an area that is clean and free of animal contamination.

The nesting materials used in the nest box should be clean and as free from germs as possible. IT is recommended that a layer of absorbent material; such as, wood shaving, peanut hulls, shredded paper, be placed on the bottom of the newt box to absorb the excess moisture and add insulation to the nest. The nest box must then have an adequate supply of nesting material that includes stray, hay, excelsior or other similar non toxic and not irritating clean material for the doe to actually construct the nest. It is imperative that these nesting materials have not been contaminated with animals droppings during storage.

REDUCTION OF CALORIC INTAKE

Twenty-four to forty-eight hours prior to kindling, the manager should reduce the total caloric intake of the doe approximately fifty percent to prevent various complications om the doe and forth coming litter. Reduction of the doe's food intake decreases the incidents of mastitis (milk gland inflammation) and ketosis (metabolic disturbance) in the doe; and, milk enterotoxemia in the kits.

The properly prepared nest box should be placed in the corner

of the doe's cage, that is not used for elimination, on the twenty-eighth day after mating the doe. Placing the box in the corner where eliminations normally occur encourages the doe to use the net box as a "litter box" rather than a nest box. This must be avoided. Most does will immediately investigate the newly presented nest box and move the nesting material about with her mouth. the nest box must be checked each day prior to kindling to insure it has not been "fouled" with urine and feces. On occasion does will remove the nesting material from the nest box and place in another area of the cage. When this occurs, the box should be moved to the doe's preferred site. This will reduce the incidents of does kindling on the wire. It should be anticipated that the doe will kindle within seventy-two hours after the nest box is placed in the cage. When past performances has indicated that a particular doe kindles on the thirtieth, thirty-first or thirty-second day, consideration should be given to placing the nest box with the doe only twenty-four hours prior to kindling. The shorter the time the nest is with the doe prior to kindling, the more successful the kindling process.

The ideal environmental temperature for the doe to kindle is between sixty and seventy degrees Fahrenheit. When environmental temperatures are lower, extra nesting material may be necessary. Kindling at temperatures below thirty degrees Fahrenheit may require the use of insulated nest boxes and other practices to maintain the core temperature of the nest at 98 to 100 degrees Fahrenheit. The heat from the nest is lost to all the surrounding area, including the bottom of the nest. Placing the nest box on, or attaching to the bottom of the nest, one to tow inches of styrofoam insolation or stacked newspaper will be beneficial in saving many litters from cold exposure.

Kindling, when the environmental temperatures are in excess of seventy-five degrees Fahrenheit also requires specific management techniques to prevent heat exhaustion in the doe and young kits. During the summer months, the amount of nesting material in the nest box must be limited and it may be necessary to remove a portion of the "pulled fur" to provide more ideal conditions for the litter.

Does in the late stages of pregnancy and does during the kindling process are very prone to heat exhaustion. Plastic bottles that are partially filled with water and then frozen placed in the cage with the doe can be quite effective in preventing the occurrence of this situation.

KINDLING

This is a term used in rabbit production to denote the parturition (birthing) process. Kindling is the normal termination (ending) of the rabbits gestation period (time

period from conception until birth). This is usually an uneventful occasion that occurs 28-32 days after conception.

Spontaneous abortions and resorptions may occur in the domestic rabbit. Abortions is a situation where the pregnancy is abnormally terminated between the 17th day and the end of the gestation period. The developing kits (feti) and afterbirth (placenta) is passed from the birth canal of the doe and is usually observed on the bottom, or beneath, the cage as a non-discrete mass of tissue and/or blood. Resorption is the termination of a pregnancy sometime after the embryo has attached itself to the uterine wall and the 17th day of pregnancy. There are usually not any obvious signs of this condition other than a doe that was thought to be bred, and even palpated pregnant at 10 - 12 days, does not kindle. There are several associated causes of abortions and resorptions in the domestic rabbit, including disease and nutritional abnormalities.

The length of the gestation period will vary to some degree depending upon the various genetic strains within the breed, number of kits (total weight) in the uterine horns and other surrounding circumstances.

Does that are carrying a small number (1-3) kits have a tendency to have a longer, or even prolonged (32-35 days) gestation period compared to does that have larger normal sized litters. Fetal Giantism may occur in the domestic rabbit and is usually associated with does that are carrying only 1 - 2 kits. These does will usually have a gestation period in excess of 33 days and when kindled, the kits will be extremely large, long, fur development initiated, eyes may be partially open; and, most commonly born dead. The doe may or may not have difficulty kindling (dystocia). The actual cause of this condition is not totally understood but is thought to be due to a hormonal imbalance associated with low weight of the uterine contents. Repeated incidents of this condition may be reduced by the implementation of assorted management practices.

Kindling occurs in response to hormonal production and their affect, in varying combinations and level, causing the cervix to relax and the muscles of the uterus to constrict. This muscular activity causes an evacuation of the uterine contents (feti and placenta) through the cervix and vagina. Each of the horns may empty its contents in its entirety; or, a kit may be alternately expelled from the right and left horn of the uterus until all have been born. The kits may be presented head first or in the breach position. Either is considered normal and there does not appear to be any variation in the survival rate. The placenta may be delivered after each kit, after multiple of kits or at the conclusion of the entire kindling process. There is a placenta for each feti and it is important that all placentas

and feti be expelled from the reproductive tract during the kindling process. A retained placenta(s) or fetus may cause considerable problems for the doe and even cause complete sterility (no production) in future matings.

Prior to kindling, the doe may become excited, nervous and go partially to completely off feed during the last 24-48 hours prior to kindling. The expectant doe will oftentimes carry nesting material sin her mouth about the hutch and rearrange the nesting materials in the nest box. Just prior to, or just after kindling, the doe will pull varying amounts of fur from the chest and belly area to line and insulate the nest for the warmth and comfort of the new kits. Fur pulling usually immediately precedes the kindling process. On some occasions, a small incomplete amount of fur pulling will precede the complete nest building process by 24-27 hours. Nest building and maternal instincts appear to be inherited and consideration must be given to these traits when selecting replacement breeding stock. First litter does commonly will not have these instincts as well developed as in succeeding litters.

It is essential that the expectant doe be provided with an environment that is relatively free from distractions and one that she has had the opportunity to adapt. It is particularly important that the area be free of dogs, cats, rodents, strangers and other types of possible predators. First litter does are usually more excitable than the experienced doe.

The doe must be provided with a properly prepared nest just prior to kindling. Ideally, the box should be placed in the cage 24 hours prior to kindling; but due to the fact that there can be a four day variation in the gestation period, it is usually recommended that the box be placed in the cage on the 28th day after mating. The box must be placed in the area of the cage where regular urination and fecal elimination does not take place. The rabbit is a creature of habit and if placed in the inappropriate location, the fouling of the nest with urine and feces will be encouraged. It is extremely important that the nest box be checked daily for possible contamination with urine and feces and when present, the appropriate cleaning measures employed. Dirty, damp nests are not conducive to successful kindling or healthy kits. It is extremely important that the appropriate size, type and prepared nest box be utilized.

The doe will be observed in the nest box ore prior to and during the kindling process than at any other time. The actual birthing process usually is of relative short duration; and, when the doe is observed in the box for extended periods of time this may indicate a kindling problem. It is normal to observe the doe during the kindling process with her head reaching between her hind legs, one

hind leg raised, assisting the birthing with her mouth and tongue. One occasion, and particularly with a difficult birth, the doe may become so aggressive in the assistance procedure that she may accidently remove an appendage (ear, leg, and tail) from the kit. It is not uncommon to observe, particularly in does with white faces and front feet, these and the genital area be stained with varying amounts of blood tinged fluid. These stains do not necessarily indicate a problem and will be removed in the grooming process shortly after kindling.

Cannibalism (eating) of the young kits by the doe may occur at this time. It can usually be related to the doe lacking a sufficient amount of fluid from being deprived of fresh clean drinking water (frozen or fouled taste); or, by the presence of predators in the rabbitry that frighten the doe to the degree that she becomes very nervous and consumes portions of the kit(s). Only on very rare occasions will this occur as a result of nutritional deficiencies; particularly when commercially prepared pellets are utilized.

The entire kindling process is usually uneventful and a very joyous time in the rabbitry. However, on occasion difficult births (dystocia) may occur. This is usually demonstrated by prolonged labor and the opportunity to notice the doe sitting in the nest box for extended periods of time. This situation may occur prior to the doe giving birth to any young or after the delivery of a partial litter. Upon further observation, one may notice the doe uncontrollably straining and a very rigid (hard) abdomen (belly) when touched. The persistence of these signs is an emergency situation and requires the assistance of a professional to relieve the blockage of the birth canal. This situation can be extremely serious and can present a dilemma to the rabbit breeder. The tow most common alternatives to this problem is the utilization of the drug Oxytocin to enhance the muscular constriction of the uterus or to have a Caesarean section (c section) performed.

There are dangers and disadvantages with both alternatives. Oxytocin is a controlled substance that must be administered, or prescribed, by a licensed veterinarian. This substance will cause the uterine muscles to contract violently when they have ben sensitized to the estrogenic hormones just prior to and just after kindling. (NOTE: Oxytocin alone will not induce labor or abort an unwanted pregnancy. It is mandated that to induce labor that the uterine muscles be first sensitized by estrogenic substances produced by the doe or given as an injection prior to the induction attempt.) These muscle contractions will cause the materials within the uterus, including unborn kits, to be expelled through the birth canal. However, if the birth canal is totally blocked by an extremely large fetus or a badly distorted fetus, there is the possibility of rupturing the uterine wall that may cause death to the doe. The cost of a surgical procedure (c

section) may be the greater financial responsibility than the value of the animal. How this problem is resolved will be the decision that must be made by the owner.

The kindling process can be very tiring and stressful to the female rabbit; especially, during the summer months when the temperature exceeds 80 degrees Fahrenheit and the humidity is high. During these times, the doe must be given extra attention to prevent heat exhaustion. The expectant doe must be placed in the coolest place in the rabbitry with an ample supply of cool water at all times. Individual does may be kept cool with continued circulating air with fans and by the addition of water filled partially frozen liter jugs. These may be changed as often as necessary to keep the doe cool. Many successful rabbit managers, particularly those raising very large headed breeds (Holland Lop, Netherland Dwarf, etc.) will utilize injections of oxytocin after the first kit is delivered (uterine muscles have already been sensitized by "self produced" estrogen) to decrease the duration of labor. This decreases the stress on the doe and decreases the incidents of heat exhaustion. Attention must be given to the amount of fur placed in the nest during elevated environmental temperatures. The excess must be removed to assist in temperature control of the doe and the litter. One may desire to retain the excess fur for possible addition to the nest at a later time, if warranted.

The doe should be allowed an ample period of time to rest at the conclusion of the kindling process. During this time, the doe should be allowed free access to all the clean chlorinated drinking water desired. Access to pelleted feed should be restricted for the first 12 hours and then gradually increased each day until the doe is on full feed 7 - 10 days after kindling. This practice must be followed to keep the incidents of mastitis in the doe at a minimum and to prevent milk enterotoxemia in the new born kits. Kindling is a very joyous occasion in the rabbitry and very few complications are encountered when the appropriate management techniques are employed. However, when complications are confronted, it is essential that the manager identify the problem and implement the necessary practices to resolve the situation.

LACTATION

This is a term that is used to indicate the secretion of milk from the mammary system. In the domestic rabbit, the system is located on the lower side of the belly and chest between the skin and the abdominal muscles. There are two lines of nipples located on each side of the midline. The mammary tissue is divided into sections and each section has an individual nipple that has several openings on the end for the milk to pass during the nursing process. The glands toward the front are most developed and usually produce the larger volume of milk as compared to those toward the rear of

the rabbit. The number of nipples per rabbit will vary depending on the breed and the genetic strain within the breed. The larger breeds should have a minimum of 8 - 10 nipples and the smaller breeds a minimum of 4 - 6 nipples. The nipples and mammary sections should be well developed and uniformly spaced on the lower portion of the belly and chest.

Consideration should be given to the mammary system when selecting replacement breeding stock. There are some outstanding animals in certain breeds that repeatedly produce offspring that have only 2 - 4 nipples per animal.

Milk production is initiated at parturition (kindling) and will usually continue until the kits are removed from the doe (weaning). The mammary tissue development is not initiated until jut a few days prior to kindling and further develops as the volume of milk increases; then, within a few days after weaning, returns to the pre-kindling status. Any departure form the above progression may indicate an infection of the mammary tissue known as mastitis. This may be very devastating and will be discussed in detail later. The volume of milk secreted will vary depending upon the breed, the strain within the breed (hereditary), the number of litters kindled (first litter does usually milk less), nutritive intake of the doe and other factors. The average New Zealand will produce about 200 grams of milk per day, other breeds will produce according to size and other factors described above.

The birth weight of the kits does not vary in size nearly as much, in accordance to the size of the doe, as one may anticipate. Does that average 10-12 pounds maximum adult weight usually kindle kits that weight about 60-70 grams and does that weigh 2-4 pounds mature weight will produce kits that weigh 35-45 grams. The kit size at kindling is not directly proportional to the mature weight of the doe. Several factors will influence the kindling weight of the kit. Included in these are genetic factors, condition of the doe at mating and nutrition during the gestation period.

The doe will nurse the litter one time per day, usually during the night or early in the morning, for a short period of time. The nursing procedure usually goes unnoticed and many beginners become quite concerned that they never see the doe nursing the litter and think the kits are not being fed properly. The feeding status of the kit may easily be determined by examining the belly of the kit. Properly nursed kits will demonstrate a well rounded abdominal cavity, an obvious milk spot (a yellow-white area just below the ribs that shows thorough the skin), and the skin will be smooth and pliable. Kits that have not been properly nursed will be "sunken in" just behind the ribs, skin will be wrinkled from dehydration and there will be exaggerated mouth movements indicating hunger.

Rabbit milk varies considerably when compared with milk of other animal species. The protein content of rabbit milk is about 3-4 times that of cow's milk and the protein level of the milk gradually increases form the time of kindling throughout the lactation period. The lactose (milk sugar) content of rabbit milk is only about 1/4 that of milk from other common animal species. The lactose content of rabbit milk dramatically drops in concentration from the start of milk production to that of the fourth week. The fat and ash level of rabbit milk is extremely high as compared to the content of other common species. Rabbit milk has approximately 14-20 percent more solids contained therein than most other common animal species.

Colostrum milk is extremely important in most species of animals in that it contains substances (antibodies) that are extremely important in preventing various types of disease in the newborn animals. This does not appear to be true in the rabbit and this is what allows for relatively good success in fostering young kits and feeding the kits by hand, when done properly. There is some composition differences between colostrum milk and that secreted later in the lactation period as discussed above.

The above information should be valuable to the rabbit producer in that it allows for the explanation of the very rapid growth in the first week to ten days (almost doubles body weight) of their life and explains the needs of the baby rabbit when attempting to raise orphaned kits.

The volume of milk produced by the doe will increase until the 10th to 14th day after kindling and remain at that elevated level for approximately another 10 - 14 days. At that time, the production drops very rapidly over the next 4-5 days and will remain at a minimal level until the litter is weaned. It is estimated that a New Zealand doe will lactate on the average of about 200 grams of milk per day depending on a variety of factors.

To a certain degree, the rabbit manager can influence the volume of milk produced, within inhereted limits, by the daily caloric intake of the doe. This phenomenon has been utilized by rabbit producers through the years by the addition of milk products to the ration to increase total milk production. It must have anticipated that if it unnecessary to supplement the doe's regular ration to attain adequate milk production; if offspring are retained for breeding stock, that one should expect to supplement their ration to achieve the same desired level of milk production.

Supplementation of the daily ration is time consuming and costly! This may appear to be insignificant to the small fancier and hobbyist; but, is of extreme importance to the

commercial producer and the fancier that hs monetary concerns. Consideration must be given to the doe's ability to produce milk when selecting replacement breeding stock as the ability to lactate is an inherited characteristic.

A female domestic rabbit's milk production ability is determined, or estimated, by 3 week litter weight. This is due to the fact that the majority of the kits growth up to this time is totally due to the milk consumption and not related to solid food intake. When making these comparisons, one must give consideration to the variation in the caloric content of the feed utilized and adjustments made accordingly.

Two areas of the lactation cycle that require consideration are the first 7-10 days after kindling and 24-72 hours after weaning.

The doe will usually nurse the litter within the first 12-1\24 hours after kindling. The process will usually not be observed and may only be confirmed by observation of the kits as discussed above. On occasion, does will fail to initiate the nursing process in the first 24 hours or totally fail to lactate. This malady is more common in first litter does than multiparous does (littered more than one time) and there are a variety of causes of agalactia (no milk production). Included in these causes are systemic infection (such as "snuffles"), poor physical condition, uterine inflammation and other maladies. The initiation of milk production can be encouraged by the manual stimulation of the mammary gland and nipples several times per day, by having Oxytocin administered, or prescribed by a veterinarian. One or two Oxytocin injections at 24 hour intervals is usually very effective in the initiation of milk flow and it will usually be sustained in most situations.

Excess milk production is a rather common and serious problem in the first 7 - 10 days after kindling and may cause devastating losses in the rabbitry to does and/or the litter. These problems may be reduced and controlled through the implementation of various management techniques.

MILK ENTEROTOXEMIA - This is a condition that is demonstrated by the sudden death of the entire litter 3 - 10 days after kindling. One will examine the nest and find healthy well fed litter only to examine the nest at a later time and find the entire litter dead. Upon closer examination, one will find that the kits have a rounded abdomen and a very prominent milk spot. The net will usually be sound in structure and not molested in any way by the doe.

This is the result of an excessive amount of milk production during the first ten day sand the young consume more milk than necessary. Certain bacteria, normally present in the

digestive system, proliferate (grows) very rapidly in the presence of excess lactose (milk sugar) and produces a very violent and potent toxin that causes the rapid death of the kit. Due to the fact that all kits nurse in a very short period of time and only once a day, all kits usually die at approximately the same time.

This does not occur out of the indicated time frame (3-10 days) due to the fact that as the kits increase in age and size, they are capable of digesting the larger volume of milk consumed. This situation usually occurs in rabbits that have been selected for maximum milk production and are "full fed" high energy (calories) rations immediately after kindling.

To correct and prevent this condition from occurring, one must control the volume of milk produced by the doe during the first portion of the lactation period. This can usually be accomplished by having the doe in appropriate flesh condition (not overly fat) prior to kindling and the restriction of the total caloric intake the first ten days after kindling by limiting the amount of feed consumed each day and the utilization of guaranteed high fiber rations. Does will usually reduce their food intake just prior to kindling and this is normal and desirable. Does that do not reduce their food intake on their own should have the volume of food consumed reduced by about 50% by the manager 24-48 hours before kindling. The food to the doe should be totally restricted for the first 12 hours after kindling. However, the doe should always have a free supply of chlorinated drinking water.

From the first to the 7th -10th day after kindling, the daily caloric intake of the doe should be gradually increased; this is usually achieved by increasing the total volume of feed given to the doe each day, until she is on full feed (pellets available at all times) at 7-10 days post kindling. The doe and litter will remain on full feed until the litter is ready to wean.

The above feeding schedule will also assist in lowering the instances of mastitis in the doe that may occur at this time in the does life cycle. The production of more milk than can be consumed by the litter in the first few days after kindling will allow the milk to "stagnate" in the mammary gland. This encourages the infectious process to develop from bacteria that may be present in the blood stream or from bacteria that gain entrance into the tissue through the nipple openings. Mastitis can be extremely important and devastating in the rabbit. Signs of this condition are that the mammary gland will become enlarge, reddened, painful when touched, a yellowish-red secretion may be obtained form the nipples and abscesses may develop. Prior to the infectious process, the skin of the mammary gland will develop a dark blue discoloration, the tissue will become "caked", and the

nipples will be very prominent. This condition that exists before the infectious process (mastitis) is called "Blue Breast" or "Caked Breast". This condition should be given attention immediately to prevent the progression into an acute mastitis.

This may be done by the application of altering hot and cold compresses to the entire mammary system for five to ten minutes three to five times per day and "stripping" the excess milk from the involved gland by hand two to three times per day. This will relieve the stress and trauma on the mammary tissue. It is recommended that the kits not be allowed to nurse infected does as the milk may be toxic and/or fatal to the kits.

Mastitis is also common in does the first few days after weaning due to the accumulation of excess milk and the presence of infective bacteria and the demonstration of the same signs as described above. Therefore, the restriction of the doe's feed intake is recommended the first few days after weaning to reduce the incidents of mastitis.

Mastitis may be treated with systemic (injectable) antibiotics. One must utilize antibiotics that are effective against the bacteria causing the infective process. Consideration must be given to culling does from the herd that have abscesses on, or in, the mammary tissue, as there is a tendency for the recurrence of this disease in future kindling.

Mastitis infected does that are of extreme genetic value to the manager may be retained in the herd by they use of a surrogate mother to raise the valuable kits. This procedure involves breeding another doe, or does, at the same time that the infected doe is bred, then fostering the desirable kits from the infected doe to the foster mother before the kits have had the opportunity to nurse the toxic milk. This technique should only be employed when the doe is extremely valuable and the manager has had, or ha access to an individual that has had, experience in fostering kits.

FOSTERING OF YOUNG RABBITS

All rabbit growers are confronted atone time or another with young kit(s) from 1-5 days of age that need a doe to nurse and care for the orphaned kits. Fostering the orphaned kit(s) may be an extremely important management tool to employ when there is unexpected death loss of a doe at (or during) kindling, when a doe will not claim or nurse the litter, there are more kits kindled than can be readily nursed by the doe; or, there is a very small litter.

Fostering may be defined as the technique of transferring young kits from their mother to another lactating doe for one

of the above described reasons. It is recommended that a group (two or more) of does be mated within 3-5 days time to allow for the possibility of the fostering technique to be employed, if necessary, for the most efficient utilization of the doe and to increase the production efficiency of the herd. Requiring a doe to nurse an abnormally large litter for her size, and the number of nipples available, will encourage litters that lack uniformity of size and this may increase the infant mortality and enhance the development of "runts" (kits that are small and never develop properly). Allowing a medium sized or large doe to only nurse two to three kits will encourage the incidents of milk enterotoxemia in the kits an mastitis in the doe, due to the excess amount of milk produced in relationship to the amount consumed. Therefore, it is recommended that kits form these does be fostered and the doe remated at 72 hours or kits from other does be added to the nest so that the doe has a minimum of five kits to nurse. Implementing this procedure increase the production efficiency of the herd. It is extremely difficult to raise a litter of only one kit even in warm weather and in heated facilities due to the fact that the more kits in the litter, the easier it is to maintain uniform heat conservation in the nest. All single kits should be fostered or have kits added to the litter.

Ideally the kits transfer very well under five days of age; but, successful fostering may take place up to as late as two weeks. Prior to transfer, the hands of the handler should be clean; but, caution must be used that odoriferous soaps and disinfectants are not used as they may disturb the doe and cause rejection. When placing the kits with the foster mother, it is recommended that all kits in the litter be handled before placing the nest back into the doe's cage. Most does will accept fostered kits quite readily without using various salves and ointments on the kits and nose of the doe to obliterate the various odors. After the fostering process has taken place, one must check the nest every 24 hours to insure the appropriate condition of the box and that all kits survive. A dead kit in the nest deteriorates very rapidly and may cause the doe to reject the entire nest.

Kits that are fostered must be marked to insure accurate identification. This may be done by placing small dot(s) in the ear by pricking the skin several times with a pin or needle and rub in tattoo ink into the are prior to fostering.

AGE TO BREED YOUNG DOES

The recommended age to breed young does varies considerably between knowledgeable rabbit persons, breeds of rabbits and the desired purpose of the animals being bred. It is becoming an increasingly popular management tool to breed at a given weight for a certain breed rather than breed in accordance with age. The validity of this practice is totally dependent

upon the desired purpose of the rabbit enterprise.

Sexual maturity is achieved in the smaller breeds of rabbits at an earlier age than those of the giant breeds. The smaller rabbit - the earlier sexual maturity is achieved.

The larger the rabbit - the longer it takes for the achievement of sexual maturity.

In the small breeds of rabbits, sexual maturity usually is reached about four to five months of age and the giant breeds sexual maturity is reached at about six to eight months of age. There will be a variance in this pattern within given strains of the various breeds of rabbits. Certain strains become sexually mature much sooner than others.

Does will usually be sexually mature approximately thirty to forty-five days sooner than bucks f the same age again, the variance between the breeds and strains within the breed does occur.

The disadvantages of mating does at an excessively young age would be the possibility of the doe having a difficult time at kindling due to the pelvis not being fully developed, and in the larger breeds there may be a tendency to retard the maximum mature weight. The disadvantages of mating the young doe is that in the smaller breeds, there would be a tendency to retard the maximum growth, and one would certainly increase the productivity of the animal in its total life span.

The disadvantage of allowing does to be very mature or older when breeding is the possibility of the animals becoming very difficult to breed. the older virgin doe has a tendency to become excessively fat and their reproductive system has a tendency to become static and they fail to be receptive. If they are receptive, the conception rate is greatly decreased.

If one is to mate an older virgin doe, one should make sure that she is in the proper "breeding condition" prior to mating. When mating older, mature does, it is important to reduce the feed intake as well as to increase the doe's activity to assure a successful breeding program.

TIMELY TIPS - BREEDING AND KINDLING

"My does will not conceive", "I cannot get my does bred". These are very common statements that are heard among rabbit breeders at certain times of the year. A crisis has been reached in the rabbit circles in that many, many persons, commercial rabbitries as well as the hobbyist, cannot get their does to conceive and raise youngsters.

This is a common complaint; but, it can be compounded when

there is extreme heat in the summer and late fall. The problem has been primarily due to the presence of "summer sterility" in the males; and, consequently, the does become overly fat and then fail to conceive. This problem has also compounded the problem; or, accentuated the problem of "fall dormancy" that is oftentimes seen in breeding does going into the fall of the year.

Anytime during the summer and fall when the adult male is subjected to temperatures in excess of 85 degrees Fahrenheit for a period of five days or longer, there is a degeneration of the spermatozoa production that is altered for a period of sixty to ninety days that renders the males temporarily sterile. This condition has caused many of the does to fail to conceive. When the dose have failed to conceive, the managers have continued to feed the does a ration that has excess energy for their maintenance requirement and this has allowed the does to become excessively fat.

One will see a tendency for the does to go into a period where they are very reluctant to mate and this is often termed "fall dormancy". The "fall dormancy" period compounded with the failure of the does to kindle from the sterile bucks resulting in the increase in the fat build up of the does ha compounded the problem where the does fail to mate and will also fail to conceive.

This is a very serious problem and one that will affect the cash flow of the commercial rabbitry as well as affect the hobbyist in that they will fail to have juniors and intermediates available to show at the spring meets. It is imperative that the manager takes progressive steps to get their does mated immediately in order to correct the cash flow problem and the lack of youngsters in the spring.

Rabbit managers should have anticipated this problem and should have been vigorously using the young, aggressive males to mate their mature does during the warm summer months. Young males, under the age of six months, do not appear to be affected with the problem of "summer sterility" to the degree that the adult males are during the summer. One must also take caution that the mature does are fed a ration that prevents them from getting excessively fat; however, it is very important that they receive adequate vitamin and mineral supplementation.

Does that are already suffering from the above condition, due to the inactivity of the breeding cycle, can be placed back into productivity by limiting the amount of feed intake and increasing the activity of the doe to reduce the excess amount of fat within their body.

Colony mating of this type of animal has been very successful in getting these does back into production. This can be done

by placing two to ten does in a large pen with a young male. One must realize that there is a possibility of injury to the does as well as the male with this type of mating system. However, the success of getting the animals matted usually is greater than the risk of injury of an animal. These does should then be palpated after they have been with the male for twelve days at five day intervals to determine when the doe will kindle. The success of colony mating is usually due to the fact that there is increased activity within the colony, rather than in single housing, and this has a tendency to increase the breeding percentage when the does are mated. This also allows for mating the does with a decrease in the amount of labor required.

WINTERTIME KINDLING TIPS

After the difficulty of getting the does mated, it is very discouraging to lose the litters from excessively cold weather during the kindling period. Many practices can be followed to increase the survival of the kits when kindling during the cold weather. If one has a good kindling method that is successful, they should be encouraged not to change their method of kindling.

If available, one should attempt to kindle the does in an area that is in the excess of 50 degrees Fahrenheit. One will be able to kindle does more consistently if the animals are kept in such environment. Not all rabbitries are equipped with the facilities to kindle does in environmental temperatures of this degree and many other practices can be used to salvage the litters.

The type of nest and the nesting material is extremely important when kindling during the extreme cold weather. It is very important to select a nest box of the proper size for the winter kindling, and they can be made of a variety of materials. The greater the insulating factor of the nest box, the more advantageous the nest box is for winter kindling. One should remember that the majority of the heat that is lost from the nest box is lost from the bottom of the nest. Dampness in the nest box is a great detriment to winter kindling, and this will entail the use of the proper nesting materials so that the nest box will remain dry and warm. Once the nest temperature drops below 90 degrees Fahrenheit, the prognosis of the future of the young decreases.

In my opinion, the floor of the nest box should be covered with some good insulating material that is very absorbent. This material can be of a variety of substances and may vary from one area to another, depending upon the economics of the substance that can be obtained. Sawdust, shaving, corncobs, excelsior or finely shredded paper have all been used with a great deal of success as an absorbent material and insulating material on the floor of the nest.

On top of the absorbent material, one should apply a copious amount of good bedding material such as grass hay stray or other substances that the doe can construct the nest from prior to or just after kindling. Placing the nest on a three-quarter inch to an inch and a half of stacked newspapers also offers excellent insolation to the bottom of the nest box.

Supplemental heating of the nest box with heating pads or heat lights has been met with varied success depending upon the manager. If heat lights are to be used, they are much more effective if they are placed under the nest box shining up on the bottom of the floor of such, rather than to be hanging over the nest box and shining into the nest box to keep the young warm. The reason for this is that the heat is lost from the bottom of the nest box and the heat from your heat lamps rises in the cold air. If placed under the nest, they are much more effective. Also, when placed above the box, the doe will tend to set in the box. If one uses any type of supplemental heat in the form of heat lamps, one should be extremely cautious and take prevention against fire.

Many rabbit managers will collect good, clean fur during the warmer months of the year and add to the nest during the winter kindling months to help insulate the young from the cold environment. It is imperative that the nest box be checked periodically for dampness so that they can be kept very dry during the cold winter months.

Another technique that can be used with great success for the small rabbit grower is to kindle the does in the basement or any warm area and then remove the doe to the regular rabbitry 24 - 48 hours after kindling. If the weather is very severe, the nest box can be removed form the doe's hutch during the night time hours and placed in an area that is comfortable and allows the nest temperature to remain above 98 degrees Fahrenheit and then return the nest to the doe early in the morning for a short period of time (20 minutes) to allow her to nurse the young and then move the nest again to the warm area until the evening hours. The nest is then placed with her again for a short period of time. This has been very successfully used by many rabbit breeders in the past few years.

If one has several does that have kindled, the nest box should be marked plainly so that the litter is returned to the same doe each time for nursing. Very few does will not accept this type of nursing procedure.

All rabbit breeders should attempt to raise the young through the winter months. This can be successfully done if extra management efforts are implemented. Year around production

in the commercial rabbitry is imperative and the manager must raise young during the winter months in order to have a constant cash flow.

RABBIT BREEDER'S WINTERTIME WOES

The occurrence of long nights, short daylight duration and the lowering of the average environmental temperature challenges the management skills of all rabbit breeders. Winter is the most devastating season and will have some effect upon the success or failure of the rabbit enterprise the remaining portion of the year.

Each year, as fall and winter approaches, there are increased complaints concerning:

1. non receptive does
2. decreased conception rates
3. decreased number of litters in the rabbitry
4. decreased maternal instincts (mothering ability of the doe
5. increase in nest box deaths

Each of the above complaints can be related to the above mentioned seasonal changes. As the length of the daylight exposure decrease, the hormonal system of the domestic rabbit is less active and the doe tends to become less receptive to the male. The receptive period in relationship to the non-receptive period is much less and the manager must put forth a more exerted effort to identify the receptive period of the doe, utilize forced mating; or, induce ovulation with or without artificial insemination to keep the doe productive. When the doe remains non-receptive and non-productive, there is an accumulation of fat in the doe; particularly, around the reproductive organs and the non-receptiveness intensifies. These problems relate to the decreased conception per number of matings and the total decrease in the number of litters produced.

The astute and progressive rabbit manager will address these problems far in advance to their occurrence. Replacement animals will be retained from those does that DO NOT exhibit the seasonal breeding characteristics; but, from does that tend to breed (be receptive) on a year around basis without being effected by the daylight exposure and the environmental temperatures. In addition, successful breeders will maintain a constant light exposure at twelve to fourteen hours per day by implementing artificial lighting and keeping the does in a productive state by forced mating and induced ovulation (hormone therapy) with or without artificial insemination to prevent the does from becoming fat and non-productive.

It is essential to attempt to solve the problems prior to their occurrence for the most success in the rabbitry.

In an attempt to increase the ambient temperature in the rabbitry to decrease the kit fatalities during kindling; and, for the manager's comfort, many managers will "winterize the rabbitry". This usually includes further insulation of the building and the covering of the windows and doors to prevent the cold brisk winds from entering the rabbitry. This is usually effective in raising the temperature within the barn by conserving the heat produced by the animals body; however, the ventilation within the barn is dramatically restricted.

Proper ventilation is just a important in the fall and winter as it is on the hottest day of the year! Ventilation is defined as: "allowing fresh air to enter so as to replace stale air; provide opening for the escape or circulation of air, gas, etc." Inadequate ventilation during the winter can be dramatically demonstrated in the remaining seasons of the year by increased incidents of respiratory disease that will cause animals produced to be expelled from competition on the show table and inhibit the individual rabbit's future production.

The successful manager will give very close attention to proper ventilation in all seasons of the year; but, particularly in the wintertime. It is extremely important that there be adequate circulation of air in the winter, even if it produces a colder ambient temperature. Rabbits, once they reach ten days of age, can withstand very cold environmental temperatures, still be very healthy, gain well and be comfortable. Rabbits that are exposed to lower temperatures will consume a larger volume of feed per day and the feed efficiency will be somewhat lower. Cold temperatures in the rabbitry will not be as comfortable for the person doing the chores; but, the rabbit will be much healthier as compared to those that are constantly exposed to contaminated air from the lack of proper ventilation.

Movement of air through the rabbitry is essential to remove the contaminants; particularly ammonia. Excellent studies have shows that ammonia, in excess of five parts per million, will decrease the efficiency of most animal production; and, the incidents of respiratory disease is directly proportional to the amount of ammonia in the rabbitry. Wintertime ventilation in the rabbitry is extremely important and the effect of inadequate ventilation will be demonstrated throughout the entire year.

Some items that need to be given consideration when attempting to improve the quality of air provided to the rabbits through ventilation.

1. For proper air movement through a building, there must be air inlets and air exhaust areas. The size must be adequate and equate to each other whether using natural air movement or mechanical air movement 2. Warm air rises toward the top of the

building and the ammonia, being heavier than air, moves toward the bottom of the building

3. Ammonia formation is proportional to the density of the rabbits within the building
4. The more frequently the urine and feces is removed, the lesser amount of ammonia is produced.
5. Most rabbitries are developed form pre-existing "odd-shaped" buildings and an appropriate ventilation system for that particular building must be developed, usually by trial and error.
6. Condensation of moisture within the building indicates high humidity and the need for three to be given attention to air quality

In summary, the fall and winter seasons, due to the longer nights and the cooler environmental temperatures, will test the rabbit manager's patience an skills. Decreased receptiveness of the doe, increased kit mortality and decreased production are all common problems confronted by the rabbit grower. These problems can be decreased or eliminated by the implementation of appropriate management techniques.

Proper ventilation of the rabbitry is oftentimes challenged in the winter. Inadequate ventilation can create problems that will demonstrate themselves in other seasons of the year. It is essential that proper ventilation be included in the rabbit manager's techniques.

FREQUENCY OF BREEDING

The hereditary constitution of the doe will determine how often the doe can be mated. One must keep in mind the productive potential of the rabbitry is to raise eleven litters per year. All rabbits do not have the genetic constitution to accomplish these goals. However, they do have that potential.

Many of the commercial rabbitries, including Dutch, oftentimes will mate the does two weeks after the doe has kindled and then wean the litter when the kits are four weeks of age, allowing the doe to have a two week rest period prior to kindling again. This appears to be a more commonly accepted practice in the commercial rabbitry than breeding the does to their maximum potential of three days after they have kindled. If one is to follow this rigorous breeding program, one must selectively cull the herd so they will have the characteristics of being able to maintain the stamina of this rigorous breeding program.

The majority of the fancy type rabbit will not be able to maintain this rigorous breeding program. However, one should keep in mind that physiological process of the rabbit and realize that it is easier to get a "producing" doe mated than

a "non producing" doe. Some individuals recommend that the doe be mated and palpated pregnant prior to weaning the litter as this allows for "easier" mating and there is a tendency for larger litter sizes.

It is recommended that does being added to the herd be placed in production during the late summer months and prior to fall and winter, as it is easier to maintain the doe in a reproductive state during this period of time than by adding new virgin does to the herd during the fall and winter months when breeding is more difficult due to the decreased receptiveness of the doe.

If one should choose a vigorous breeding program, one must have outstanding nutrition and expect an increased number of mammary problems. On the rigorous mating program, the longevity of the doe in the herd will be decreased; but, usually the total number of youngsters produced will be increased. The frequency of mating the doe will depend entirely upon the purpose that one has for the rabbits mated.

HOW TO WEAN KITS

The age to wean young rabbits will depend upon the bred, the intended use of the rabbit, how well the rabbits are developing and the owner's desires and past experience. In years past, young kits were never weaned before they were eight to ten weeks of age. However, with increased information concerning the lactation of the doe and experimenting with various weaning times, the age that kits are weaned has been reduced to where a majority of the kits are now weaned somewhere between four and eight weeks of age.

Does lactate (milk) within their genetic limitation in response to the amount of nutrients that they consume. The amount of milk produced by the doe will usually gradually increase from the time of kindling until approximately three weeks post kindling. This is the time the doe milks her greatest quantity. Shortly after this peak production of milk, the milk production falls very rapidly until the doe is lactating a very small quantity by the time the kits are four weeks of age. In other words, the doe goes for maximum to minimal milk production in about seven days. Regardless of the amount of nutrients the doe consumes. Therefore, it can be easily speculated that since the milk production is so low four weeks after kindling, there is very little advantage in allowing the young kits to be with the doe any longer length of time. This is the reason most individual rabbit growers are now weaning their kits somewhere between four and six weeks of age. There ha been some rather valid research that indicates that the performance of animals weaned at four weeks of age is approximately the same as those that are weaned at later stages when the end result is compared when the animals all reach junior age.

From the above information provided, it is anticipated that most kits will be weaned between four and six weeks of age. The proper procedure used in weaning the kits has been discussed for many generations. It is the consensus of most successful rabbit breeders that the doe and litter should be separated at one time. Therefore, the doe should either be removed from the kits and placed in another cage; or, the kits should be removed form the doe and the entire litter should be held together, at least in groups of bucks and does, for two to three weeks following weaning from the doe. There has been solid evidence that the stress on the weaned kits is not as severe if the siblings are kept together for a length of time after weaning from the doe rather than placing the kits in individual cages at the time of weaning. In addition, it has been shoen that the removing of kits all at one time reduces the incidents of mastitis in the doe (inflammation of the mammary gland) in the doe as compared to removing one or two kits at varying intervals. By removing all the kits at one time, the doe tends to dry up what little milk she does produce much faster than by allowing some of the kits to stay with her for longer periods of time and stimulate some production by the suckling process.

Due to the fact that young kits, form approximately four to eight weeks of age, consume more solid feed per body weight than at any other time in their life, there is an increased incidents of diarrhea and enteritis during the weaning process. This is attributed to the fact that the young kits are consuming vast amounts of nutrients as well as there is an increased stress upon the kits due to weaning.

Young rabbit kits open their eyes at approximately ten days of age and will readily initiate the consumption of dry feed at approximately fourteen days of age. Creep feed for young rabbits has not been a very popular or successful practice as of this time. The young kits will start to eat form the feeder of the doe at approximately fourteen days of age. One should note that if the length of the pellet is too long, there is an increased waste of the feed due to the fact the young kits will apprehend the pellet with their lips and teeth. If the pellet is extremely long, they will bite the pellet in two an consume the portion that is in the mouth. The portion that is outside the mouth will usually be wasted due to the fact that the kits do not remain over the feeder. Therefore, one must give consideration to the length of the pellets for the young kits to prevent feed waste.

Another very interesting situation is the pH (acid) of the young kits stomach is relatively neutral the first portion of their life and the various bacteria that they ingest passes through the stomach to other portions of the digestive tract. This is the manner in which the very important cecum becomes inoculated with the bacteria for further digestion of the

fibrous portion of the diet when the rabbit gets older. However, as the rabbit approaches weaning age, the digestive juices of the stomach become very acid and very few bacteria pas beyond the stomach area into the gastrointestinal tract. There has been serious studies done concerning the importance of the inoculation of the cecum at a young age and its benefit at preventing the incidents of enteritis at weaning.

Due to the seriousness and increased incidents of enteritis at weaning, some rabbit managers will restrict the amount of feed consumed by the doe and litter twenty-four to forty-eight yours prior to weaning and twenty-four to forty-eight hours after weaning. it is anticipated this will reduce the amount of calories consumed and will assist in the prevention of enteritis caused by over eating or enterotoxemia.

The identification of the young kits should be done seven to ten days prior to weaning; or, seven to ten days after weaning to reduce the stress of the weaning process. After the kits have been weaned, they should be kept in groups for ten to fourteen days after weaning prior to being placed in individual cages.

Weaning is a very important and stressful time in a young rabbit's life and many management practices can be implemented to reduce the stress on the individuals.

FEEDING NEWLY WEANED KITS

The weanling rabbit's gastrointestinal system is more susceptible to various types of pathology than at any other time in its life. This is due to the fact that the animal is consuming more volume of deed per pound of body weight than at any other time, the digestive bacteria in the cecum is relatively unstable, and there is a tremendous amount of stress placed upon the young weanling. It must be assumed that most rabbit managers full feed the doe and litter. Therefore, the young kit, when weaned, has ben able to consume as much feed as it desires. Due to the stress factors at weaning, some managers will reduce the feed consumption of the doe and litter twenty to fifty percent twenty-four to forty-eight hours prior to weaning to assist in the prevention of enteritis. In addition, many individuals will reduce the feed consumption of the kits post weaning, twenty to fifty percent to twenty-four to forty-eight hours to enhance the prevention of enteritis or enterotoxemia.

The feeding problem that one will pursue will depend upon the intended use of the rabbit. Growth rate and feed conversion is extremely important to the commercial producer and they will wish to feed the animal for the greatest growth rate possible. Other individual that are going to utilize the kits for show, pets or individuals that have had increased

incidents of enteritis, will not be as interested in the growth rate and will feed the animals so they will continue to grow and attain their maximum inherited weight; but, will not be as interested in the actual growth rate.

To achieve the maximum growth rate, it is imperative that the animal consume as many calories per day as possible and that they be of the appropriate protein content to achieve maximum growth rate. However, the limiting factor will be that it may be necessary to limit the number of calories consumed to prevent the condition of enterotoxemia. Therefore, it will depend on the manager and the intended purpose of the kits how the animals are fed.

It is accepted by most rabbit growers that at this particular period in the rabbit's life, one needs to feed a protein that is approximately 16% to 17%, the fat level approximately 3% and the fiber levels of at least 16%. It should be noted that one makes the assumption that the higher the fiber level in the feed, the lower the energy level and vice versa. The higher the energy level, the more rapid the rate of gain. However, one must be extremely caution that the energy level does not reach such a level that fatal enteritis occurs in the herd.

It is generally accepted that individuals that are raising fryer rabbits will full feed their weanlings from the time of weaning until they are marketed. While individuals keeping animals for replacement or show stock will tend to limit feed the weanlings from the time of weaning until they reach the adult age. This is particularly important for the replacement animal so the does do not have an excessive amount of fat in their abdominal cavity to cause breeding problems. Some managers limit feed these animals the amount of pellets they will consume once a day in approximately twenty to thirty minutes. The volume of pellets supplied to each of the weanling can be determined by monitoring the flesh condition of the animal and feed accordingly.

Feeding the weanling rabbit is of extreme importance in that one is able to maintain the maximum growth rate; bit, control the enteritis in the herd. The actual amount will depend on the concentration of the commercially pelleted feed available to each individual grower.

RAISING ORPHANED RABBITS

Feeding orphaned kit(s) is not a difficult endeavor and the results can be very gratifying. However, it requires a lot of time and patience. On occasion, individuals are reluctant to attempt this procedure due to previous bad experiences resulting from improper techniques. To raise orphaned kits successfully, it is necessary to implement strict management practices. It is mandated that the young kits are provided a

warm dry nest. The kits must be confined to a small area, where if there are more than one, they are kept in contact with each other to assist in the maintenance of the proper temperature within the nest. The above can be accomplished by placing the kits in a small confining dish or pan that has been lined with soft nesting material, fur or a soft towel.

The artificial nest must be placed on a heating pad, under a heat light; or, provided heat in some manner so the temperature can be maintained at approximately ninety-five to ninety-eight degrees Fahrenheit for the first ten to fifteen days of the kits life. The temperature can then be lowered there to five degrees per day and the kits allowed the freedom to leave the nest. It is extremely important that the nest is kept dry and clean.

During the first ten to fifteen days of the kits life, they are not capable of urinating or defecating without genital stimulation. This is due to the lack of development of the nervous system and the majority of death losses of orphaned kits in the first fourteen days of their lives can be attributed to a ruptured urinary bladder or intestine. It is essential that each kit's genitals are manually stimulated every two hours, day and night, for the first ten to fourteen days. This can be done by holding the kit in an upright position and gently stroking the area between the hind legs several times with a cotton ball or other soft material several times until elimination have occurred. The kit should then be returned to the nest. When natural eliminations are noticed in the nest, the manual stimulation process can be discontinued.

Feeding the young kits during the first part of their lives is of grave concern to most managers. There is a tendency to over feed the kits by feeding them commercial puppy or kitten formulas and feeding them too many times per day. It is recommended that each kit be nursed two times per day at twelve hour intervals.

Rabbits are unique in that the first milk produced by the doe (colostrum) is very similar in nutritive elements as the elements produced in mid-lactation. In addition, there appears to be very few maternal antibodies in the colostrum milk and this fact allows for orphaned kits to be raised successfully. Rabbit milk, as compared to other animals, is extremely high in protein, low in lactose, high in ash and low in water.

Due to the fact that rabbit milk is considerably different in nutritive ratio than other animal's milk; or, commercial puppy or kitten milk substitutes, consideration should be given to the milk substitute. The following formulation has been utilized with considerable success in raising orphaned rabbits and rabbits weaned at birth in the research

institution.

MILK REPLACER FORMULA FOR RABBITS

1 pint 2% milk
2 egg yolks
2 Tbsp. powdered milk
2 Tbsp. corn syrup
1 tsp. bone meal
NOTE: Mix thoroughly and keep cool until use

The base formula must be kept refrigerated and only a small portion warmed to ninety degrees Fahrenheit as needed. The kits can be fed with a small nippled bottle or an eye dropper. The kits should be fed only the amount they will readily consume, twice a day. Care must be utilized during the feeding process to insure the kits do not inhale any fluid into the respiratory tract and one does not over feed the kits.

The young kits eyes open at ten days of age and they begin to crawl from the nest shortly thereafter. The young kits rapidly develop. By twenty-one days of age they can withstand most environmental elements of the adult and the nest box can be removed from the cage. At fourteen days, the kits can be offered bread that has been soaked in milk, two to three times per day. The kits will readily adapt to utilizing the bread as a "nursery" and the bottle feeding can be gradually discontinued. The young rabbits will gradually start eating solid feed or rolled oats at fourteen to twenty-one days of age; and the rolled oats/pellet mixture shortly thereafter until the diet consists totally of commercial pellets at approximately thirty days of age. Young kits that have been fed as orphans may have a "roughened" fur appearance and will weigh slightly less at thirty days than a comparable kit nursed normally. But eight weeks of age, the body weight of the orphaned kits will be almost identical with that of kits nursed by the doe in a conventional manner.

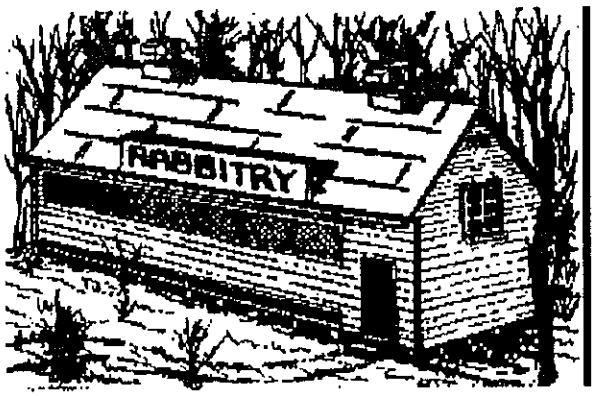
In summary, young kits are extremely dependent upon maternal care. Kits that are orphaned can be fostered or raised by hand quite successfully. However, regardless of the procedure utilized to raise the young kits, there are strict guidelines that must be followed.

ANIMAL	WATER %	PROTEIN %	LACTOSE %	FAT %	ASH %
Rabbit colostrum	68	13.5	1.6	14.7	1.6

14 days	74	13.4	1.0	9.0	2.2
30 days	61	16.9	0.2	17.5	2.8
Cow	87	3.5	4.8	4.0	0.7
Human	87	1.2	6.9	4.6	0.2
Sheep	84	4.8	4.6	5.4	0.9
Goat	87	3.7	4.2	4.1	0.8
Pig	84	4.9	5.3	5.3	0.9

Sources: Data from Lebas, 1991; Dittmer 1961. Adapted from Kelly 1976.

PRACTICAL VENTILATION OF THE



RABBITRY

THE BASICS OF RABBITRY VENTILATION

All individuals associated with owning and producing domestic rabbits agree that providing the animals with quality environmental air is of utmost importance for the health and maximized production of this species. Whether one constructs a new facility or converts an existing structure into a rabbitry, it is of extreme importance that one implements the appropriate techniques to provide the occupants quality air to breath.

Ventilation, by definition is: "allowing fresh air to enter so as to replace stale air". Basically, the purpose of any method of ventilation is to remove the contaminated air from around the rabbits and to replace it with fresh uncontaminated air. Oftentimes individuals confuse the purpose of the ventilation system of that of cooling the rabbitry only. This may be an associated effect of many ventilation methods but it is not the primary purpose. Adequate ventilation is just as important during cool weather as it is during the warmer months. Appropriate ventilation in the rabbitry is very confusing to rabbit growers, often totally misunderstood, of extreme importance, can be costly and may have a variety of solutions.

A totally controlled environment that dictates the temperature, humidity, air purity and etc. is desired for maximum production and health. To provide these conditions, the initial investment, maintenance of the system and the daily operation may be quite costly. The cost of environmentally controlled housing may exceed the amount of money that the rabbit fancier or small operator is willing to invest. Even though a controlled environment is ideal, many rabbit growers will sacrifice maximum production for a lesser production, and allow the rabbit to physiologically adapt to a varying amount of environmental changes. This may not be in the best interest of the maximum rabbit production; but, it is the "attitude" of many fanciers and backyard rabbit producers.

Environmental air may be contaminated with many substances that re detrimental to the animals and should be removed from the air that the rabbit breaths. These include, but are not limited to:

1. Carbon dioxide and other elements resulting from metabolism of ingested food.
2. Substances generated in the eliminated excreta. (Ammonia, bacteria and other elements).
3. Water droplets - humidity. The higher the humidity, the greater the surface area for bacteria to attach and contaminate the air.
4. Airborne microorganisms free-floating in the air or attached to other suspended particles.

5. Dust, pollen or other allergens in the air.

The following will discuss "applied" ventilation techniques and ventilation principles. It is anticipated that by comprehending the principles and understanding various alternative ventilation methods, the rabbit person will be able to apply this information to their individual rabbitries and enhance the quality of air that their rabbits inhale. Thereby enhancing production and health in the rabbit population.

The basic principles of ventilation are:

1. The warmer air in a structure tends to rise to the top of the structure. Rabbits exhale air that is approximately 102 degree Fahrenheit; therefore, tending to elevate the environmental air in most incidents. Ideal temperature in the rabbitry is 68-72 degrees Fahrenheit.
2. Ammonia, the primary obnoxious gas in most rabbitries, is heavier than air and tends to collect in the lower portion of the rabbitry.
3. Ammonia is suspended in the air by the fact that it will dissolve in water. Humidity is water molecules suspended in the air; therefore, this allows the ammonia to be suspended in the air. Humidity becomes of extreme importance to the rabbit grower. Ideally, the relative humidity should be 50% or less throughout the year.
4. Air will move from an area of higher pressure (positive) to an area of lesser (negative) pressure.
5. Mechanical devices; such as fans, are utilized to create positive and negative pressures to assist air flow.
6. There are limitations on how far air may be "pulled" or "pushed" with natural or mechanical ventilation methods.

Achieving appropriate ventilation will be dependent upon: a) the amount of air to be moved, measured in cubic feet per minute (cfm); b) the quality of air put into the structure form the fresh air source; and c) the volume of contaminates produced within the structure. One may reduce the amount (volume) of air necessary to properly ventilate a structure adequately by reducing the amount of air contaminates produced within that structure. This may be achieved by reducing the density of animals, more frequent removal of excreta or by the utilization of materials to inhibit the formation of the obnoxious gases, particularly ammonia.

Any type of ventilation system must have air inlets to allow the fresh air to enter the structure; and air outlets to allow the stale air to be removed. (see diagrams), It is of extreme importance that these (inlets and outlets) be of appropriate total size for the volume of air that must be

moved, be placed at the correct locations to allow the area to be ventilated; and, assure that the openings are not restricted. Caging, accumulated dust and fur can oftentimes retard the air flow in excess of 50%. The size and placement of the inlets and outlets will vary depending upon the size of the structure and the type of ventilation system utilized.

There are two basic methods of ventilation.

I. NATURAL VENTILATION

This method is totally dependent upon the natural air movement due to the presence of the prevailing winds and the thermal activity of the air. This is the most common ventilation system in most small rabbitries in the United States. The fresh air is moved into the rabbitry by the air currents and the stale air is "pushed" out of the enclosure>

The advantages of this system are:

1. economical to operate and maintain
2. no supplemental energy necessary
3. efficient and workable with appropriate weather conditions and physical structure.

The disadvantages of natural ventilation are:

1. climatic conditions, such as prevailing winds, may not be dependable and consistent.
2. requires a rather open physical structure, and these may not be conducive to environments with temperature extremes.
3. requires a physical structure that addresses air quality below the normal window level.
4. the amount of air movement limits the density (pounds of rabbit per square foot) of animals per given area.
5. more difficult to convert existing structures into rabbitries due to location and size of air inlets; as well as, air outlets may not be of adequate size or properly placed to allow for the exhausting of the stale air.

II. MECHANICAL VENTILATION

This is a ventilation system where mechanical devices, such as fans, are employed to create negative or positive pressure to move air into or out of the structure. Fresh air is either "pushed" (positive pressure) or "pulled" (negative pressure) into the structure. There are limitations to how far air may be moved, laterally and/or horizontally by a single mechanical device. Mechanical ventilation may be used as the only source of fresh air or may be utilized in combination with natural ventilation to assist in controlling the air quality when the need arises.

There are two basic types of mechanical ventilation. They are:

A. **NEGATIVE PRESSURE VENTILATION SYSTEM** - This is so named due to the fact that the contaminated air is exhausted from the structure via a mechanical device; thereby, creating a lower pressure (negative) within the structure and fresh air enters the building through the supplied inlets or cracks and imperfections in the building. There are a multitude of variations of how this type of system may be installed to meet the needs of the particular structure.

The following must be given consideration when installing a negative pressure ventilation system.

a). Location of exhaust device. (see diagrams). The effectiveness sand efficiency of this ventilation system will depend upon the location of the mechanical device in the structure.

Air may be "pulled" much further directly away from the fan (horizontally) than to each side (laterally). Therefore, it is most appropriate to place the exhaust device on one of the narrow ends of the building. the end selected should be away from the direction of the prevailing wind. This will assist the action of the air flow. If placed to blow into the prevailing wind, the resistance would be increased; thereby, lowering the efficiency of the air movement and placing increased demands on the motor, decreasing the life expectancy of the device.

The exhaust device that is placed on the narrow end of the building should be laterally placed in the center of the span to allow for uniform air movement within the structure. When a building exceeds 24 feet in width, consideration must be given to the placement of multiple devices, equally spaced, to each 24 feet. Practically speaking, it is very difficult to move air more than 12 feet laterally and vertically on each side of the fan and of a greater length than 75 - 100 feet. Devices that are less than ample size will have even lesser capabilities.

After the decision to locate the exhausting devices in the center of the narrow side of the building away from the prevailing winds, one must make a decision on the vertical (up and down) placement. This placement must be as high as possible or as low as possible, to achieve the maximum uniformity of ventilation, and will be totally dependent upon the location and placement of the air inlets.

When the air inlets are low, 6 - 12 inches from the floor (below the lowest cage), the exhausting device must be as high as possible (see diagram). This would be in the apex of

"A" framed structures or 12 inches below the false ceiling, when present. It is recommended that the device be above the highest cage in the structure. The advantage of this configuration is that this allows for the warm air that raises to the top to be exhausted rapidly. This may become a disadvantage when the environmental temperatures are extremely cold; as the warm air will not be utilized to heat the building and when the building is supplemented with heat, this may increase the heat cost needed to maintain the desired temperature. The primary disadvantage of this system is that the ammonia that is produced is heavier than the air and tends to collect closer to the floor; and, must be "pulled" through the rabbits to be ventilated. This may allow for the rabbits to be exposed to this obnoxious gas; but, with frequent removal of the excreta and the use of ammonia formation inhibitors, this disadvantage can be kept minimal.

The placement of air inlets just below the roof and/or above the highest cage mandates that the exhausting device; again, be in the middle of the narrow end of the structure, away from the prevailing wind and as close to the ground as possible (see diagram). This allows the fresh air to enter from the top and the stale air to be exhausted from the bottom. The advantage of this system is that the ammonia, this is heavier than air and collects along the floor, is quickly exhausted from the structure and has less of a tendency to come in contact with the rabbits. The disadvantage is that the lighter warm air is pulled through the rabbit; however, in cold weather this may be an advantage.

b). The placement and size of the air inlets.

These are extremely important structures! The vertical location of these has been discussed above. It must be emphasized that caution must be used to insure that the vertical location is correct. Without the appropriate upper or lower air inlet placement adequate ventilation is difficult to achieve. There is a tendency, when converting existing structures, to utilize existing doors and particularly windows, for air inlets. Many times these will be the same level as the cages; this allows for the possibilities of creating drafts on the rabbits and for the air to "channel" directly to the exhausting device and not to exchange the air in the cages above and below the inlets. This same situation may be created when the exhausting device is placed in a window.

The air inlets must be placed uniformly around the <u>entire perimeter</u> of the structure to allow for complete ventilation. Ideally, the inlets should be adjustable to allow the manager to control the volume of air moved in various sections of the rabbitry to correspond to the density of animals within the

structure and the outside environment. Adjustable air vents that are 12 inches high and 3-4 feet in length are usually recommended and are commercially available. It is very important that the vent be kept free of fur and dust so as not to restrict the air flow.

c). Where negative pressure ventilation systems may be utilized.

These systems, or variations of these systems, may be utilized successfully in many situations. They are most adaptable to narrow buildings that are not more than 24 feet in width and are less than 100 feet in length; and, where there are not temperature extremes. However, even when there are temperatures extremes, one may make other additions to assist in controlling the environment and use these systems very successfully. In addition, the principles of these systems may be utilized very successfully to assist other ventilation systems; or, to ventilate a specific area of the rabbitry that needs assistance. This is particularly true when adapting an irregularly shaped building into a rabbitry.

B. POSITIVE PRESSURE VENTILATION SYSTEM (see diagram) This is a system where a mechanical device, such as a fan, forces (blows) air into the structure increasing the pressure (positive) inside the building and forcing the stale air out the outlets. When larger buildings are to be ventilated, a large specialized plastic tube (Venturi) may be utilized to distribute the air appropriately.

To work efficiently and effectively the placement of the mechanical device and the location of the air outlets are of extreme importance to insure that the structure is uniformly ventilated. The lack of proper distribution or the deflection of the air by various objects may cause the development of "pockets" of stale air that may be detrimental to the rabbits housed in that section of the building.

The following must be given consideration when implementing a positive pressure ventilation system.

a). Location of the mechanical device to force air into the structure (see diagram). The efficiency of the system will depend upon the proper location of the source of the fresh air in relationship to the outlets for the stale air. The device should be located in the narrow end of the building facing the prevailing wind. This will assist air flowing into the structure.

The lateral placement of the mechanical device must be in the middle of the structure to encourage uniformity of the air disbursement. The vertical placement will be in correlation of the air outlets. Placement of the mechanical device 6 -12 inches above the floor (below the lowest cage) will mandate

that the air outlets be high as possible (above the highest cage) and just below the attachment of the roof structure and around the entire perimeter of the structure.

The vertical placement of the mechanical device will be elevated (6-12 inches below the ceiling level and above the cages) when the air outlets are placed low (6 inches above the floor and below the cages). This place must be utilized when one adds the air distribution tube (see diagram) to the system to more uniformly distribute the air and to ventilate structures to extend length.

The advantages of the higher placed mechanical device are that there is usually less restriction of the air flow and one may utilized the distribution tube.

b). The size and placement of the air outlets. These are extremely important and must correlate to the vertical location of the mechanical device forcing air into the building; when mechanical device high, the air outlets low and vice versa.

The size and configuration of the outlets is exactly the same as those discussed with negative pressure ventilation. It is of extreme importance that the outlets be around the entire perimeter of the structure.

c). The situations where positive pressure ventilation systems may be utilized. This system is desired in the wider and/or longer structures and buildings of odd configuration; especially, with the utilization of the distribution tubes. With this system, the rabbit manager has greater control of the air quality in most circumstances. The disadvantage of this system is that when the distribution tube(s) are added, they add cost and increase the difficulty of installation.

MECHANICAL AIR MOVING DEVICES

The selection of the correct device to ventilate the rabbitry may be very confusion due to the availability of this equipment in many shapes, styles and sizes. In addition, determining the amount of air that must be moved ha many variables and may be confusing to determine. The total volume of fresh air that must be moved into the structure; or, the amount of stale (contaminated) air that must be pulled out of the structure, will vary depending upon many factors. These include:

a. Size of structure - calculated in cubic feet. The volume within a structure to be ventilated is determined by multiplying the length times the width times the height. example: A building that is 50 feet long, 10 feet wide and 10 feet high would contain 5,000 cubic feet of air space.

b. Density of rabbits. Increasing the total pounds of rabbits in a structure increases the demands of the ventilation system.
c. Frequency of excreta removal. The longer the excreta is allowed to stand within the structure, the more air contaminates is generated and the greater the demands on the ventilation system.
d. Environmental temperature. As the temperature increases, there is an increased amount of air contaminates generated from the excreta. The effect of ventilation on the environmental temperature within the structure itself will be totally dependent upon the temperature of the fresh air source.
e. Humidity. The higher the humidity, the greater the surface for contamination; thereby, increasing the demands on the ventilation system.
f. Other factors.

The volume of air that the ventilation device may be capable of moving will be dependent upon several factors; these include the following:

a. motor size, measured in horsepower (hp).
b. motor speed, measured in revolutions per minute (rpm).
c. size (diameter) and number of blades on the device.
d. pitch of the blades.
e. length of time operated per segment of time per hour. Example: 2-10 minutes every 15 minutes for full time. Timers available with a multitude of possible combinations.

The capabilities of most commercial mechanical air moving devices are attached by the manufacturer to the device. This is usually in the form of cubic feet of air that can be moved per minute (cfm). Determining the capacity of home made devices will require more information and may be more difficult.

Generally, it is recommended that one install a system that is capable of totally exchanging the air in the structure a minimum of 10-20 times per hour when operating at maximum capacity. This amount may not be necessary to adequately ventilate the rabbitry but will allow the utilization of the system at less than total capacity to decease the stress and wear on the electrical motors.

Utility exhaust fans, for a negative pressure system, or mechanical intake devices for a positive pressure system, are readily available from many supply houses. They are usually listed in many sizes and an example follows:

BLADE DIAMETER	BLADE PITCH	AIR DELIVERY CUBIC FT/MIN	MOTOR *RPM	**HP
7"	1/8"	135	1500	1/40
10"	1/8"	520	1500	1/40
12"	1/4"	650	1200	1/30
16"	1/8"	879	1200	1/20
18"	1/8"	1625	1000	1/15

*REVOLUTIONS PER MINUTE
**HORSEPOWER
NOTE: Devices are available in other specifications. These noted are for demonstration purposes.

An example of computing the need for the proper sized device is a follows:

Building size - 10 feet wide, 50 feet long, 10 feet high
10 x 50 x 10 = 5,000 cubic feet of air space

To change the air 10 times per hour; 50,000 cu. ft. of air must be moved. To change the air 20 times per hour; 100,000 cu. ft. of air must be moved.

From the specifications listed above, utilizing the 10 inch fan would provide the following: -520 CFM (cubic feet of air movement per minute) or; -31,200 cubic feet or air movement per hour.

This would be approximately 6 total air changes in the 10' x 50' x 10' building; at maximum use, this would not conform to the needed 10 total air changes per hour. Therefore, a device with more air moving capacity must be considered. Utilizing the 18 inch fan would provide the following:

-1625 CFM (cubic feet of air movement per minute); or, -97,000 cubic feet of air movement per hour. This would be approximately 20 air changes per hour. This would meet the established parameter of 10-20 air changes per hour.

This demonstrates the necessary steps in determining the requirement of achieving the amount of ventilation desired in a specific sized structure and how to determine the air moving capacity of a mechanical device.

TIMING DEVICES

There are a multitude of these available that may be set manually to operate a varying amount of time per 15 minutes. This allows for adjustment to compensate for a variety of environmental changes at the manager's desire. Other devices such as thermostats and humidistats may be utilized to control the ventilation device(s).

DISTRIBUTION TUBES

These devices may be utilized to distribute the fresh air throughout the rabbitry when positive pressure systems are utilized. These are particularly beneficial in structures that are very long and in varied shapes, other than rectangular structures. Adequate distribution of the fresh air is just as important as adequate volume. Due to the various unique caging methods in many rabbitries, it is not uncommon for stale "pockets" of air to develop due to deflection of the air flow. This situation may be expressed by rabbits in certain areas having the increased incidents of respiratory disease compared to other areas of the barn.

CHECKING AIR FLOW

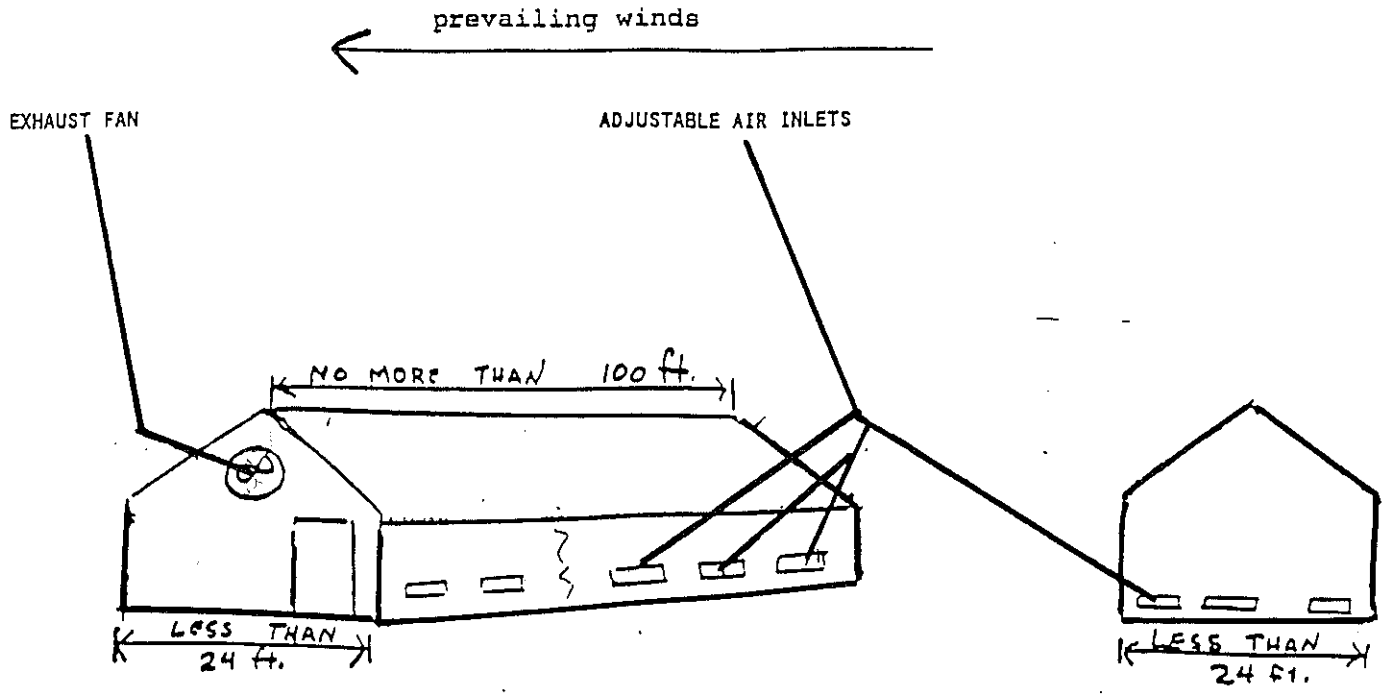
Periodically it is advisable to evaluate the air flow within the rabbitry. This can be easily done by the utilization of non-irritating non-toxic smoke producing devices that are specially manufactured for this purpose. These devices may be purchased at reasonable prices, from most businesses specializing in heat and air conditioning.

The colored smoke is released within the structure and the pattern and amount of time that is required for the smoke to be removed is evaluated. This allows one to make various adjustments in the volume of air moved and the caging configuration to insure that appropriate ventilation procedure are being employed.

SUMMARY

Ventilation within the rabbitry is of extreme importance to the health and welfare of the occupants. Appropriate ventilation may be achieved in many ways depending upon the circumstances.

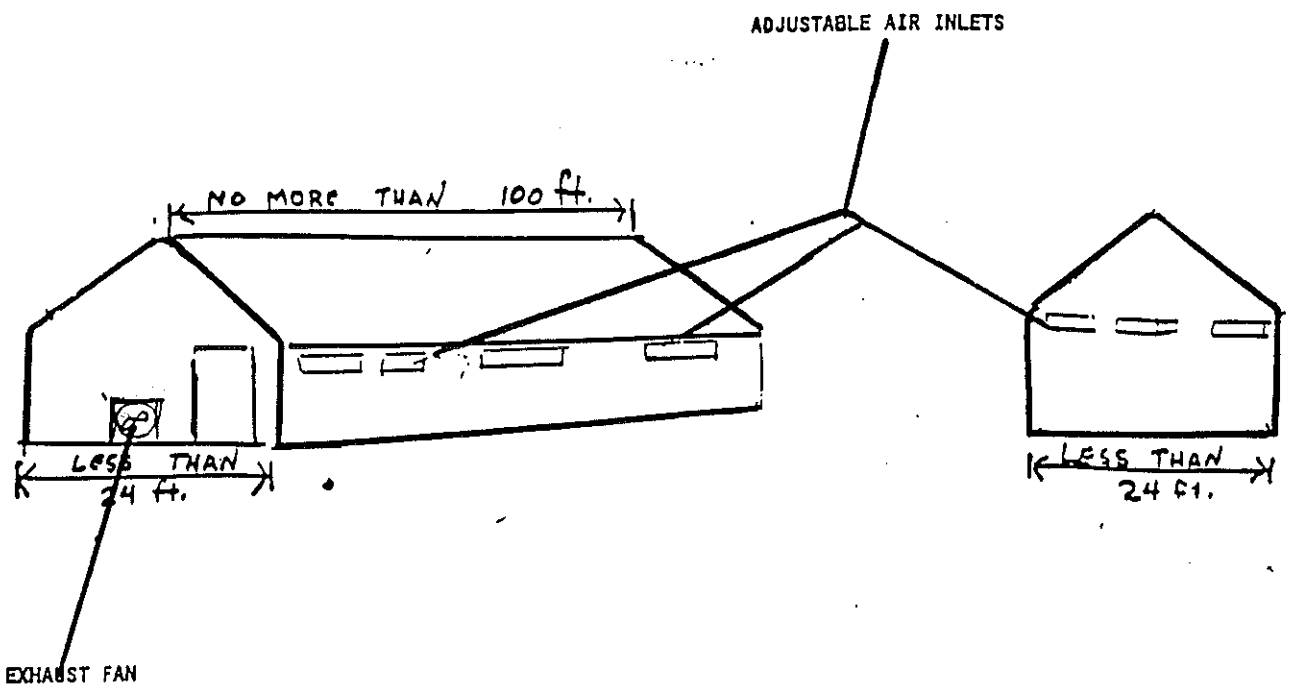
To achieve providing quality air to the rabbits there must be inlet(s) for the fresh air and outlet(s) for the stale air, the placement of each is critical to achieve complete ventilation of the structure. The type of ventilation system necessary will depend upon many factors. One may use various additives, such as distribution tubes to enhance the air quality in large odd shaped buildings. to insure that the ventilation method is functioning adequately, the air flow should be checked with a non-toxic colored smoke.



FRONT AND SIDE VIEW

BACK VIEW

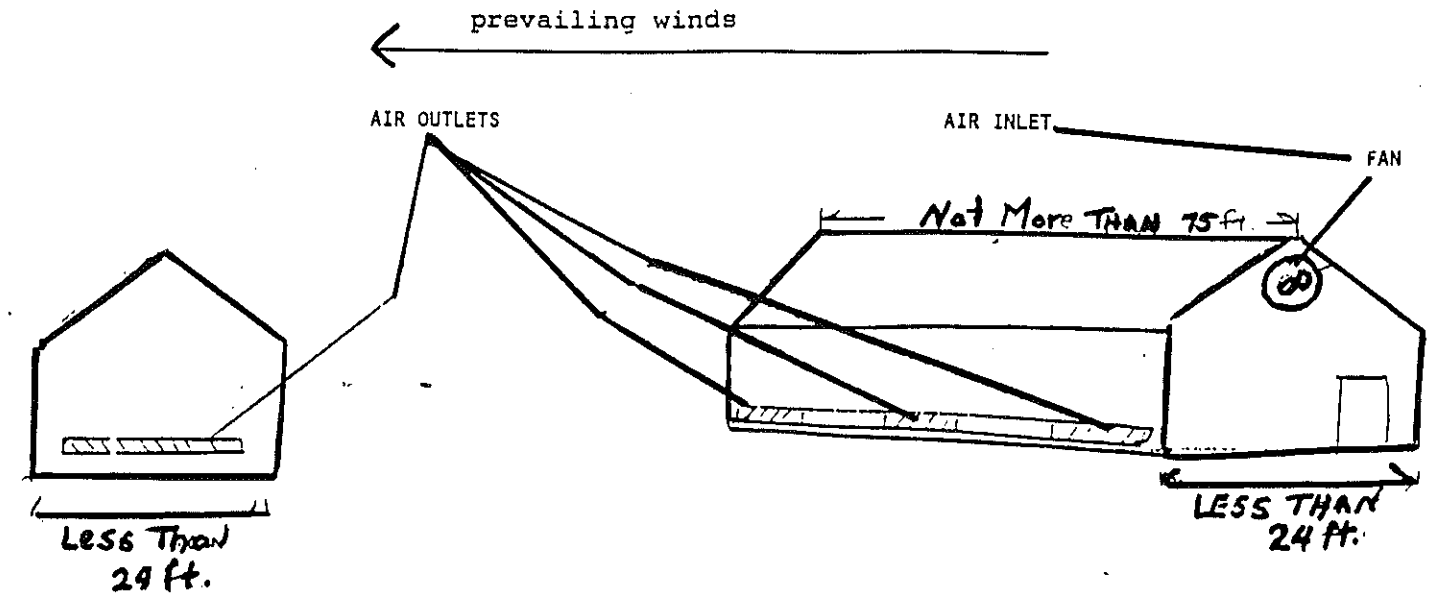
FIGURE 1 - NEGATIVE PRESSURE VENTILATION SYSTEM -Elevated exhaust fan low air inlets.



FRONT AND SIDE VIEW

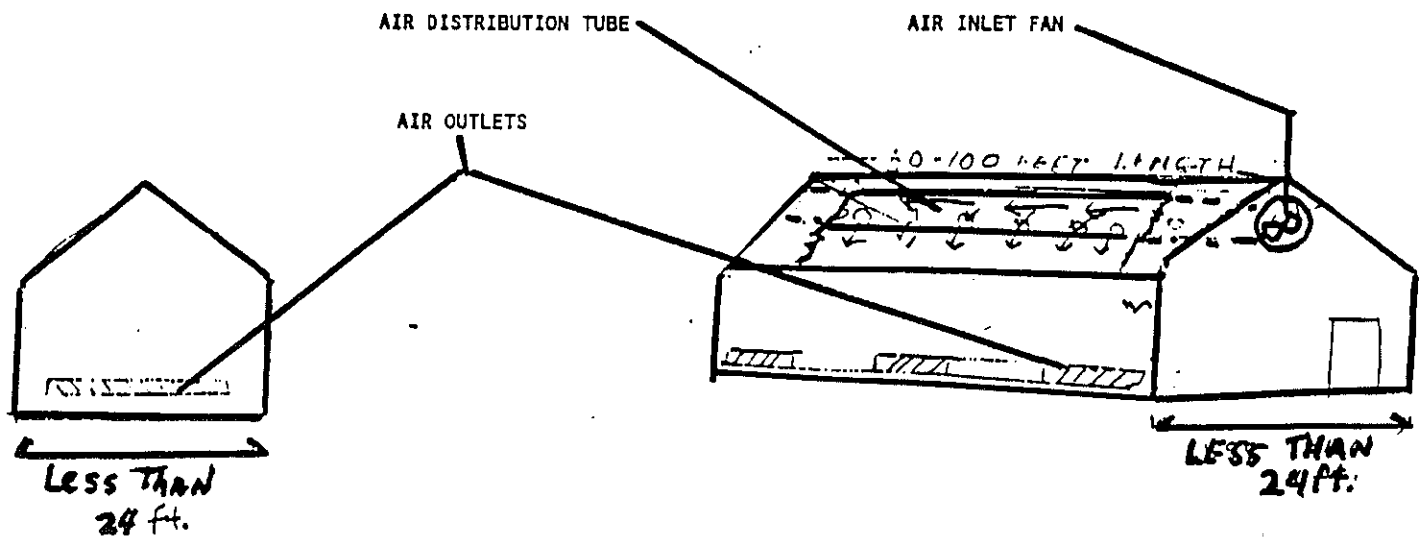
END VIEW

FIGURE 2 - NEGATIVE PRESSURE VENTILATION SYSTEM - Low Exhaust fan and elevated air inlets.



BACK VIEW FRONT AND SIDE VIEW

FIGURE 3 - POSITIVE PRESSURE VENTILITION SYSTEM -



BACK VIEW FRONT AND SIDE VIEW

FIGURE 4 - POSITIVE PRESSURE VENTILITATION SYSTEM - For long structures - excess of 50 feet.

A DISCUSSION OF VARIOUS AILMENTS

OF THE DOMESTIC RABBIT

DISEASES OF THE DOMESTIC RABBIT

The presence of a disease in the domestic rabbit interferes with the intended purpose. This animal has multiple uses and the effect of a disease on a rabbit will be perceived totally different depending upon the owners intended use.

Disease in a commercial operation will interfere with production. These operators must be aware of early diagnosis, preventing the spread of the disease to other animals in the herd and preventing the situation from returning in the future. Commercial operators are very conscious about the health and welfare of their rabbits. Mistreated rabbits will not produce to their maximum potential, will not have adequate rates of gain or efficient feed conversion. Performance is essential for this type of producer to have an economically profitable operation.

A rabbit that is ill will never attain its maximum genetic potential as it relates to body type, fur quality, production and overall condition. These factors are of extreme importance to the hobbyist. It is essential that these rabbit owners give concern to exposure to disease as they exhibit their rabbits in the company of others from various rabbitries.

House rabbits receive individual care with the extrapolation of more advanced medical and surgical procedures from other species. The quality and consistency of health care for the pet rabbit is improving. This is a rapidly expanding area of the rabbit industry.

Each phase of the rabbit industry may learn from each other even though the perception is somewhat different. Health care of the domestic rabbit has suffered through the years due to:

1. The lack of research on rabbit health care and production.
2. The industry has been so small that it has demanded little attention in most accredited veterinary school's curriculum.
3. The rabbit has some unique physiological characteristics. Some of these do not lend well to the extrapolation of medical procedures from other species without considerable variation.
4. Few drugs are "cleared" for the use in rabbits due to the cost of approval in relationship to the market potential.
5. "Off label" drug usage may create hazards of the possibility of contaminating the food chain from lack of knowledge concerning withholding times.

A disease is "a specific state of malfunctioning of the animal body". There are several factors that cause the

rabbit's body to malfunction. There are two classifications of disease; infectious and noninfectious.

INFECTIOUS DISEASE

This is a disease caused by a living pathogen or pathogenic agent. These include:

1. Internal parasites (example: pinworms)
2. External parasites (example: ear mites)
3. Protozoa (example: Intestinal and Hepatic Coccidiosis)
4. Fungi (example: Ringworm)
5. Bacteria (example: Pasteurellosis - "snuffles")
6. Viruses (example: Myxomatosis)

There are many organisms that live in the environment, within and on the body. Organisms living in or on the body that cause diseases are pathogens or pathogenic agents. Organisms that live on or in the body and does not cause any problems are normal residential organisms. On occasion, stress injury or other abnormal conditions occur and normal residential organisms may cause a disease or abnormality.

Infectious diseases are contagious in that they may be transmitted from one rabbit to another rabbit. There are varying degrees of contiguousness from one organism (disease) to another and within strains of the same organism. Identifying the disease causing organism is essential. This allows appropriate measures may be taken to control the spread of the disease and prevent the disease from returning to the rabbitry.

HOW DISEASES ARE TRANSMITTED

Knowing how the pathogenic agent passes from one rabbit to another is important. Knowing this information will allow the rabbit owner to implement management practices to control the disease in the rabbitry. Pathogens are usually very species specific in that they will pass only within individuals of the same species. On rare occasions a disease of rabbits will affect the human. When this is possible, there is public health significance. Infectious disease that affect both humans and animals are zoonotic diseases.

Methods of transmission are as follows:

DIRECT CONTACT

This is where the animals must be in contact with each other for the disease to be transmitted. The incidence of this method of transmission increases when the density of rabbits in the cage is high. Another method of direct contact is the transmission of the venereal disease via mating.

INDIRECT CONTACT

The transmission of the pathogen is from one rabbit to another through inanimate materials (formites). The organism may be on feed crocks, in watering systems, nest boxes, grooming equipment, or on the shoes or hands of the caretaker. Appropriate disinfection of all fomites is essential to prevent transmission of disease by this method. It is important to select the correct disinfectant. One must use the recommended concentration and be sure the contact time is adequate to sterilize the equipment.

AIRBORNE TRANSFER

Pathogens move about in the air by adhering to water droplets (humidity) or dust particles. Microorganisms cannot survive for long periods of time without moisture. Elevated humidity encourages the increase of pathogen numbers in the air.

Airborne microorganisms enter the environmental air via the aerosols created when rabbits sneeze or when they gain access from contaminated surfaces by air movement. Increased density of rabbits in a given area may increase the concentration of pathogenic organisms in the air.

Airborne infections may be reduced by:

1. Keeping the humidity low (40% - 50%)
2. Enhancing the ventilation (minimum of 10 total air changes per hour).
3. Do not over crowd rabbits for the size of the facility and the capacity of the ventilation system.

An example of an airborne infection is "snuffles".

VECTORS

These are usually insects that carry the disease causing germ from one rabbit to another. Most of these are mechanical vectors where the pathogen attaches to the body surface to be distributed to other places. A good example of this type of vector is the common fly.

A biological vector has a portion of the development of the disease process taking place in the vector. An example of this would be the insect necessary for Myxomatosis to develop.

ORAL TRANSMISSION

Pathogens may be transmitted in the feed, water or during the grooming process. Most pathogens in the feed are destroyed by heat during the pelleting process. Feed, including forages, usually becomes contaminated during storage by feces and urine of pets or rodents. Watering equipment is an ideal

site for microorganism growth, particularly when the environmental temperatures are warm. This may be reduced by adding chlorine to the drinking water to suppress this growth.

Rabbits groom themselves daily with their tongue and when pathogens are present, they also may be ingested. To minimize this type of exposure it is essential that one controls the density of animals in the cage. Appropriate cage sanitation must be implemented and maintained.

Contamination of the food and water with feces and/or urine allows for many microorganisms to be transmitted to other rabbits or for the rabbits to reinfect themselves. This may be prevented by using feed and water systems that prevent contamination. Also, one must prevent overcrowding in the cages. This is a common way coccidia perpetuates itself in the rabbitry.

NONINFECTIOUS DISEASE

These diseases are not contagious and will not pass fro one rabbit to another. Infectious diseases are important to the rabbit producer. They may impair production, cause poor performance, predispose the rabbit to other types of disease and may cause death. Noninfectious diseases include maladies caused by mismanagement, genetic disorders, metabolic malfunctions, injuries, toxic substances and nutritional disorders.

Good management is essential. Utilization of practices that are not appropriate may cause severe losses, particularly in production. An example would be using nest boxes that are not appropriate for the size of the doe.

Genetic defects may be passed from generation to generation. Many genetic defects are self eliminating in that defect causes deaths in the rabbit shortly after birth or before reproductive maturity. Other genetic defects, such as malocclusion, are not self eliminating and may cause severe consequences. This is uncomfortable for the rabbit, is a disqualification on the show table and interferes with the rabbit's life style.

The most common metabolic disorder in rabbits is Ketosis. This is a malfunction of the fat metabolism of the body and is most commonly observed just prior to or just after kindling.

Improper handling or implementation of incorrect management techniques often encourages injuries to the rabbit. The most discouraging example of injury is the dislocation of the spinal vertebrae causing complete paralysis of the hind legs.

Lack of, or an excess of various nutritional elements may interfere with the health and production of the domestic rabbit. The most common deficiency in the diet of fiber. The signs of deficiency and toxicity of some of the micro nutrients are very similar and special procedure must be implemented to differentiate. Nutritional deficiencies are most commonly observed when commercially prepared pellets are with an abundance of additives that are not balanced.

In conclusion, the presence of disease in any rabbit may be serious. Early and correct diagnosis is essential for the welfare of the rabbit and the benefit of the owner. This will allow the owner to:

1. Treat the condition correctly.
2. Implement the necessary management practices to prevent the disease from spreading to other rabbits in the herd.
3. Take the necessary precautions to prevent the condition occurring again.

Determining whether the condition is infectious or noninfectious and understanding how disease is transmitted will help the owner in achieving

THE RESPIRATORY TRACT OF THE DOMESTIC RABBIT

The respiratory system contained in the thoracic cavity is very important to the rabbit's cellular activities. This system carries out the vital exchange of oxygen and carbon dioxide within the body. In addition, the respiratory system plays a role in the regulation of body temperature, elimination of moisture and vocalization.

I. ANATOMY

There are two groups of muscles involved in respiration. the inspiratory muscles move air into the system and expiratory muscles move air laden with carbon dioxide out of the system. The diaphragm is an inspiratory muscle.

The following is a list of parts of the respiratory system and their role.

PHARYNX - A passage way for air from either the nose or the mouth.
LARNYX - The voice organ which is located in the anterior portion of the neck in most animals.
GLOTTIS - An opening in the floor of the pharynx.
EPIGLOTTIS - Lid-like structure which protects the glottis.
TRACHEA - Tube-like structure commonly known as the "windpipe".
BRONCHI - Tube-like structure of which there are two, each leading to a lung.

LUNG - A chamber containing many blood capillaries where respiratory exchanges occur.
ALVEOLI - Small compartments in the lungs where the actual respiratory exchanges happen.

II. PHYSIOLOGY

How does this amazing process called respiratory occur? As the rabbit breathes, approximately 45 times per minute, air is brought into the respiratory tract with the help of the inspiratory muscles. They contract, which causes the thoracic cavity to expand and the lung to inflate. Air is drawn into the trachea from the mouth or nose and proceeds to the lung by means of the left and right bronchi. From there it travels to bronchioles and finally to the alveolar beds (air sacs) where the actual exchange of oxygen and carbon dioxide occurs. Then as the inspiratory muscles relax and the expiratory muscles go into action, air is forced out of the thoracic cavity contracting. Thus the process is completed.

III. DISEASE

Rabbits are susceptible to several kinds of diseases. We will deal with only a couple. Before discussing them, it is a good idea for you to know what the signs or symptoms are that will indicate to you that a disease condition exists. Here are six good indicators:

1. Increased body temperature
2. Increased respiratory rate
3. Nasal discharge
4. Loss of appetite
5. Labored breathing
6. Death

As you work with your rabbit/rabbits on a daily basis, you should be on the alert for any of these signs and be prepared to act to restore a stat of health.

Below are a couple of respiratory diseases observed in the rabbitry.

A. SNUFFLES

Snuffles, also called rhinitis, is a chronic disease involving nasal sinuses. It is one of the most commonly observed rabbit diseases with reports indicating as many as 70% of the rabbits affected in some colonies. The causative is a bacteria called *Pasteurella multocida.*

1. **SIGNS**
   This disease is characterized by a mucus to mucopurulent nasal discharge. The nasal discharge causes the rabbit to rub the external nares with its front paws. The wetness causes the fur to have a matted look. Other signs are

sneezing, coughing, and a snuffling sound from which the disease derives its name.

2. **CONTROL AND PREVENTION:**
The establishment of colonies free of the organism has provided the surest method of preventing the disease. It is important that you remove clinically ill animals. Also helpful would be to remove carriers of the organism as determined by a nasal bacterial examination.

3. **TREATMENT**
Antibiotics can be used to treat snuffles. Although the clinical signs can easily be suppressed, a cure on the other hand is difficult if not impossible. Some drugs that have been recommended are penicillin, streptomycin and aueromycin. These help in fighting off secondary infections. Another suggestion that has been offered is to chlorinate the drinking water (1 tsp./gallon).

B. **INFECTIOUS PNEUMONIA**

This disease is the greatest single cause of death among mature animals; as well as 53% of the deaths in some studies. Other studies have shown that the majority of pneumonia cases occur in four to eight week old rabbits. Several organisms are the cause of this disease among which are Pasteurella multocida and Bordetella bronchiseptica.

1. **Signs**
One problem in identifying signs is that because the domestic rabbit has so little opportunity to exercise, respiratory distress is not always evident until it is too late. Some of the signs one should watch for are labored breathing, loss of appetite, increased body temperature, bluish eye color, nasal discharge and rapid death.

2. **CONTROL AND PREVENTION**
The procedures are the same as for Snuffles. Additionally, one should be sensitive to proper ventilation and limiting stressful situations.

3. **TREATMENT**
Broad spectrum antibiotics have been the recommended treatment. Erythromycin has proven to be very effective with adult rabbits.

"SNUFFLES" - PASTEURELLOSIS

"Snuffles" is an upper respiratory infection that is caused by the organism Pasteurella multocida. This is a normal inhabitant of the upper respiratory system of many rabbits. When the animals are placed under some type of stress, such as hot weather, shipping, kindling or the presence of

parasites or other disease, the Pasteurella sp. organism is able to gain access into the tissue of the rabbit and cause various signs and symptoms. The most common sign of "snuffles" is that the animal will sneeze periodically and there will be a white to yellow nasal discharge. When the infection is more prolonged and the Pasteurella multocida organism enters the blood stream (septicemia), the organism can cause other serious situations. This can be recognized as a very acute pneumonia, abortions, reproductive disturbances, multiple abscesses and other signs of systemic infection.

This is a very dreaded disease in the rabbitry, due to the fact that there is not any effective treatment of this organism in the rabbit with any type of antibiotic or vaccine.

Due to the above facts, prevention and control is of extreme importance. It is imperative to control "snuffles" in the rabbitry that the animal has a supply of excellent quality air. It is mandated that there by a sufficient amount of ventilation within the rabbitry that the ammonia content that the rabbit inhales is maintained at a very low level so the ammonia does not irritate the mucus membranes of the respiratory tract and allow the Pasteurella multocida to become established. In addition to good ventilation, one must also keep the various stresses upon the rabbit to a minimum.

The second item to control "snuffles" in the rabbitry is when a rabbit develops the above signs of "snuffles", they **MUST** be removed from the rabbitry immediately so they do not contaminate the other rabbits and equipment with the Pasteurella multocida organism. Strict culling is essential if one is to control this disease in the rabbitry.

The third item the rabbit manager must adhere to in controlling "snuffles" is to retain breeding stock that has shown a resistance to the Pasteurella multocida organism. This is very important and only animals that show resistance to the disease should be retained in the herd for breeding stock. If the animals develop any of the signs and symptoms, they should be immediately culled from the herd.

If one follows the above recommended procedure, within about four to five generations, one can develop a herd of rabbits that is relatively Pasteurella sp. resistant. This is a very long and tedious process but one that is well worthwhile.

In rabbitries that has an "out break" with Pasteurella multocida or a pneumonia type situation, the animals can be treated immediately with terramycin in the drinking water to prevent the secondary type of pneumonia that often persists. Again, antibiotics are not effective against the Pasteurella

multocida itself; but, by utilization of antibiotics when there is a respiratory disease out break, one can eliminate the secondary bacteria from causing the problems which will often allow the breeder to go through a crisis. It will be mandated that they improve the ventilation in the rabbitry as well as cull the animals that show the actual signs of the Pasteurella multocida infection.

WRY NECK

Wry Neck is a condition in rabbits where the head will be tilted to one side or the other. The degree of head tilt will vary considerably from rabbit to rabbit and the head tilt can become so severe that the animal will not be able to stand on its feet. They will actually roll over and over due to a lack of balance. Even though the animal's head will be very severely tilted, they will usually continue to eat and drink as long as they can stand on their feet to apprehend the feed and come in contact with the water.

The actual cause of Wry Neck in rabbits is due to an inflammation of the balance mechanism deep within the ear. Wry Neck **IS NOT** associated with ear canker in rabbits. The inflammation of the inner ear is usually caused about 97% of the time by the organism Pasteurella multocida. The remaining 3% is caused by various types of bacterial infection of the balance mechanism. The bacterium usually gains entrance into the ear through the progress of a respiratory infection or from the bacterium being carried to the middle ear via a septicemia. This is often times related to respiratory inflammation or pneumonia that is caused by the Pasteurella multocida organism.

Treatment of animals that have shown prolonged signs of Wry Neck is very difficult and the effectiveness of the treatment is very poor. IF animals are treated after the signs re immediately initiated, the success rate is about 60%. Unfortunately, many of the animals that recover from Wry Neck will have a recurrence of the condition sometime in their life. The most successful treatment to date is the utilization of injectable terramycin used as ear ointment placed in both ears each day for about fifteen to seventeen days. Approximately 60% of the animals will show improvement and recover with this treatment.

The difficulty in treating this condition is due to the fact that it is very difficult to get antibiotics to the inflamed area and the fact that Pasteurella multocida is not sensitive to any of the antibiotics utilized in ear ointments. It is anticipated that with the use of the terramycin it is not the actual antibiotic that is effective in curing the disease; but, it is the carrier of the drug that is able to penetrate deep in the ear and destroy the infective agent.

When there is a high incidents of Wry Neck within the herd, there is usually an association of high incidents of "snuffles". When increased incidents of this disease is seen, it is very important that one review the ventilation system within the rabbitry to be sure there is adequate ventilation to decrease the incidents of "snuffles". When this occurs, the incidents of Wry Neck will also diminish.

ABSCESSES IN THE DOMESTIC RABBIT

Abnormal enlargements of various areas of the domestic rabbit's body are frequently observed. This situation may be frightening and puzzling to the rabbit owner.

DEFINITION - An abscess may be defined as: "A localized collection of pus in a cavity formed by the degeneration of tissue". This abnormality may be further described by adding a word to describe the location, length of duration or the size.

Examples: Pulmonary abscess: an abscess located in the lung.
Acute or chronic: indicating the presence of the abnormality for a short or long time, respectively.
A micro abscess: indicating that the abscess may only be identified microscopically.

Each abscess will have an outer wall of varying thickness filled with pus. The purulent material will contain debris of cellular degeneration, microorganisms, and the consistency will vary depending upon the cause of the abscess and the amount of time it has been present.

ABSCESS LOCATION- The abscess may be located any where on the rabbit's body; or, in any tissue within the body. The rabbit owner will primarily be aware of those abscesses that can be observed on the surface of the body. The area where most abscesses are observed is around the chin, neck or the mammary gland; or, on the feet of the domestic rabbit. The majority of the abscesses observed by most owners will be located subcutaneously, meaning that the abscess itself is between the skin and the muscle or bony tissue.

CAUSE OF ABSCESS IN THE DOMESTIC RABBIT - Most abscesses are caused by some type of bacterial organism. When abscesses develop, the bacteria must have gained entrance into the rabbit's body by one of two major pathways.

1. **INJURY** - With this type of situation, the rabbit can become injured by being scratched by another rabbit, abrading the skin tissue in the cage, injury during the handling process, or by some other means. The integrity of the skin is broken and the bacterium gains entrance into the tissue. The bacterium then proliferates and the body attempts

to keep the organism from expanding into other tissues of the body by forming a capsule around the infected area. As the abscess mature, there will be an outer thick capsule that develops and the cavity of the abscess will be filled with pus. The injury may have had the infectious organism present for an extended period of time prior to the noticeable enlargement.

2. **SYSTEMIC INFECTION -** This situation occurs when the rabbit has some type of infectious process in its body and a septicemia develops. Septicemia is a condition where the bacterial organisms circulate throughout the body in the blood. With this condition present, the animal can have a minor bruise or slight injury to the skin that allows the blood to escape the very small vessels and the bacteria is then located in the tissue and an abscess develops.

This is a very common cause of abscesses in the domestic rabbit due to the high incidents of "snuffles" in the rabbit. A vast majority of the abscesses that are identified in the rabbit is due to the same organism that causes "snuffles" in rabbits, Pasteurella multocida.

Abscesses around the chin and neck are quite common in the domestic rabbit. This type of abscess usually develops when the animal sexually matures and the "chinning" habit initiated to mark their territory is increased and exaggerated. The trauma to these areas allows for the bacteria to escape in the tissue and the abscess to develop.

Abscesses can be seen any place on the body and this can usually be related to minor injuries that take place in the nest box or during the suckling period. Many times the very sharp toenails will penetrate the epidermis of the skin allowing entrance of the bacterial organism and then the abscess will develop at a later time. Single and multiple abscesses are very common on the feet of mature rabbits that are prone to sore hocks. The abrasion of the foot pads allows a bacterial organism to gain entrance and then singular or multiple abscesses will develop on the side of the feet. This can occur on any of the breeds of rabbit; but, it is much more prevalent in rabbits of the Rex fur type.

Mammary abscesses are common. These usually occur sometime during the nursing period and relates to the engorgement of the mammary gland with milk that is not removed during the suckling process. However, mammary abscesses can be seen in virgin does and bucks.

DIFFERENTIAL DIAGNOSIS - Tumors, hematomas (localized blood clot) and localized swelling from trauma must be considered when an enlargement develops on the surface of the rabbit's

body. When palpated, most tumors will be solid throughout without the softness in the center. Hematomas will appear rather suddenly and there will be a history of severe trauma. The edema (fluid in the tissue) will be more diffused and lack demarcation when compared to abscesses.

As the abscess matures, an area on the capsule will develop a softness and feel closer to the surface. The softened area will appear hot, the fur will be lost and this is the area that the abscess will open to allow drainage.

TREATMENT OF ABSCESSES IN THE DOMESTIC RABBIT. It is recommended that professional advice from your local veterinarian be obtained in the treatment of any type of abscess. It has been found that treatment is much more successful when the entire abscess is surgically removed and the skin sutured together. However, many times the abscess will rupture allowing the contents to spread throughout the cage and it must then be treated a an open wound. The treatment of an open abscess may be difficult and the healing time prolonged. It is extremely important that the exudate (pus) be cleansed from the would frequently and that topical and systemic antibiotics by utilized to curtail the infectious process. Opening abscesses under professional guidance is a method of treatment. It is extremely important that the abscess be in the appropriate stage before opening. Lancing an abscess prematurely may be very detrimental to fatal to the rabbit.

It is important that one implement appropriate sanitation practices and understand that the contents of the exudate (pus) contains infective microorganisms that may increase the concentration of the particular organism throughout the rabbitry. It is extremely important that all materials used and the area where the abscess is lanced be appropriately sanitized. There are many excellent sanitizing agents available; but, one of the most effective and readily available agents is one part household bleach and four parts water, making sure the contaminated area is subjected to the sanitizing agent for a minimum of twenty minutes.

Mammary abscesses need special attention. Once a mammary abscess has developed, oftentimes, they are very difficult to heal and most of the time that section of the mammary gland will be lost from milk production. It is not uncommon that when these does are remated and kindle in the future, the mammary abscess will recur. The milk from the mammary gland may be very toxic to the young kits and it is recommended that the kits be removed from the doe with mastitis as soon as possible. When the doe is of such genetic significance that it is necessary to remate the doe to proliferate the gene pool, one may wish to give consideration to mating other does at the same time so the kits form the infected doe may be fostered to other does to be utilized a surrogate mothers.

Under most circumstances, it is advisable that animals with mastitis be culled from the herd and not given the opportunity to be mated in the future.

PREVENTION - Prevention of abscesses is much more appropriate than attempting to treat these conditions. One can reduce the incidents of abscesses by keeping the incidents of "snuffles" at a minimum in the herd. This includes providing adequate ventilation, culling infected rabbits from the herd, appropriate sanitation and utilizing breeding stock that has been selected for resistance to the disease.

In addition, one should give very serious consideration to the appropriate sanitation of the nest boxes, the utilization of bedding material that has minimum exposure to bacterial agents; and, that over crowding does not occur during the suckling process. Routine sanitation of all cages and utensils is essential to keep the bacterial level at a minimum. when abscesses do occur in the herd, it is extremely important that one attempt to identify the cause and them implement the appropriate procedures to prevent the recurrence of this condition.

In summary, abscesses can be very devastating in the rabbitry. It is extremely important that one identify the cause. When abscesses are to be treated, it is suggested that the advice of your local professional be obtained.

METRITIS IN RABBITS

This is a very common condition in rabbits that can often be very discouraging to the fancier as well as the commercial operator. Metritis, or simply uterus infection, can be frustrating and cause financial loss due to the decrease in conception rate, abortion and the loss of an individual productive unit, as well as, a valuable genetic entity from the rabbit herd.

Metritis can be technically described as the presence of any inflammatory process in the uterine tract. This condition has almost become epidemic in several rabbit producing areas in the United States. Due to the incidents of this condition in the rabbitry, one can find signs of decreased conception rate in the producing herd below the 70% average on first conception. The size of the litters may be erratic and can vary from the normal average to very few kits per litter as well as causing a variation in birth weight of the kits. Depending upon the type of infectious agent and the severity, one can also find the sign of abortions anywhere from twelve to twenty-four days into the gestation period. The presence of this condition in the herd can also cause an increase in the number of does that will totally fail to conceive and these does must be eliminated from the herd due to the lack

of production. Agalactia, or lack of milk production, can be another very common sign that is associated with metritis. This is particularly true in the first week after kindling.

Metritis can e caused by the presence of any type of bacterial or inflammatory agent that is present within the uterine tract. The most common organisms associated with metritis in rabbits are those of Pasteurella sp., Staphylococcus sp., and the Spirochete that normally causes vent disease.

Rabbits become infected with metritis primarily through one of the following methods.

1. Genital contact. This type of metritis is diseminated through the herd by using a male that has contacted the infectious agent through mating a doe that was infected. The most common types of metritis transmitted through this method is the type caused by the Pasteurella sp. and the Spirochete infections. However, virgin does have been found to be infected with these types of infectious agents.
2. Systemic infection. These types of uterine infections are due to the animal being systemically infected with some other type of bacterial disease, such as "snuffles", and the bacterial agent is carried through the blood stream to the uteri where it localizes and causes metritis. This type of uterine infection is usually seen where there is a high incidents of "snuffles" in the herd. This can then cause a uterine infection and this infection can then be transferred through the mating act to other animals in the breeding herd. The most common types of bacterial organisms found in this type of transfer is the Pasteurella sp. and Staphlyococcus sp.
3. Post-kindling contamination. This type of metritis is caused by the contamination of the uteri with a variety of bacterial organism during the kindling process. This type of contamination is enhanced due to the presence of a retained placenta or a retained feti during the kindling process. This type of metritis can be caused by a variety of organisms and one that can be very devastating to the rabbit person through the loss of good producing animals from the herd due to not being able to get these does bred in the future.

NECROPSY FINDINGS

An animal will show, upon necropsy, a variety of signs depending upon the type of bacterial contamination of the uteri. One can find a gross amount of pus in the uterus (pyometra) to almost a normal uterus with just a small amount of fluid contained within. Other findings will show portions

of the degenerated placenta or feti that has been retained during the kindling process. To determine the exact cause of the metritis will entail the use of good culturing techniques.

TREATMENT

Treatment of metritis will depend upon the type of organism that is causing the problem and the method of infection. Uterus infections that are caused by the Pasteurella sp. organism will be very difficult to treat with any type of antibiotics. One should rely primarily upon the elimination of the Pasteurella sp. organism from the herd and the prevention of systemic Pasteurella sp. infections in the herd.

The common metritis caused by the Spirochete infection is relatively easy to treat with the use of proper dosages of Penicillin G and the proper treatment program. This information should be obtained from your local veterinarian.

PREVENTION

Prevention is probably the most important item in the control of metritis in one's rabbitry. Many uterus infections can be controlled through good management practices. This would include excellent ventilation and culling measures to control Pasteurella sp. in the rabbitry. One should be certain to use only males and females that show no external signs of inflammation of the genitals at the time of breeding. However, in some of the latent Spirochete infections, it is totally impossible to detect the presence of the infection without culturing the organism. If Spirochete infections are diagnosed in the herd, it is very important that one maintains a good preventive program through periodic treatment of the bucks and regular treatment of the does post-kindling, to control this condition.

The reduction of retained placenta and feti in the does is a very important item in reducing the incidents of metritis in the herd.

Many are of the opinion, it is imperative that the rabbit managers use good preventative management practices to assure the reduction of retained placenta and feti. This can be accomplished through routine injections of a mixture of Oxytocin and Penicillin G within twenty-four hours after kindling.

To the fancier, particularly to those individuals that are breeders of the miniature or "large-headed" animals, this is a very important management technique to include in your herd management program. specific dosages and information can be obtained through your local veterinarian.

CAKED BREAST

This condition in rabbits is usually found in does that have lost their litter during kindling or within the first two to three days after kindling. Or, in does where the litter has just been weaned. Caked breast is not an infectious disease and is caused strictly by the engorgement of the mammary tissue with milk. the gland becomes very hard and is oftentimes warm to the touch; and, can be painful to the doe when palpated.

The importance of this condition is that it is oftentimes a precursor to a more severe condition or infection of the mammary tissue itself, mastitis.

Does with this condition can be successfully treated by withholding the feed from the animal for 24 hours then feeding only about 25% to 50% of the normal ration for the succeeding 96 hours or increasing the fiber content of the ration and lowering the energy content. In very severe cases, the application of alternating hot and cold packs to the mammary tissue will be successful in reducing the swelling, as well as, the periodic application of Camphorated Oil to the breast has proven successful and beneficial in some instances. "Stripping" the milk from the mammary gland is recommended in severe situations.

Prevention of caked breast should be the goal of the rabbit manager. This can be done successfully through management practices. When a doe looses a litter at kindling, or shortly thereafter; or, when one weans a litter form the doe, the total caloric intake of the animal should be reduced dramatically for the first 24 hours, feed withheld completely 24 hours after kindling; and, a high fiber diet with low energy fed for the next 96 hours. The importance of caked breast is for the manager to see that this condition does not progress into mastitis.

EAR CANKER (MITES) IN RABBITS

This is one of the most common external parasite infestations of the domestic rabbit; and, can to totally unnoticed until the external ear is over flowing with scabby incrustation. Rabbits housed in any type of facility and of any age are susceptible to this Psoroptes cuniculi mite infestation.

The mites establish themselves deep in the external ear canal of one or both ears. The mite feeds on the cells and serum of the external ear canal lining. With constant irritation of the tissue, the increasing number of mites, secondary bacterial infection and the drying of the serum and debris, a "scabby" brown encrusted material begins to fill the external ear canal. Initially, the accumulation will be very small in amount and deep within the ear canal; and, will oftentimes

go completely unnoticed. With the passing of time, the entire surface of the external ear will become filled with the brown scabby encrusted material. Secondary bacterial infection with varying types of bacteria normally present in the ear canal allows for rapid accumulation of the scabs.

Prior to observing the physical evidence of ear mite infestation, the rabbit may exhibit increased general irritability, periodic scratching of the back of the neck with the hind feet and shaking of the head. With prolonged ear mite infestation and secondary bacterial infection, the rabbit can become anorexic, lose body condition, fail to reproduce and become generally unthrifty.

Ear mite infestation, even in the advanced stages, is usually not associated with the condition of Wry Neck where the head will tilt toward the side (torticollis) and progressive loss of balance. It is a common misnomer that these two conditions are related and parallel each other in occurrence.

Treatment of ear mites is relatively easy. This can only be achieved by eradicating both ear canals of the mite through the application of some type of non irritating oil (mineral oil, sweet oil) to coat the outside breathing pores of the mite and cause suffocation and death of the mite. Utilization of oils that have a pesticide added enhances the efficiency of the treatment. It is recommended that these medications be purchased from your local veterinarian.

The medication should be placed in each ear as per the directions on the medicine container. However, it is important that the medication be repeated seven to ten days after the initial treatment as the medicament is only effective against the adult mite and has no effect upon the eggs or immature forms of the mite. If treatment is not repeated, the infestation will recur at a later time. Where more than one animal is housed in the immediate area, it may be necessary to treat all animals in the herd to completely control the condition.

The Psoroptes mite is usually introduced to the rabbit by contact with other rabbits; or, rabbit materials that are contaminated with the infective mite. In addition, the mite may be carried in the hay and straw utilized around the rabbit.

In summary, ear canker is a very common malady in the domestic rabbit caused by a mite. The most common sign is the rapid accumulation of brown scabs in the external ear. This condition can be easily treated by the utilization of a specific otic ointment obtained from your veterinarian. Due to the nature of the infestation, all rabbits in the herd may need to be treated to completely control this condition.

WEEPY EYE

Weepy eye is a very common condition in rabbits and the incidents is increased on those breeds that have very large, bold heads such as the French Lop, Holland Lop, Netherland Dwarf, Dutch and so forth. Weepy eye usually has the signs of a continuous milky discharge fro the eye that mats the fur on the lower inner corner of the eye. This condition can vary in degree to very minor and barely noticeable to a very serious condition that is very ugly looking and has a tremendous amount of secondary bacterial infection throughout the entire under surface of the eye and the eye ball itself.

Weepy eye is usually caused by a blockage of a small duct that leads from the lower inner surface of the eye lid to the nasal area. This duct is called the lacrimal duct and it normally carries the tears that are produced by the eye and collects on the inner surface of the eye, to the nose to be evaporated. This small duct usually becomes blocked with various types of debris; or, inflammation, and does not allow the tears that are produced to evaporate and the tears are collected in the lower "trough" made by the eye lid. As the tears are produced, the "trough" overflows and causes a matting of the fur on the underside of the eye and this allows for a secondary infection of various bacteria.

Treatment of this condition should be initiated immediately after it is noticeable. If one instills neomycin ophthalmic in the eye two to three times per day for five to seven days in succession, oftentimes the small duct will become unclogged and the animal will return to normal. In other situations, it may be necessary to have the lacrimal duct opened by a veterinarian to allow for complete healing. Unfortunately, in some of our "large headed" breeds of rabbits, there is a genetic narrowing of this duct and it is almost impossible to correct the situation. Various types of human nasal decongestants and atomizers have been utilized to treat Weepy Eye to varying degrees of success.

ANATOMICAL STRUCTURES OF THE EYE THAT ARE OF IMPORTANCE TO THE RABBIT PERSON

The anatomical structure of the eye has created considerable confusion in the rabbit industry. Many descriptive terms of the eye have been used that are confusing or have been misconstrued in the literature. Below are listed some structures of the eye that are used in the Standard or terms that the rabbit person should be familiar with to understand pathological (disease) conditions of the eye.

CORNEA

This is the clear, transparent covering of the surface of the eyeball. Light will easily pass through this structure to

the sensitive portion of the eye, the retina, that lies deep inside the eyeball itself. If the cornea is damaged (injured) or becomes infected, scar tissue may develop during the healing process. The scar tissue will be evident as a "spot" or the surface of the eye. The "spot" that remains is not harmful to the animal; but, will prevent the rabbit from competing on the show table.

IRIS

This is the colored portion of the eye and is a muscular structure inside the eyeball that surrounds the pupil. The contraction of this muscle controls the size of the pupil and the amount of light that is allowed to enter the eye. The light that enters is focused upon the sensitive retina, that lies on the back portion of the eyeball, by the lens. Iris coloration that is not complete or has patches of discoloration, is said to have "spots" or "flecks" in the eye. When the coloration of the iris of the eye does not match the coloration of the corresponding eye, the eyes are mis-matched. the coloration of the iris is due to the presence of pigmentation of the iris muscles. In albino rabbits, the pigmentation is totally void. Both "spots" in the eye or mis-matched eye color are condition that will disqualify the animal on the show table.

PUPIL

The pupil is the center portion of the eye that is surrounded by the colored "pigmented" (except in albinos) iris. The pupil will change in size (dilate or constrict) in response to the amount of light entering the eye. Depending upon the breed and variety of rabbit, the pupil will have a glow or a cast to the shadow to the pupil.

A pathological (disease) condition that involves only the deep center portion of the eye is the cataract. This is a condition where the lens of the eye becomes opaque and is seen as a "white center of the eye". Cataracts usually occur in rabbits as a result of diabetes.

SCLERA

This is the white portion of the outer limits of the eyeball. The sclera will become red and inflamed with an infection or injury to the eye. This area of the eye is covered by a very thin mucus membrane that reflects the inner surface of the upper and lower eyelid and is known as the conjunctiva.

CONJUNCTIVIA

The thin, vascular, mucus membrane that covers the sclera and inner surface of the upper and lower eyelids. This membrane becomes swollen and inflamed (red) with injury or the

infectious process (conjunctivitis). Conjunctivitis can be treated by installation of some type of antibiotic ophthalmic solution that contains neomycin.

LACRIMAL GLANDS

These glands are located on the upper lateral (outside) edge of each eyeball and produces tears that clean and moisten the surface of the eye. The lacrimal glands are stimulated to increase tear production by injury or infection of the eye.

TEAR DUCT (NASOLACRIMAL DUCT)

A small tube (duct) that extends from the inside (medial) of the inner surface of the lower eyelid to the nasal area. This duct carries the excess tear production from a "trough" formed by the lower eyelid. The tears (lacrimation) produced by the lacrimal glands flow over the surface of the eye. These tears are drained from the area by the tear duct to the nasal area where they evaporate.

The tear duct can become blocked with "debris" from a respiratory infection, environmental debris or a stricture of the tear duct. The tears will "overflow" the lower lid and cause a wet, soiled area of fur below the eyelid. With time, the area becomes infected with secondary bacteria and this is known as "weepy eye". Acute "weepy eye" condition can be treated by instilling neomycin, or other suitable ophthalmic, into the eye three times daily for three to five days. Also, over the counter "atomizer type" decongestants can be sprayed into the nasal area with varied degrees of success. Chronic "weepy eye" presents a special problem and the duct may need to be "flushed". This is a very simple surgical procedure that can be performed very readily by your veterinarian.

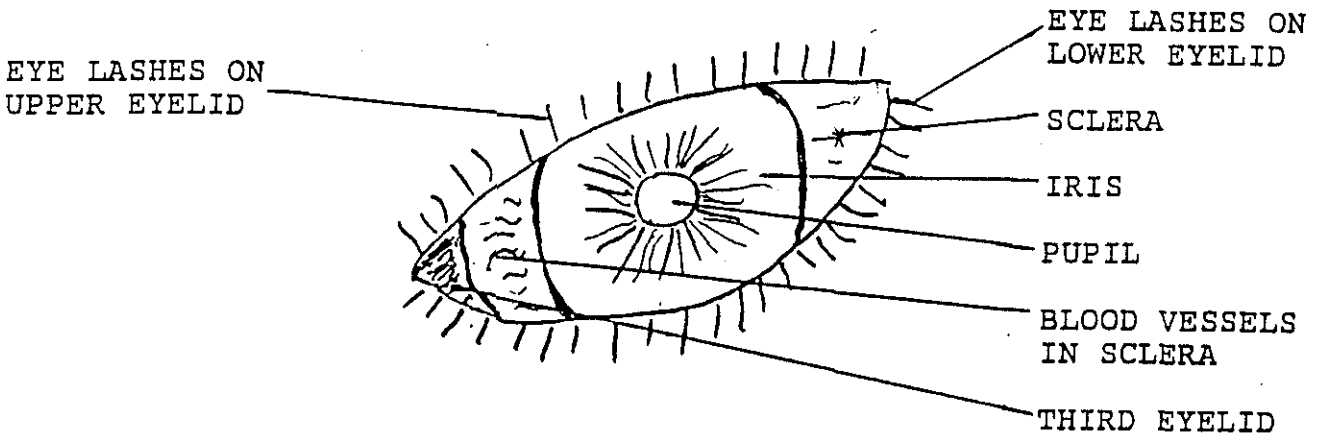
When the condition is caused by a stricture of the duct, it may not be treatable and one should consider the possibility of hereditary causes. The stricture of the nasolacrimal duct is most commonly found in animals with "bulldog" head type. This stricture may be closely associated with the hereditary formation of the skull.

EYELIDS (UPPER AND LOWER)

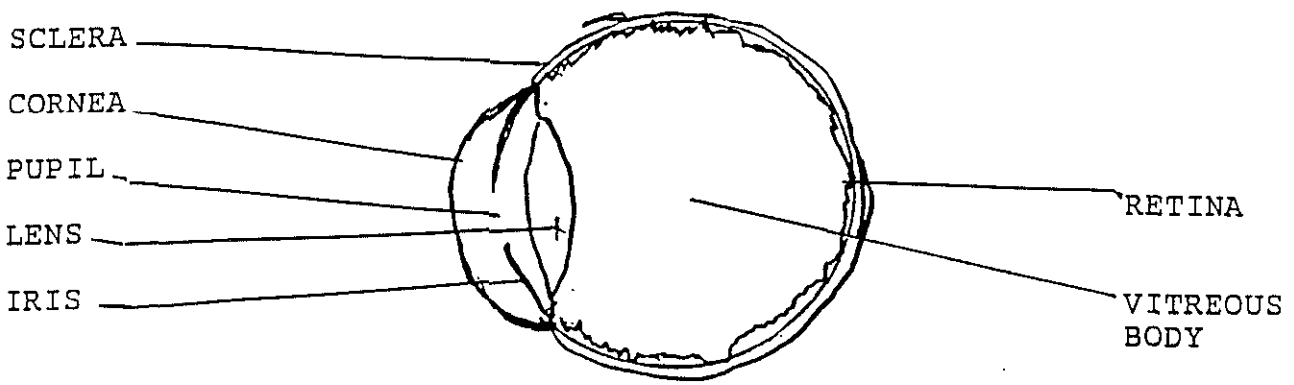
The eyelids of the rabbit will open and close periodically and close as a reflex to protect the eyeball. Attached to both eyelids are long hairs, eyelashes. A condition that does exist in rabbits is where the eyelids are abnormally short and this mandates that the lids turn inward. This causes an irritation of the cornea (surface) of the eye that can be very serious. The cornea will become inflamed, there will be excess tearing and the condition becomes serious with

time. This can often lead to corneal ulcers that are very serious and can cause the animal to lose the eye. This condition is often caused by a previous infection of the lids of the eye or is a hereditary condition. This is known as "entropion".

Regardless of a person's involvement with the rabbit enterprise, familiarity with different anatomical terms of the structures of the eye is imperative for complete understanding. Eye pathology can be serious. The severity of the condition can be reduced when treated early.



GROSS ANATOMICAL STRUCTURES OF THE EYE



SAGGITAL SECTION OF EYEBALL

SORE HOCKS - SORE FOOT PADS

Sore hocks is a very common condition in all breeds of rabbits. However, it appears to be more common in those breeds with the extreme depth of body and those breeds that have concentrated on increasing the body size and depth of body without placing sufficient amount of effort toward the actual size of the foot itself. Sore hocks, due to the above reasons; and, due to the fact that the fur does not have guard hairs, is relatively more common in the Rex rabbit than in many of the other breeds.

Sore hocks is a misnomer in the fact that it is not actually the hock that becomes sore; but, the lower surface of the foot pad that becomes ulcerated. This can be seen in the front feet as well as the hind feet. The condition of "sore hocks" is an ulceration of the skin portion of the foot pad and an ensuing infection.

The cause of "sore hocks" is that strictly of genetic factors that are complicated by ensuing environmental factors. The actual cause of sore hocks is the foot pad is not sufficiently large enough for the amount of weight that the animal must carry on these pressure points. Also, the lack of fur density and skin thickness on this area will enhance the development of sore hocks; thus, the reason for the appearance of this condition to be more prominent in the Rex rabbit.

Other factors that contribute to sore hocks is the nervousness of the animal itself, which is an inherited trait, as well as, the animal possibly being excited by extraneous noises or predators in the rabbitry. It is very important when the incidence of sore hocks is relatively high in the herd that one uses caution to see that the floor wire, if on wire bottomed cages, is fitted properly. The half-inch wire should be facing the surface of the foot pads. With an increase in the humidity in the area, there will also be an increase in sore hocks. The high humidity causes the fur to mat on the feet and does not give the cushion and protection of the fur as it does where the humidity is lower. Many individuals will use resting boards to help reduce the problem of sore hocks. In many cases, this will be of assistance; but, one should remember that sore hocks has a hereditary cause and it is important that one select for foot structure that is able to compensate for the desired body size and capacity.

To treat the sore hocks in one generation will only indicate that one is wiling to continue to treat sore hocks in future generations if one does not selectively cull. These sore hocks can be treated by the use of resting boards and the use of any type of astringent material on the sores themselves. One of the common types of astringent that is readily

available and works as well as any is the use of Preparation H or any type of constrictive balsam that can be applied to the ulcerated area. To further eliminate the condition from the herd, one should be sure that one breeds strains of animals that are not excessively excitable, that there are no predators in the rabbitry; and, that one controls the humidity within the rabbitry.

Another condition that will enhance the appearance of sore hocks in the herd is a condition where there is a fungal infection, often called pododermatitis, on the front and hind feet. This fungus lives in the nail beds of both front and hind feet. This fungal infection causes a denuding of the hair from the foot pads and this enhances the incidence of sore hocks due to the pressure placed on the bottoms of the foot pads.

The fungal pododermatitis can be treated by placing the entire foot in a weak solution of iodine for two to three days in succession. This is a condition that seems to be coming more prominent in some areas of the country.

A common complication that is often seen in sore hocks is a Staphlycoccus sp. infection. This is a relatively common situation and is enhanced where there is the use of resting boards. Staphlycoccus sp. infections are very common and they proliferate very rapidly in the open sores of the sore hocks and can often affect the entire leg. Staphlycoccus sp. infections are very serious and one should use a major disinfecting process in the entire rabbitry to see that these infections do not progress.

In summary, sore hocks is a hereditary condition caused by the increased body capacity in size in relationship to the size of the foot; and, the fur covering of the foot. Such things as high humidity, excitement, predators, and improper cage floor surface can enhance the incidence of sore hocks. It is much more economically feasible to select breeding stock that has the characteristics to prevent sore hocks rather than to treat this condition on a continued basis.

FUR CHEWING

Fur chewing is a situation that confronts many rabbit growers on various occasions. The incidents of fur chewing occurs most commonly in growing rabbits from four weeks to four months of age. However, it can occur in any breed and at any age of rabbits, depending upon the actual cause.

Rabbits will chew the fur off their litter mates, from themselves, from rabbits in adjoining cages or the mature does may chew the fur from their young kits.

The initial observation one will have when fur chewing is

present is that the whiskers of the animal will be void; or, there will be an uneven appearance in the uniformity of the length of the fur. Animals that are caged alone will usually chew the fur primarily from their sides and animals that are caged together will chew the fur all over the body and on the face.

The actual cause of fur chewing can be divided into the following groups.

1. Nutritional causes
2. Pathological causes
3. Physiological causes
4. Hereditary causes

NUTRITIONAL CAUSES

When fur chewing is initiated in the rabbit herd, the first through of a possible cause is that of nutrition. There are very few actual nutritive element deficiencies in most of our commercial rations that will be the cause of fur chewing. The mineral magnesium has been associated to some degree or another with fur chewing. However, the magnesium requirement is thought to be adequate in most diets for rabbits. However, the magnesium requirement is increased in rations that are high in calcium. Due to the fact that alfalfa is high in calcium, low magnesium levels may be given consideration as a cause of fur chewing. Fur chewing in some herds has been decreased by the addition of magnesium oxide to the diet. When all other probable causes of fur chewing have been eliminated, the addition of magnesium to the diet should be considered.

Diets that are low in fiber have been incriminated in the increased incidents of fur chewing in many rabbitries. The rabbit will chew fur/wool to increase the fiber content of their diet. Rabbits that are fed an abundance of fiber in the pelleted ration; or, rabbits that are allowed free access to various types of roughage, do not have as great an incidents of fur chewing as those animals on low fiber diets. When fur chewing occurs throughout the rabbitry, one should give consideration to the fiber content in the ration.

Increasing the fiber level in the pelleted ration; or, adding roughage to the diet, "free choice", will decrease the protein almost immediately. Rabbits on rations that are low in protein, or low in quality of protein, have seen an increased incidents of fur chewing. Rabbits that chew fur due to this cause will usually also lick the excess fur that accumulates in and around the cage.

PATHOLOGICAL CAUSES OF FUR CHEWING

The majority of fur chewing in rabbits can probably be associated with a pathological cause. The incidents of fur

chewing increases dramatically when there is an increased incidents of enteritis in the herd. The rabbit will chew the fur in order to increase the fiber level of the diet and to "sooth" the intestinal tract from the pain that is associated with enteritis. This is particularly true since most rabbits are on commercial pellets and they do not have access to a free amount of fiber in their diet. Another common cause of increased fur chewing in the rabbitry is a high infestation of the protozoan parasite, coccidia. It is anticipated that with the increased coccidia infestation, there is an increased incidents of chronic enteritis and intestinal irritation that will enhance the need for fiber and when the fiber is not freely accessible, the rabbits will chew fur from themselves and other sources.

By eliminating the various types of enteritis and the incidents of high coccidia infestation in the rabbit, one will decrease the incidents of fur chewing in the herd.

PSYCHOLOGICAL CAUSES OF FUR CHEWING

In response to boredom, oftentimes, the animals will "nibble" on the fur of themselves in the grooming process; or, "nibble" on the fur of rabbits in adjoining cages. This cause of fur chewing is usually most commonly seen in animals that are caged by themselves. Usually when boredom is the cause of fur chewing, it is most commonly seen in animals that are over four months of age and are nervous. This causes of fur chewing is closely associated to the disposition of the animal which also can be inherited. If fur chewing occurs as a result of boredom, one can oftentimes decrease the incidents by adding various types of objects to the cage that will divert the attention of the animal to other things. (Example: pop can with a pebble inside).

INHERITED CAUSES OF FUR CHEWING

Any type of structural defect of the anatomical structure of the head that allows for malocclusion can increase the incidents and possibility of fur chewing in that particular animal. When fur chewing is associated with malocclusion, it will usually be one animal in the litter that is chewing the fur off the other animals without a history of enteritis.

When the cause of fur chewing is boredom, it is very closely related to the disposition of the animal and there may be an inherited predisposition to the fur chewing. When this is the cause, it will usually be seen in succeeding litters of the same mating.

Fur chewing can be due to many causes, as related above. However, it is very important that fur chewing from the above causes be differentiated from fur chewing that is caused by various types of external parasites. Any type of external

parasite that causes an irritation of the skin itself can cause the rabbit to chew the fur from around the irritated source. When the cause of fur chewing is external parasites, one will usually see that the skin is reddened and three will be other signs of trauma of the skin by the teeth and toenails. The parasite can be demonstrated.

There are types of fur mites that can be found in rabbits that do not cause irritation to the skin; but, clip the fur off even with the skin. These types of parasites are usually found on the head and neck of the rabbit. To differentiate this condition from fur chewing, one will notice that the hairs are all very short; or, are of normal length. The fur in the surrounding area will not be varying lengths as is seen with self inflected fur chewing. Fur loss on the head and neck, when the rabbits are caged individually, is almost always caused by fur mites.

In summary, fur chewing can usually be associated with nutritional, pathological, psychological or inherited causes. The most common cause of fur chewing can be associated with the fiber content of the diet, which relates to an increased incidents of intestinal irritation and enteritis.

WOOL/FUR BLOCKAGE

It is mandated that all rabbit owners be aware of this devastating situation in all breeds of rabbits! Wool/fur blockage occurs in all breeds of rabbits; but, it has received most publicity in the fiber producing rabbits. This is due to the fact that it is more noticeable in these breeds due to the long wool fibers allowing the fecal pellets to be attached to one another in a row (similar to a string of pearls); and, as a result of the owners of fiber producing animals being in much closer contact with the animals than many of our normal and Rex furred rabbits. This condition is actually a blockage of the gastrointestinal tract due to the formation of a fur mass or ball. The blockage occurs the greatest percentage of the time at the area where the stomach empties into the small intestine. The diameter of the digestive tube is dramatically decreased in size at this particular location.

The digestive system of the rabbit does not produce any digestive juices that has the ability to digest, or dissolve, the actual fur or wool fibers. Thereby, allowing the fiber to collect over a period of time, if not physically moved through the digestive tract. Varying amounts of wool/fur is ingested by the rabbit in the normal self-grooming procedures with the rasp-like tongue and lips. The quantity of fur ingested will vary depending upon the molting pattern and availability of the fur/wool. The incidents of wool blockage is increased after heavy molting periods and following the kindling process.

The ingested fur/wool has a tendency to collect in the stomach area due to the peculiar muscle contractions of the stomach and is not passed through the digestive system. The fur that collects in the stomach is formed into a mass by this muscular activity. As more fur is ingested, the mass gradually enlarges. The fur mass further "matures" with the ingestion of finely ground feed and can become relatively firm. The mass enlarges and there is a tendency for the mass to periodically block the opening from the stomach into the small intestine. When this situation occurs, it does not allow the other ingested food and water to pass into the small intestine. The stomach will enlarge to the point where the rabbit will go off feed varying lengths of time.

SIGNS

The signs the rabbit owner will observe with a developing fur mass will vary from animal to animal. One of the most consistent and early signs one sees is there will be periodic inappetence (not eating) with the frequency of the inappetence coming closer together and the length of time that the rabbit does not eat is extended. This coincides with the development of size of the fur mass and the frequency that it blocks the gastrointestinal tract.

In addition, the owner will notice an irregularity in the size and shape of the fecal balls; as well as, one fecal ball will be attached to another in a chain of three to eight fecal balls resembling a "string of pearls".

As this condition progresses and the inappetence becomes longer in duration, there will be a decrease in the amount of fecal material produced to the point that there may not be any fecal balls excreted at all within a 24 - 48 hour period of time. There may be intermittent diarrhea. The animal will lose body weight, act like it wants to eat and can't, there will be a decrease in the water consumption and generally becomes lethargic and debilitated.

PREVENTION

Rabbit owners should give much more attention to the prevention of fur/wool blockage than the treatment of this condition, due to the fact that it is much easier and more successful.

There is not one entity in itself that will prevent the incidence of fur/wool blockage in rabbits. It will be necessary for the manager to implement a combination of practices to keep the incidents as low as possible. To prevent wool block in domestic rabbits, one should employ one or more of the following measures.

1. Remove dead and molting fur fibers. It is imperative that one groom the animal periodically to decrease the quantity of ingested fur during the molting process. This is particularly true when the rabbit goes into a molt or when the rabbit has just kindled. All the dead and loose hair should be removed from the pelage of the animal on a frequent and regular basis. This is particularly important in the fiber producing breeds due to the volume of fiber produced.

2. Provide ample exercise. It is anticipated that the reason the wild cottontail does not suffer dramatically from the incidents of fur/wool blockage is due to the fact that they are very active. However, it is very difficult to allow the domestic rabbit to have the amount of freedom and motion of the wild rabbit. One should provide the animal with as much exercise as possible. As the animal exercises, the cyclic contractions of the stomach muscles are altered to some degree encouraging the passage of the fiber from the stomach into the small intestine.

3. Provide ample drinking water. It has been determined that rabbits that have a tendency to drink larger volumes of water have a decrease in the incidents of wool/fur blockage. This can be explained due to the fact that more water moves through the gastrointestinal tract, there is a tendency to carry with it the fur fibers that accumulate in the stomach into the small intestine. Once the fibers are in the small intestine, they move through the digestive system without incident. Some individuals shave had success in lowering the incidents of wool blockage in rabbits by increasing the salt concentration a small amount in the food. However, <u>extreme caution</u> must be taken if this management practice is employed, to prevent any possibility of salt toxicity. It is extremely important that fresh water be supplied to the animal at all times to prevent this devastating and possibly fatal situation.

4. Addition of fiber to the diet. It has been a long time conclusion that by allowing the rabbit a daily quantity of hay assists in the prevention of wool blockage, due to the fact that the coarse fibers carries with it the fur fibers from the stomach into the small intestine. However, the effectiveness of this procedure has received a tremendous amount of scrutiny and has been questioned. In addition, the addition of roughage to the diet on a daily basis is costly, takes extra time and can cause enhanced matting in fiber producing animals.

5. Allowing the stomach to empty daily. (NOTE: The rabbit's stomach never completely empties; but, has less volume of ingesta at times). Recent research indicates that if the

rabbit's stomach is allowed to empty to the greatest degree each day, this assists in the movement of fur fibers out of the stomach and into the small intestine. As compared to allowing the rabbit to be on full feed and there being a constant amount of ingesta in the stomach assisting the fur to roll up onto a mass. The logic behind this principal is that when the stomach has less volume of ingested food, as the muscular activity continues in the stomach, a greater portion of the collected fur fibers will be forced into the small intestine and pass on through the gastrointestinal tract.

6. Addition of digestive enzymes to the diet. It has been found that the fruit of the papaya family contains enzymes that will actively dissolve the fur fibers. Feeding a small piece of raw pineapple to the rabbit one or two days every seven to fourteen days will assist in preventing the "build up" of fur in the stomach, reducing the incidents of wool blockage. The principal of this theory is that the fur digesting enzymes breaks down the fur fibers sufficiently that allows the fur fiber to be passed through the gastrointestinal tract as the muscular activity ensues. Some of the rabbits will fail to eat the raw pineapple and it is very messy to dose each animal with one to two teaspoonfuls of raw pineapple juice once a day every ten to fourteen days. These same enzymes are contained in papaya tablets that can be purchased at most natural food stores. Many individuals will feed the rabbit one to four papaya tablets each week to assist in the prevention of fur/wool masses. Other individuals have had equal results by the utilization of various meat tenderizers administered to the rabbits periodically.

   The actual dosage and amount of raw pineapple juice, papaya tablets or meat tenderizer has not been scientifically established and most individuals administer the enzyme in varying amounts and in varying sequences of time with varying success.

   There has been a great deal of success in the assisting of the prevention of fur masses by adding synthetic fur/wool digesting enzymes to the pelleted ration on a daily basis. This will not totally prevent the problem; but, it will assist in lowering the incidents of fur/wool block.

   Research has not identified any adverse effects from adding the fur digesting enzymes to the diet that results in lowering the incidents of fur/wool blocks.

7. Addition of lubricants. Some individuals have found that by periodically administering a gastrointestinal lubricant to the animal will be of assistance in reducing

fur/wool block. This can be done by adding such materials as mineral oil or the materials used to prevent fur blockage in cats on a regular basis. The theory with this measure is that the lubricating material will assist in moving the fur from the stomach into the small intestine. However, if the fur has already been formed into a large mass, it will be totally impossible to lubricate the mass sufficiently to pass into the much smaller diameter of the small intestine.

All of the above practices appear to be effective in reducing the incidents of wool block to some degree or another. IT is recommended that it is probably necessary to implement more than one of the above procedures to assist in keeping the incidents of wool block at a minimum

TREATMENT OF WOOL BLOCK

The treatment of total fur blockage can be very discouraging; as well as, costly. Treatment should be implemented as early in the course of the condition as possible. To treat this condition, it is almost always necessary to utilize an fur digesting enzyme to assist in breaking down the mass prior to the passing into the small intestine. It is anticipated that by utilizing concentrated doses of the digestive enzymes, in the form of papaya tablets or raw pineapple juice, will be necessary. In treating fur masses, it is necessary to treat the animal with one or two teaspoonfuls of raw pineapple juice three to four times per day for three to five days in succession to assist in the breaking up of the mass; or, by administering one to four papaya tablets three to four times per day for three to five day sin succession. During this procedure, one should see that the animal has a free source of drinking water and the effectiveness of the treatment may be enhanced by forcing small amounts of water to the animal by mouth two to three times per day. At the conclusion of the enzyme therapy, one may wish to utilize the administration of two to three days of lubricants in the form of mineral oil at the rate of one-half to one teaspoonful twice a day to assist in the passage of the digested and degenerated mass.

It is extremely important that one use great care when administering any type of liquid material by mouth to be sure that the material does not get into the respiratory tract and cause very severe foreign body pneumonia.

If the blockage continues to exist after the above enzyme therapy, it may be necessary to surgically intervate and remove the mass. The animal is oftentimes in such poor condition that it is a very poor surgical risk and the procedure can be quite expensive.

In summary, many rabbits suffer and die from fur/wool blockage. This condition occurs in domestic rabbits due to the fact that there is not any normal digestive enzymes that will digest or dissolve the fur fibers that are ingested during the grooming process; particularly at times of heavy molt and just after kindling. The fur accumulate and is formed into a mass due to the muscular action of the stomach and fails to pass through to the small intestine. There are several management practices that can be implemented to assist in the prevention of the wool blockage. Prevention of wool blockage is much more feasible than attempting to treat this condition.

Treatment can be attempted with the use of concentrated fur digesting enzymes to assist in breaking up the fur mass followed by the administration of lubricants to assist in the passing of the particles of the digested fur mass into the small intestine. Surgical intervention can be performed as the last resort.

KETOSIS - PREGNANCY TOXEMIA

Acute death of does during the last few days of the gestation period; or, the first few days after kindling, without sign or cause can be very devastating and frustrating to the rabbit owner. Many of these deaths are never definitively diagnosed and will always be a mystery.

The condition known as ketosis or more commonly known as pregnancy toxemia, can cause the above. The signs seen with this condition is usually only that of acute death in a well-conditioned (fat) doe during the latter one-third of the gestation period. Or, the first few days after kindling. If signs are present, they will be displayed only for a short period of time and they will include that of the doe being very lethargic, disoriented, and severe depression. Does that die prior to kindling and that are not observed for a few hours after death, may demonstrate blood-like soiled fur around the vulva/rectum from the leakage of blood tinged fluid from the pressure created by the feti filled uteri.

From practical experience, this condition is more common in some herds than others and more frequently seen in does that have had some other condition present that produces a minor inappetence during the latter stages of pregnancy. In addition, there are enhanced incidents of this condition in herds that utilize high energy diets and in does that have an excessive amount of fat stored in the body.

The entire physiological concept of this condition is not totally understood in rabbits; however, the demands for energy during the latter stages of pregnancy is at it highest. This is due to the fact that the greatest amount of growth of the feti occurs during the last few days of the

gestation period. To meet the energy demands, the fat deposits of the doe's body are automatically mobilized. As the fat is metabolized in the liver, it is anticipated that the normal functions of the liver is altered, due to the fast amount of fat present; and, the end products of the fat metabolism, ketones, are dramatically increased in the blood. In elevated levels, these ketones can be very detrimental and devastating to the rabbit's body.

This condition has such a rapid onset, and death is so acute, one usually does not have the opportunity to administer treatment. However, if one is fortunate enough to observe the depressed and lethargic doe, the animal can be treated by a veterinarian with subcutaneous glucose (50%) and cortacosteroid injections. In addition, immediate oral administration of 50% dextrose solution, liquid molasses or kayro syrup can be very beneficial in the treatment and recovery of the doe. The success of treatment has been varied from one individual to another.

Prevention of this condition is much more practical than treatment. It is extremely important that bred does be in proper condition (not too fat) and that the total caloric intake be increased during the last portion of the gestation period. This can be accomplished by increasing the volume of feed given to the doe; or, by increasing the concentration of the energy by adding high energy feeds; such as, molasses, to the diet.

Upon necropsy of does that die of this condition, one will be able to demonstrate a grossly enlarged liver that is discolored yellow to yellow-brown and there will not be any other noticeable pathological lesions present.

In summary, ketosis; or, pregnancy toxemia, occurs in the female domestic rabbit during the last days of the gestation period or shortly after kindling. The most common sign is that of an acute unexplained death in a well conditioned doe. The cause of death is usually related to the high levels of ketone substances in the blood as a result of the metabolism of the fat deposits in the body due to the increased need of the body for energy to support the rapidly developing feti. Prevention of this condition is more practical than treatment and can be accomplished by keeping the does in proper breeding condition and increasing the energy consumption of the doe in the last portion of the gestation period.

CRYPTORCHISM IN DOMESTIC RABBITS

The testes form in the abdominal cavity during embryonic development. At 4 - 16 weeks after kindling they individually pass from the abdominal cavity, through the right and left inguinal canal and into the scrotum. the actual time the testicles descend will vary with the breed

and with strains within a breed.

The function of the testes is to produce viable sperm to fertilize the ovum of the female after mating; and, to produce male hormones. Formation of the sperm will only take place when the sperm producing cells are at a temperature lower than the normal 102.5 degrees Fahrenheit body temperature. Functionally, this is the reason for the testicles to be located in the scrotum. The temperature is cooler farther away from the body and this allows the sperm to be formed. The male hormone, testosterone, produced by certain cells in the testicle function at either the lower temperature in the scrotum or at the normal body temperature.

Cryptorchism is the retention of one (unilateral) or both (bilateral) testicles in the abdominal cavity. In the "rabbit community" this is commonly known as non-descended or retained testicle(s). Retention of one, or both, testicles are disqualifications in senior bucks. Junior bucks may display both testicles or neither and be eligible for competition. Junior bucks that display only one testicle must be disqualified form competition.

This is an inherited condition that relates to a malady in the opening in the abdominal wall or the mechanism that encourages the testicle to descend. The genetics of cryptorchism have been studied extensively in other species of animals. This is not a simple recessive genetic trait but has other multiple influences. This is a common abnormality seen in all breeds of domestic rabbits. It is more prevalent in some strains within an individual breed than others. Both the buck and the doe can carry the inherited traits for this condition to express itself in future generations.

Animals that have this condition should not be used in a breeding program. This is due to the inherited nature of this malady. Does may carry this genetic fault that will occur in male offspring of future generations. Males demonstrating unilateral cryptorchism (one testicle retained) will mate the does and successfully sire offspring. They have one functional testicle that produces viable sperm. Males that have bilateral cryptorchism (both testicles retained) will mate with the does but will not produce offspring. This is due to the lack of viable sperm production when both testicles are retained.

This condition is more prevalent in the smaller breeds, in rabbits handled a lot and in breds that need grooming. On rare occasions, there are situations when both testicles will not be observed in the scortal sac and it will not be due to genetic factors. The testicles are immature and small as they pass through the inguinal canal and matures rapidly as they reach an area of lower temperature. The rabbit retains some muscular control over the testicle. It may withdraw

these organs closer to the body at times of excitement, danger, pain or lowered environmental temperature.

Injury that results in severe pain to the testis will cause violent contraction of the muscle that "pulls" the testis back into the inguinal canal; or, into the abdominal cavity. When conditions are right, the testicle will remain trapped in that area and it will not go back into the scrotum. Once the testicles descend into the scrotum and develop, this situation will not occur.

These situations will occur when young bucks are handled and they are accidently set straddle of a carrier divider; or, another object. This also may occur when young fiber producing rabbits are groomed in the crotch area; and the slicker accidently nicks the scrotal area. It is estimated that injuries account for less than 1% of the non-descended testicles on rabbits. The remainder is due to genetic factors.

Unless one is absolutely sure that a testis is non-descended due to an injury, it should not be used in the breeding herd. Using a sire with this genetic defect can cause many problems for the future of the rabbitry. Males that display unilateral or bilateral cryptorchism may be used as pets. It is recommended that these rabbits be neutered and that both testicles be removed. If not, there is an increased incidence of malignancy in the retained testis that may shorten the rabbit's life and cause discomfort.

No treatment for this inherited condition is recommended due to its affect upon the future soundness of the offspring. When both testicles have been observed and one is injured that allows for retention, some individuals have been successful with treatment. This treatment is to hold the little buck at a 90 degree angle to the table and gently tap this bottom on the table for several minutes at a time for 12-20 days in succession. This will only be effective when the testis has been trapped in the inguinal canal from injury.

REAR LEG PARALYSIS

This condition occurs frequently in rabbits and oftentimes baffles the owner or breeder to how and why this condition develops. This is a condition where the animal will lose total motor control of the rear legs and usually cannot feel any type of pain in the rear legs. Although sometimes there will be a small amount of sensation in the paralyzed extremities. The animals will usually show a loss of the control of the urinary bladder as well as the bowels. Urination and defecation oftentimes occur when the animal is lifted from the cage due to a loss of this control.

The cause of this condition is usually due to a fracture or dislocation of the spinal vertebrae somewhere between the tenth thoracic vertebrae and the third lumbar vertebrae. This diagnosis can often be confirmed with the use of radiographic techniques if one desires to confirm the diagnosis. It is quite costly and not frequently used by the rabbit manager. Rear leg paralysis can also occur from a subluxation or where the vertebrae has been dislocated and it returns to its proper alignment and this cause cannot be demonstrated radiographically. Regardless of the cause, there is permanent damage to the spinal cord that interferes with the motor functions of the hind legs. The prognosis of this situation is very poor and the animal oftentimes should be destroyed for humane purposes.

The fracture or dislocation may occur due to the rabbit's normal activity of frolicking in the cage or can occur when the animal is being handled and the animal thrusts its rear legs backward violently. The latter usually occurs during the process of handling the rabbit such as tattooing, mating or some other activity. This condition is much more frequent in does than bucks.

RED URINE

This condition appears to be common, and normal, in a small percentage of the domestic rabbit population. It is most commonly observed by owners that are in very close contact with their rabbits (pet owners and Angora breeders); or, by owners that live in the northern areas and have their rabbits in outside hutches where their urine is observed in the snow during the winter months.

Rabbit urine is quite unique and varies considerably from other species. The color of rabbit urine specifically varies from a dull yellow to a bright brownish-orange; or, on occasion, the urine will appear to be bright red. Rabbit urine separates into two factions; the lower is a cloudy white precipitous portion that contains calcium carbonate; and the upper portion is more clear. Rabbit urine is alkaline (pH averages 8.2), has a specific gravity that ranges from 1.00 to 1.04, and normally contains the protein substance albumen. Rabbits produce, on the average, sixty-five to seventy milliliters of urine per kilogram of body weight. In addition, urea is present in rabbit urine. When the urea in the rabbit urine combines with water and urease, an enzyme present in all plant material, there is the production of ammonia, gas and carbon dioxide. This is extremely important as ammonia is an upper respiratory tract irritant and thought to be the precursor of many of the respiratory ailments in rabbits.

Domestic rabbits have the ability to very efficiently absorb calcium from the ingested food stuff and actively excrete the

excess calcium via the kidneys. This normal physiological process is what causes the urine to appear cloudy. the calcium and phosphate materials in the urine has the tendency to accumulate on the cage surface and forms a "roughened" surface which may interfere with the effectiveness of the sanitation process.

The red appearance of the urine in a small percentage of domestic rabbits is often mistaken by the novice; and, sometimes experienced breeders, as blood in the urine resulting from a kidney or urinary infection. Hematuria (blood in the urine) can be differentiated from red urine by the presence of small clots of blood in the urine that can be visualized with the naked eye rather than with the condition with red urine where the discoloration is uniform and homogeneous throughout the entire urine specimen.

The red urine condition is thought to be due to an incomplete; or, partial, metabolism of one of the vitamins or tannins present in the rabbit's system and is not associated with any pathological disease or infection. Much money has been spent to cure this normal condition.

YELLOW FAT

The muscle of a freshly processed rabbit carcass is a glistening light "pinkish-red" with pure white fat accumulations at the top of the shoulder, just behind the front legs, in front of the hind legs and scattered throughout the abdominal cavity with particularly heavy amounts in the kidney area. This type of carcass has excellent "eye appeal" and is expected by the consumer.

On occasion, in a very small percentage of the rabbits processed, all the fat on and within the carcass will be yellow colored throughout without any tendencies toward being white in color. This condition is highly undesirable; but, does not condemn the carcass for human consumption. However, due to the discoloration of the fat, the carcass usually cannot be sold due to the fact that the consuming public assumes that the mead is undesirable. It is mandated that the commercial rabbit grower produce a product that the public finds appealing and will purchase.

Yellow fat is an inherited condition in a very low number of the domestic rabbit population. this condition does not interfere with growth rate, external physical characteristics and cannot be detected until the animal is processed.

Many plant materials contain the fat soluble carotenoid (yellow) pigment, xanthophyll. When these substances are ingested by the rabbit, they are usually metabolized to a completely colorless material in the liver by the enzymes present. Due to a recessive inherited condition, these

enzymes are absent in a very small percentage of the rabbit population. This allows the xanthophyll (yellow pigment) to be present in the intact form. Due to this being fat soluble, it will be disbursed throughout the fat as a yellow discoloration. If animals are fed an xanthophyll free diet, the fat will not be yellow, even if the enzyme is lacking. However, due to the nature of most rabbit formulations, this is not feasible.

These discolored carcasses are not usually marketable. Due to the fact that this condition is inhereted, it is recommended that the animals carrying this recessive trait be eliminated from the herd. Therefore, when this condition is identified in a litter of rabbits that have ben processed, it is recommended that the records be checked and consideration be given to eliminating the parents from the commercial producing herd and that none of these offspring be retained as replacement animals.

In summary, yellow fat is caused by a recessive genetic defect in the animal to produce enzymes necessary to metabolize the xanthophyll, when present, to a colorless material. Xanthophyll expresses itself as yellow fat soluble pigment disbursed in all the fat deposits on and in the rabbit carcass. The presence of this condition does not condemn the carcass for human consumption; but, due to the appearance, there is not a public demand for this type of discolored product.

Animals carrying these recessive genetic traits should be eliminated from the commercial producing herd.

COCCIDIOSIS IN THE DOMESTIC RABBIT

This is a very common disease in the domestic rabbit that is caused by a protozoan parasite. The signs and effects of coccidiosis may develop rapidly. This is due to the relatively short life cycle of 10-12 days; and, the ability of each adult parasite to produce more than 10,000 eggs (oocyst) per day.

There are two forms of coccidiosis in the domestic rabbit.

1. HEPATIC FORM. In this form, the adult parasites live in the linings of the bile ducts of the liver. Upon gross necropsy, or during the harvesting of the carcass, the liver will show multiple white spots on the surface. These will appear like grains of salt scattered about. The density of the white spots will depend on the severity of the infestation.
2. INTESTINAL FORM. The adults of this form of coccidia live in the linings of the small intestine. There are several species of coccidia that infest the small intestine. The exact location of the infestation will depend on the species that the

rabbit may be infested with at the time. There will not be any obvious signs of this type of coccidiosis upon gross necropsy examination or during the harvest of the meat.

Hepatic coccidiosis may be more serious than the intestinal form; but, effort must be carried out to keep all forms of coccidia infestation as low a possible. The signs of coccidiosis will vary depending upon various factors. These include:

1. Type of coccidia present. As discussed above, the hepatic form is thought to be more serious than the intestinal form. The seriousness of the intestinal form must not be overlooked.
2. The severity of the infestation and the number of species of coccidia present. This will be closely related to the effectiveness of the sanitation practices used in the rabbitry and the frequency of the use of a coccidiacide. The greater the number of species present in the intestinal tract, the more severe the infestation.
3. The age of the rabbit. Young rabbits are much more susceptible to infestation than adult rabbits. As the rabbit matures in age, there is some degree of immunity that develops. However, adult rabbits will be infested and may act as carriers of this parasitic disease.
4. The amount of stress to which the animals are exposed. The signs are much more evident when environmental factors are not within the suggested parameters. Example: signs are more prevalent during hot weather with high humidity and during severe weather changes.

SIGNS OF COCCIDIOSIS

The signs of this condition will appear very gradually and may go totally unnoticed by the inexperienced rabbit owner. On other occasions the appearance of the signs will be very acute (fast). The actual signs will be influenced by an abundance of conditions discussed above. The signs of coccidiosis in the herd will include; but, not be limited to, the following.

Young rabbits from 3 weeks to 16 weeks of age are the rabbits that re first and most severely affected. The reason being the animals in this age group are more susceptible due to the lack of immunity. This is also the time of highest exposure to the infective oocyst (egg). During the nursing stage of the life cycle the density of rabbits per cage space is at its highest. This is an ideal time for the young to become exposed to infective oocyst from an infected dam.

An early sign of infestation in young kits is that the growth

rate and feed efficiency will be decreased. The kits will appear thin in flesh (boney) and they will not be as thrifty as anticipated. The fur will appear rough, dry and will have a tendency to stand on end.

The presence of the adult coccidia will interfere with the efficiency of the digestive process and irritates the lining of the intestinal tract. This allows for an increase in the irritation of the intestinal mucosa and the possibility of infection from the various bacteria present. This results in an increased incidence of diarrhea and enteritis.

The common sign of chronic coccidiosis in the adult rabbit is a dry coat that lacks luster. A complaint that is often expressed is that the rabbit goes from molt to molt and will not finish in fur.

Prolonged low-grade coccidia infestation lowers the resistance of the rabbit to other diseases. The reason is not totally known but it is probably associated with the lowered blood count and a depression of the immune system.

"SIMPLIFIED" LIFE CYCLE OF THE COCCIDIA PARASITE

A brief understanding of the life cycle of this protozoan parasite is important to allow appropriate measures to be implemented to control this condition in the rabbitry.

The adult coccidia lives in the linings of the bile duct of the liver (Hepatic form of the disease) or in the mucosal linings of the small intestine (Intestinal form of the disease). These parasites live within the cells of these mentioned areas. This is important as it relates to the interference with the function of the cell and to the permanent damage to the cell that may be caused by this condition.

There are more than 10 different types of coccidia organisms that frequently effect the rabbit. Eimeria steidae is the parasite that invades the cells of the liver and is of greatest concern. The presence of these protozoans in the bile duct cause numerous "saw-dust" like spots on the liver that are observed while harvesting the carcass; or, upon gross necropsy examination of the abdominal cavity. The intestinal lining may be infested with several species of intestinal coccidia and there will be **NO** obvious signs on the liver. Many growers are incorrectly of the opinion that when the rabbit has a liver that is free of spots, the rabbit is free of coccidia. THIS IS ABSOLUTELY NOT TRUE.

Intestinal coccidia is very specific where they live within the small intestine. Each species infest a very specific area. The greater the number of species present, the greater the area of the intestinal tract involved. Therefore, the

greater the number of species involved, the more severe the problem.

The total life cycle of the coccidia is about 12-14 days. Each adult can produce many thousands of eggs, called oocyst, each day. This provides for the potential of a serious infestation in a short period of time.

Each adult produces the oocyst that pass with the fecal material excreted. The oocyst must be exposed to the air for period of 48-72 hours before they become infective to the rabbits. This is a flaw in the coccidia life cycle and allows the rabbit owner an opportunity to intervene.

This fact should put a stop to the often stated commend, "MY rabbit got coccidia on the show table". This would not be possible unless the deposited fecal material was exposed to the air for at least 48-27 hours. This does explain the need for appropriate disinfection of show equipment prior to the use from year to year.

The oocyst of coccidia is very resistant due to their ability to sporulate. This allows the eggs to live outside the body for long periods of time and be infective, even through severe environmental changes. These spores are resistant to many forms of disinfection. This is a factor that makes control very difficult.

The eggs gain entrance into the body through the ingestion of an infective oocyst. Oocyst that are ingested during the consumption of the night feces and oocyst that have not been exposed to the air for 48-27 hours **ARE NOT** infective. Exposure occurs from contamination of the food source with the fecal material; or, the consumption of the egg during the grooming process where the fur has been contamination with an infective oocyst. Forage that has been harvested where rabbit feces has been used as a source of fertilizer may be the source of infestation.

Once the egg is ingested it develops into a larva (immature) form for 3-5 days. During this time, the immature coccidia enters the epithelial cells of the lining of the bile duct of the liver or the epithelial cell of the small intestinal lining. There the protozoan parasite matures to adulthood. It takes another 3 to 5 days for the parasite to reach its reproductive stage to start producing oocyst. The entire life cycle is 12-14 days in length. Each adult can produce thousands of eggs each day. This protozoan parasite's short life cycle, its ability to produce many eggs each day; and, the ability to sporulate makes it a very difficult parasite to control in the rabbitry.

COCCIDIA CONTROL PROGRAM

For all breeds of domestic rabbits to produce at their maximum genetic potential, whether gaining weight or reproduction of the breed characteristics for exhibition purposes, it is important that rabbits of all ages be as free of this protozoan parasite as possible. This may be achieved by reducing there exposure of the rabbits to the infective oocyst and removing the adult parasite from the rabbit's body.

REDUCING THE EXPOSURE OF RABBITS TO THE INFECTIVE OOCYST

This must be included in all coccidia control programs. This will include; but, will not be limited to, the following.

1. Remove all accumulated fecal material from the floors of the wire bottomed cages at least every 48-72 hours. This includes wire brushing the wire floors every 48-72 hours to insure the removal of all feces. When solid floors are used, the excreta should be removed every 48-72 hours. This time interval is mandated due to the fact that it takes the eggs 48-72 hours to become infective. Eggs ingested prior to the 48-72 hours needed to mature will not develop into adult parasites.

   This practice will be especially important when the density of rabbits within the cage is increased; usually, during the nursing stages of the life cycle or when litters are grouped together after weaning (fryer feed lots). It is recommended that a 4 1/2 to 5 pound fryer have at least 1 1/2 to 2 square feet of cage space.

   Extra fecal material also will collect in the cages when rabbits tend to molt or with the fiber producing rabbits. anything that allows for increased exposure of the rabbit to the excreta should be eliminated.

2. Prevent contamination of food and water sources. Young kits may have a tendency to defecate in the feed crocks or other types of feeders. It is essential that one utilizes feeders and watering systems that does not allow this to be possible; or, that feeders and water utensils be cleaned every 48-72 hours to prevent the consumption of feed and/or water contaminated with the infective oocyst. This is particularly important during the juvenile stages of the life cycle and during very cold weather when there is a tendency for the rabbits to set in the bowls to get their feet off the wire.

3. When hay is utilized in the diet, it must be from a source where rabbit fecal material has not been utilized

to fertilize the crop. Also, the hay should be provided in a rack where it will not lay loose on the floor and become contaminated with fecal material. It is a common practice for growers that have rabbits with loose stool to add hay to the cage to provide the rabbit with more fiber. Hay that becomes contaminated with fecal material may increase the rabbits exposure to the infective oocyst; thereby, complicating the enteric condition further.

4. Use nest boxes and nesting material that have been properly sanitized and are free of all coccidia and coccidia spores. This is an ideal site for the young rabbits to be exposed to this parasite.

5. Sanitize all cages and equipment with a sanitizing solution periodically. It should be noted that "flaming" the cages is not an appropriate and effective method of destroying the coccidia oocyst or the spores of the coccidia. For this method of sanitation to be effective, the cage must be heated to a point that serious damage is done to the wire. "Flaming" the cages does assist in removing the collected fur from the cage. Removing the fur is essential as it will decrease the total area where the stool and oocysts can collect. However, "flaming" is also a fire hazard. A good sanitizing solution is one part household bleach and four parts water. The surface to be disinfected must be exposed to the sanitizing solution for a minimum of twenty minutes.

REMOVING THE COCCIDIA PARASITE FROM THE RABBIT'S BODY

It is essential that rabbits in all stages of their life cycle be kept as free of this protozoan parasite as possible. The parasite is most devastating in the weanlings and young growing rabbits. Allowing older rabbits to carry this parasite in the body and shed infective oocyst in the fecal material allows the parasite to be proliferated in the herd. This increases the exposure of the young rabbits to this devastating disease.

To avoid this it is recommended that all rabbits in the herd be treated to rid this parasite from the body. Most successful rabbit owners use some type of coccidiacide in the rabbitry two to four times per year plus good sanitation to control this disease.

Through the years there has been much confusion concerning coccidiosis in domestic rabbits. At one time the presence of intestinal coccidia was almost entirely over looked and given little concern. Many growers used commercial pellets that contained a coccidiastat or a coccidiacide and the difference was not understood by most.

A coccidiastat is a substance that is administered to the rabbit that prevents the level of infestation from increasing. It **WILL NOT** lower the infestation; but, the level will not increase. coccidiastats were added to the commercial pellet and fed continuously. The only exception was the time just before the animal was harvested for human consumption. A coccidiacide is a substance that is administered to rabbits and the coccidia are destroyed resulting in a lowering of the number of adults within the rabbit's digestive system. The intent of a coccidiacide was to lower the number of adult parasites in the rabbit's body. Coccidiacides are to be used long enough to cover the life cycle of the parasite and then discontinue their use.

The most common substance used as a coccidiacide and a coccidiastat was Sulfaquinoxaline at varying concentrations for each of the intended uses. This was confusing as many breeders fed the coccidiastat and thought they had not worries about this parasite. More confusion existed as these were termed "medicated feeds" and then feeds that were medicated with other substances, for a totally different reason, were incorrectly thought by rabbit breeders to be coccidiacides.

Sulfaquinoxaline has been banned for use as a feed additive. This has placed the rabbit industry in a precarious position and new coccidia control programs have had to be initiated. This has been done through the use of coccidiacides in the drinking water, in addition to proper sanitation.

Sulfaquinoxaline added to the drinking water to form a 0.1% solution is the coccidiacide of choice. One should not accept other sulfa substitutes as they are not nearly as effective in the domestic rabbit as a coccidiacide as the sulfaquinoxaline. The sulfa drugs are bitter to the taste. One may need to add one teaspoonful of any flavor of jello to the drinking water to mask the bitter taste.

To be effective, the appropriate regimen of treatment is required. The treatment period must cover the entire life cycle of 12-14 days. The sulfa drugs may be toxic to the kidneys of the rabbit when treated for many days in succession. Therefore, the recommended regimen of treatment is to medicate the drinking water for five successive days with sulfaquinoxaline at a 0.1%. NOTE: The drug is available in several concentrations and the amount of stock solution that must be added to attain the 0.1% will vary depending upon the concentration.

At the conclusion of the first five day treatment period, one will have a herd that is free of the <u>adult</u> coccidia. Immature forms and oocyst will still be present in the gastrointestinal tract of the rabbit. The medication should then be removed from the drinking water for 10 days. This

will prevent damage to the kidneys and allow the oocyst and the immature forms to develop into adults without attaining sexual maturity. Following the 10 day withdrawal of the medication from the drinking water, the herd should be treated again with sulfaquinoxaline at the rate of 0.1% for another five consecutive days. At the conclusion of the second five day treatment period, one will have a rabbit that is relatively free of all forms of the protozoan parasite. If one does not repeat the treatment for the second five day period, do not waste time and money initiating the treatment in the first place.

To maintain control of the coccidia in the rabbitry, one should implement this program two to four times per year. This should be in addition to good sanitation practices to reduce the exposure of the rabbits to the infective oocyst. It is extremely important that the medication be withheld the appropriate length of time before the rabbit is harvested for human consumption.

There are other medications that may be successfully used as a coccidiacide; but, they have not been approved for use in rabbits. If other medications are used, it is extremely important that they are effective in the treatment of coccidia. There is some non-credible information among rabbit owners where certain drugs are thought to be effective and they are not. Medications are available in various forms for other species of animals and they have varying solubilities in the drinking water. Some medications are not as absorbent in the rabbit as other species; therefore, not as effective in the rabbit. Since these medications are not approved for the use in rabbits, the appropriate withdrawal time is not available.

Unfortunately, many times rabbit owners implement a coccidia control program but use the incorrect dosage, do not use the correct medication or they do not cover the life cycle of the parasite and they fail to achieve the intended goals. Another reason for the program to be non effective is that the coccidia may become resistant to the medication.

In summary, coccidiosis is a protozoan infestation in the domestic rabbit that must not be taken lightly. The liver form and the intestinal form of this condition exist. The life cycle of this parasite is 12-14 days in length and each adult can produce several thousand eggs each day. With this productive ability and the fact that growing rabbits have very little natural immunity allows for a serious condition to develop very rapidly. Coccidiosis is a predecessor of many other pathogenic conditions that may develop in the rabbitry. Control of this parasite must include good sanitation and the periodic use of coccidiacides.

WARBLES (BOT FLY LARVA) IN THE DOMESTIC RABBIT

The domestic rabbit acts as a host to the larva of the elusive and seldom seen adult Bot fly (Cuterebra sp.) This is a relatively common parasitic condition of the domestic rabbit in any area of the United States where the Cuterebra sp. Bot Fly inhabits.

The mature Bot Fly deposits their eggs upon the fur of the rabbit during the spring and early summer. After a relatively short period of time, the eggs hatch and the young larva penetrate the skin of the rabbit. The larva can migrate varying distances in the tissue beneath the skin (subcutaneous), until it develops into the encapsulated larva stage of its life cycle. It is theorized that the penetration of the larva is enhanced by the rabbit grooming or licking the area of the body where the egg has been deposited and may even encourage the penetration of the larva into the mucus membranes of the nose and mouth as contact is made.

Initially, the rabbit grower will notice a distinct enlarged mass in the subcutaneous tissue (in any breed) of rabbits. Usually, the mass is located around the neck and shoulders; but, can be located anywhere on the rabbit's body. This mass gradually enlarges over a two to three week period of time, becomes more distinct and feels like a "marble" and will have a limited amount of movement under the skin. Upon closer examination of the enlarged area, one can identify a small hone in the skin that may be surrounded by a small amount of serum or fluid. This is the "breathing pore" of the warble (bot fly larva). As the larva develops, one can identify a black blunt end of the larva through the pore and see movement. During the later stages of development, the mass will become about two to three centimeters (about the size of a quarter) in diameter, there will be fur loss around the opening, there will be pain in the rabbit and the rabbit will attempt to lick and chew the irritated area. At first impression, the grower will anticipate there is an abscess developing until one identifies the larva through the breathing pore.

This condition is most commonly demonstrated during the late spring, early summer or early fall; but, can occur anytime throughout the year depending upon the development time of the larva. Usually, the incidence of this condition is quite low. Only one or two animals in the rabbitry will be affected. However, the incidents can be higher where there is a large population of adult bot flies.

Treatment consists of having a professional aseptically enlarge the breathing pore until the larva can be removed. the larva will be about two centimeters long and one centimeter in diameter and will appear to have a large number

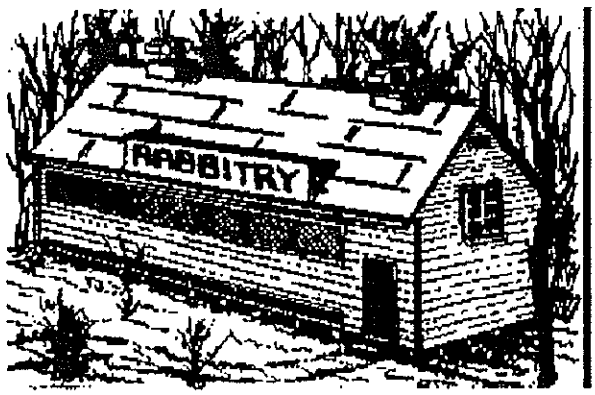
of very black spines covering the body. Application of antiseptic and/or antibiotic creme daily to the would is recommended until the wound completely heals. Treatment is usually very successful without incident. One should not attempt to push or squeeze the warble through the breathing pore as this may cause damage to the tissue surrounding the larva; or, the larva may be ruptured and this creates the possibility of a fatal acute reaction to the rabbit to the fluids of the crushed parasite (anaphylactic shock).

Warbles can be prevented by denying the adult bot fly access to the rabbitry. Fly control can be very difficult and one may need to implement several fly control techniques to be successful in meeting the needs of the varying rabbitry designs. The most economical, safest and effective method of fly control is to darken the rabbitry by covering the windows and doors with a mesh-like material that allows air to enter; but, restricts the entrance of light; such as, burlap. It is essential that the fly breeding sites be eliminated through frequent cleaning and the use of hydrated lime spread on the potential fly breeding areas of the rabbitry. Various insecticides can be periodically used, making sure that the active chemicals are safe to be used on the rabbit and care be taken that the feed and water is not contaminated. Pest strips placed throughout the rabbitry is very beneficial.

In summary, warbles, the larva of the Cuterebra sp. bot fly is seen in many areas throughout the United States in low incidents in the rabbitry. The condition is manifested by a localized enlarging mass, singular or multiple, usually around the neck and shoulders. In the final stage of development, the fur around the breathing pore will be void or soiled.

The treatment of the condition is the aseptic removal and destroying of the larva by the enlargement of the breathing pore followed by daily applications of antiseptic and/or antibiotic creme. Care must be taken not to damage the surrounding tissue or the larva, due to the possibility of creating fatal anaphylactic shock. This condition can be controlled in the rabbitry by denying the bot fly access to the rabbit.

SANITATION AND DISEASE PREVENTION



IN THE RABBITRY

PREVENTION OF DISEASE IN THE DOMESTIC RABBIT

A preventative disease control program is of utmost importance in the rabbitry. Controlling diseases in the rabbitry is easier, less costly and more effective than trying to treat any type of disease outbreak. This program should be initiated and included in the construction and developmental plans for the rabbitry. It is much easier to incorporate initial appropriate ventilation procedures than to change once the rabbitry is in operation. Consideration must always be given the ease of cleaning and disinfection. If the task is easy and convenient, it is more likely to be done on a regular and timely basis. To have a successful rabbitry, one must incorporate a progressive and effective preventative disease control program.

The major factors to a successful preventative disease program, whether it is a large commercial operation or a small 4-H rabbit project, should include the following considerations.

MANAGEMENT

A rabbitry's success depends on the number of rabbits produced per doe and/or the quality of rabbits produced. Management practices may be ignored due to increased cost for improvements and the extra labor involved. the management practices important to good disease control includes, but is not limited to, the following:

1. Proper Physical Facilities . Ease of cleaning and disinfecting the entire rabbitry periodically is essential. The cages must be constructed in units of a size that they may be readily moved, disinfected and returned. All materials used in the cage system, floors, walls and ceilings must be of nonporous materials that can withstand chemical disinfection. The presence of areas that allow organic materials to accumulate are not conducive to good sanitation and disinfection.

Facilities that are not easily disinfected allows for bacteria build up and the possibly of the presence of pathogens. This increases the possibility of disease in the rabbitry.

2. Adequate Ventilation System. Providing the rabbits quality environmental air is a very important factor in a sound management program. The purpose of ventilation is often mistaken to indicate a method of cooling the rabbitry. Movement of air will cool the rabbitry when the fresh air source has a cooler temperature. The purpose of a ventilation system is to provide quality air to the rabbits. This is just as essential when temperatures are cool as it is in the summer months.

Research shows that rabbitries with inadequate ventilation have decreased production, increased incidents of respiratory disease and other associated diseases. The primary air contaminant in the rabbitry is ammonia. Production of this irritating gas occurs in the intestinal tract and in the collection area of the urine and feces. Adequate ventilation is essential to remove this material from the air. The goal of the system would be to change all the air in the rabbitry 10 times every hour. This will be influenced by the density of rabbits (rabbits per square foot), cleaning system and the frequency of cleaning.

It is essential the air inlets and outlets be of the appropriate size and in the proper locations to provide quality air to all rabbits. Many owners will move large volumes of air within the rabbitry and still have poor ventilation.

Most rabbit raisers have adapted an existing structure to house a few rabbits. Initially, the quality of air was adequate and the ammonia level was very low. When the human nose can detect ammonia in the air, it is ten time the level that may be damaging to the rabbit. The passing of time allows litters to be saved, new breeds to be added and the density of rabbits within the enclosure to increase greatly. The density of rabbits eventually exceeds the capabilities of the ventilation system and health problems start to develop.

Proper ventilation is a key to disease prevention in the rabbitry. Evaluate the efficiency of this system every three months.

3. Marketing. To the fancier, producing rabbits or to the commercial operator, marketing of the offspring is essential. This is necessary to prevent over crowding and placing extra stress on the sanitation program and the ventilation system. As these management practices deteriorate, the defense mechanism of the rabbit decreases and there are more incidents of disease. More disease produces more pathogens. A vicious cycle soon develops that causes many problems in the rabbitry.

Production and sales must equal each other or there will be an increase in the inventory of the rabbitry. One must have an appropriate market for those animals that are not of breeding or exhibition quality. Maintain a monthly inventory of animals to monitor the need for marketing strategies.

CULLING

This is a difficult task for many breeders as this requires making some very difficult decisions. Does one keep as excellent rabbit, possibly a show winner, that has a health

defect? The response to that question will determine the future herd health in the rabbitry. Culling sick rabbits and those animals with an inherited predisposition to a disease should be done immediately.

Only rabbits that show signs of disease resistance and desirable disease resistant characteristics should be kept for herd replacement animals. With proper culling and selection of replacement stock, each generation of stock should become healthier and more resistant to disease.

SOUND GENETIC POOL

Select initial breeding stock that is as free of genetic faults as possible and has as many desirable traits as possible. Some breeds, and strains within the breed, vary considerably concerning traits that relate to health and disease resistance. Inherited traits that must be given consideration are as follows:

1. **REPRODUCTIVE TRAITS.** Raising litters successfully is the desire of all rabbit breeders. Nothing is more discouraging than to keep a rabbit for long periods of time and not raise any young. Breeding difficulties are a major problem confronted by breeders. Give consideration to the following:
   a. Receptiveness to male. Rabbits do not have "heat cycles" like most other animals. Select breeding stock that will be receptive all year, regardless of the season. Many strains tend not to be receptive in the fall and winter when the total day length is getting shorter and the temperature is decreasing.
   b. High conception rate. One desires animals that posses the ability to have a minimum of a 90% conception rate on first mating.
   c. Litter size. This will depend on breed size and the inherent ability to ovulate a large number of eggs. Rabbits of smaller size will kindle fewer kits.
   d. Ability to lactate abundantly for litter size anticipated. The ability to lactate to the maximum potential is inherited. Daily energy consumption will influence milk production within the inherited potential.
   e. Possessing the necessary maternal instinct to build an appropriate nest and care for the kits.

2. Soundness of feet and foot pads. Rabbits that do not have proper feet and legs are prone to sore hocks and other gain abnormalities. These animals cannot produce to the maximum potential and must be removed from the herd prematurely.

Inherited characteristics that assist in the prevention of

sore hocks include:

a. Large foot and foot pad size on front and rear feet in proportion to the body size.
b. Thick foot pads on front and rear feet.
c. Thick density of fur on the bottoms of the feet.
d. Rabbits that are not excitable and traumatize their foot pads by stomping their feet excessively.

3. Disposition. This is an important inherited trait. The rabbits must have the disposition to adapt to the existing facility and to meet the needs of the intended production purpose. Rabbits that are bred for house pets must have the appropriate disposition to meet the needs of the buyer.

Rabbits that are nervous, aggressive and excitable should be culled from the herd. These are the rabbits that "stomp" their feet and become very excited at the sound of a strange noise or any activity. This increases the incidents of sore hocks, encourages does to destroy their nest and cause many other problems.

4. Physiological habits. These are habits associated with several husbandry factors that are important to the rabbit owner. Offspring of rabbits that have aggressive appetites and drink a lot of water tend to do the same. Another important factor is eating habits and tendency to waste feed. The offspring tend to adapt or continue the same habits. Defecation habits, the rabbit's personal hygiene traits, and grooming traits tend to follow specific blood lines.

5. Disease resistance. Select and cull rabbits to increase the natural resistance to pathological conditions, particularly respiratory and digestive disease. Some breeds, and some strains within a breed, are more susceptible to these diseases than other rabbits raised under the same environmental and husbandry conditions.

6. Alignment of the incisor teeth. The normal alignment of the incisor teeth is that the upper incisors must overlap the lower incisors. Incisors that meet "head to head" (butt) or where the lower incisors are in front of the upper incisors, presents a serious problem. These conditions are a disqualification at exhibitions and are called simple malocclusion (butting), malocclusion, wolf teeth or buck teeth. The incisor teeth elongate at the rate of 1/2 to 3/4 of an inch per month. When not in proper alignment, the upper and lower incisors will not wear each other off uniformly. This will allow them to grow uncontrollable and they grow back into the rabbit's head like "rams' horns.

The position of the teeth is dependent upon the inherited length of the lower jaw (mandible). This is thought to be a simple recessive trait in breeds with oval shaped heads. Malocclusion in the breeds with the large round heads has

other inherited factors involved. This includes the development of the upper and lower jaws at the rate to maintain the incisor position. One may mate one line that is free of tooth abnormalities to another line that is free of malocclusion and a portion of the offspring may have bad teeth. The cause would be the variation in the rate of development of the upper and lower jaws of the two strains.

Rabbits may "pull" their teeth on the cage wire. Many blame the cause of bad teeth on wire pulling than actually exist. When teeth are pulled on the wire, one of the incisors will show deviation. It is rare that both incisors would be pulled the same amount and not allow some deviation laterally.

Select breeding stock that is free of this condition. This may be more difficult in some breeds with the large round heads. In these breeds, select individuals that have the desirable length of lower jaw. the maturity rate of the maxilla (upper jaw) and the mandible should develop at similar rates.

PROPER RECORD KEEPING

This is an area neglected by most all rabbit managers. Those that do keep records often do not include anything concerning health.

Some strains of rabbits are more susceptible to certain diseases than others. Mating animals that have disease resistance will produce offspring with this characteristic. It is much better to produce animals with disease resistance than to treat the disease. Proper records are essential to allow the manager to examine the susceptibility of the rabbit to specific disease conditions.

There are several excellent programs for the personal computer that assist in record keeping. Even small rabbitries must give consideration to computerized record keeping.

RODENT AND PEST CONTROL

This is an absolute must for all rabbitries! Rodents, birds, insects and pets do not have any place in the rabbitry where they, or their excreta, may gain access to the rabbit. Caution must be used to insure that feed, water, bedding materials and equipment does not become contaminated with excreta of these animals. Disease may be propagated and harbored in the above pests. Many of these animals can be carriers of internal and external parasites.

The presence of strange animals in the rabbitry may frighten the rabbits, causing severe trauma from the reaction to the

excitement. Does in the late stages of pregnancy and those does that have just kindled are particularly sensitive to rodents and strange animal's presence in the rabbitry. Maternal neglect, not building a nest or abandoning the kits, may be attributed to this problem.

NUTRITION

Balanced diets are essential for the health and welfare of the rabbit. The content of the ration and the amount of feed fed will depend upon the stage of the rabbit's life cycle. A good example is that obviously lactating does have a different nutritional requirement than the house rabbit.

Nutritional problems occur when the ration is lacking some element (deficiency), there is an excess of some element (toxicity); or, the product is contaminated with a foreign substance. The latter is extremely critical due to the sensitive nature of the rabbit's digestive system.

Most commercially prepared rabbit pellets are nutritionally balanced to the best of the manufacturer's ability. Most rabbit owners use these as the base ration. Some owners will add various substances to the ration to enhance the performance of the rabbit for its intended use. Others add treats to the ration without any reason.

There are risks when adding substances to the rabbit's diet. These include the possibility of upsetting the digestive flora, causing anorexia (not eating), diarrhea and death. The amount of balanced ration consumed is decreased in preference to the treat. When the treat, or feed additive, is not nutritionally balanced, there is the possibility of creating a nutritional deficiency of some of the micro nutrients. All feed additives should be nutritionally balanced.

Water is an essential and important element of nutrition. Fresh, clean uncontaminated water must be available at all times. To insure the quality, water samples should be evaluated once or twice a year.

Watering utensils are idea locations for various pathogenic (disease causing) microorganisms to proliferate. It is essential that water crocks, bottles and the lines of automatic watering systems are sanitized every 14 to 21 days. Additional chlorination of the drinking water on a daily basis, including city water that has been chlorinated, is very beneficial. Adding one teaspoonful of household bleach (containing 5.25% Sodium Hypochlorite) per gallon of drinking water will reduce the bacteria and decrease algae growth in the warmer water. There is no detrimental affects of continued chlorination of the drinking water.

SANITATION

This is essential in all rabbitries and includes regular cleaning and disinfection of the facilities. The frequency and efficiency of the cleaning procedure will be dependent upon the ease of the cleaning process. This should be given consideration during the construction or conversion of a facility for a rabbitry.

Use materials that may be readily disinfected and construct cages so that they are easy to clean. This will allow the cages to be in units of such size that they may be removed from the structure periodically for disinfection.

There are many good disinfectants on the market. Some are more effective in the presence of organic material than others. It is important that all the mature and debris is removed from the cages prior to disinfection to enhance the effectiveness. The contact time of a disinfecting agent is important for thorough disinfection. If the suggested contact time is not met, the procedure will not be effective. Twenty (20) minutes is usually a sufficient time for most disinfecting agents.

Nest box sanitation is one area that needs special attention. This is an area where kits may be exposed to conditions that do not express themselves until later in their life-cycle. Sunlight is a good disinfectant; but, it is not always available and the time restraints sometime sis not within the realm of reality. With some boxes, it is totally impossible for the sun to reach all areas. The use of one part household bleach with four parts water and submersion of the box for twenty minutes is a good disinfecting process.

Caution must be used in selecting a disinfectant. The material should not be corrosive to the cage and should give consideration to the environment. When using disinfectants, appropriate protective measures should always be used.

CONTROLLING DISEASE OUTBREAKS

All rabbitries are susceptible to contacting a pathogenic (disease causing) organism and having a disease "out break" in the herd. The earlier the disease is observed, diagnosed and treated, the greater the chance to minimize the loss.

Great efforts should be placed on limiting the exposure of the rabbits to pathogenic organisms. This will include several practices discussed above. It also must include quarantine of new animals and exhibition animals brought into, or back into, the herd. Visitors or anyone, including manager, should clean footwear and hands with appropriate disinfectant prior to entering rabbitry.

Rabbit medicine is a highly specialized sector of veterinary medicine. The reason being that very little information is given to veterinarians during their professional training. This presents a problem for the rabbit owner and necessitates advanced preparation to prepare for problems. Owners must locate a facility that is willing to work with them to resolve problems timely and efficiently. Time is of essence. Many state labs will perform necropsy and diagnostic procedures but one does not receive any of the results until all work is completed and then it is without recommendations. The time element may allow severe losses in the herd. One must locate a consultant prior to any emergency to make the necessary arrangements should an emergency develop. The preparation may include schooling on how to do home necropsies and the determination of normal tissue from diseased organs.

PARASITISM

For maximum performance and health, the rabbit should be as free of parasites as possible. The presence of internal parasites may interfere with the absorption of nutrients from the ingested food. This will have a detrimental affect on fur and flesh condition. More important, the resistance to other diseases is decreased.

The most prevalent internal parasite is the protozoan parasite that causes coccidiosis. In addition to good sanitation, it is usually necessary to use a chemical coccidiacide in the drinking water two to four times per year. The frequency of the use of parasiticides and coccidiacides in the rabbitry will depend upon the management practices employed.

OBSERVATION

The good rabbit manager will be able to detect a forthcoming problem several days in advance to the average rabbit grower. This is a result of spending time in the facility observing the normal rabbit and detecting abnormalities via sight, sound, smell and feeling the rabbits. This is an acquired trait that some rabbit breeders never develop.

In summary, a good disease prevention control program is essential. It is much easier and efficient to prevent disease in the rabbitry than to treat or eliminate once it is present.

Disease control programs will vary from rabbitry to rabbitry depending upon various circumstances. The above discussion includes various aspects that must be considered.

SANITATION AND DISINFECTION OF THE RABBITRY

I. **Understanding the Basics**
   A. What are the goals of the sanitation program?
   B. What are the advantages and limitations of the agents or chemicals to be used?
   C. How is the agent or chemical used?

II. **Definitions**
   A. Cleaning agent - an agent that, when used with some form of agitation, removes soil.
   B. Sanitizer - an agent that reduces the number of bacterial contaminants on inanimate surfaces to levels prescribed by public health rules and regulations.
   C. Disinfectant - a chemical that destroys or eliminates infectious agents from a surface.
   D. Sterilant - any physical or chemical agent that kills or inactivates microorganisms.
   E. Bacteriostat - an agent that prevents the growth of bacteria, but does not actually kill them.
   F. Bactericide - an agent that kills all bacteria; but, not necessarily bacterial spores or other microorganisms.
   G. Fungicide - an agent that kills fungi.
   H. Viruscide - an agent that destroys or inactivates viruses.
   I. Sporicide - an agent that destroys bacterial and mold spores.
   J. Biocide - an agent that kills all living organisms, disease-causing or non-disease-causing.

III. **Choosing a Disinfectant**
   A. Effectiveness - concentration, temperature and time will influence the result.
   B. Affect on the animals - toxicity, stimulation of liver enzymes, effect on pheromones and behavior. Fragrance containing products should not be used. Scents can mask odors left by inadequate cleaning.
   C. Affect on personnel - are safety data sheets available?
   D. Affect on the environment - is the product E.P.A. (Environmental Protection Agency) registered?
   E. Will there be damage to equipment?
   F. Cost - is it economical?
   G. Will there be labor savings?
   H. Is the produce readily available?
   I. Is the produce compatible when mixed with other disinfecting agents?
   J. Does the supplier provide "extras" such as:
      1. consulting
      2. free shipping/free dispensers

3. microbiological service - culture and identification of organisms - to evaluate the sanitation program

IV. **Animal Welfare Act Regulations**

A. Cleaning

1. Cages must be free of excreta, hair, cobwebs, and other debris.
2. When cages have a solid floor, replace soiled litter with clean litter once a week. 3. Wire-floored cages must have the troughs or pans beneath them cleaned weekly.

B. Sanitation

1. Cages must be cleaned and sanitized (by exposure of 180 degree Fahrenheit for 3 minutes or by chemical means) once a month.
2. Empty cages must be cleaned and sanitized before introducing new rabbits into them, if they were previously occupied.
3. Premises must be clean, in good repair, and free of accumulations of trash.
4. An effective program for the control of pests (flies, rats, mice, etc.) shall be established and maintained.

SHOWROOM SANITATION - THE RABBIT EXHIBITOR'S CONCERN

All rabbit owners are aware of the importance of employing approved sanitation practices in the rabbitry to enhance and protect their precious and valuable animals from the possibility of exposure to various disease and parasitic conditions. Most exhibitors are aware of the possible exposure of their rabbits to pathogens when attending exhibitions and take precautions to minimize exposure; and, isolate the animals from the remaining herd upon return from the exhibition.

Show officials support the exhibitor's concern by making publicized statements in show catalogs that state: "Diseased animals will be removed from the showroom". This is commendable; but, oftentimes very difficult to implement without creating confusion, alarm and hard feelings. It would certainly be more effective and appropriate for the exhibitors to control and implement this disease prevention practice themselves rather than depending upon the show officials to enforce the rules of common courtesy.

It is not uncommon for a rabbit to appear totally healthy within the home environment and through the stress of traveling a pre-existing (unknown) condition to demonstrate itself at the show. This can happen to all exhibitors. When noticed, or brought to the attention of the owner, one should (must) voluntarily and immediately, not necessarily at the request of other show superintendent, remove the rabbit from

the showroom. The common statement is: "It was okay when I left home". This is probably true; but, now it is evident and that animal should be removed to prevent any possible further contamination and to prevent anxiety among other exhibitors. This is not an ideal situation; but, one that can be accepted due to the nature of respiratory disease in rabbits.

Unfortunately, there are those individuals that wish to "win at all costs" and will regularly administer substance, at various intervals prior to the show dates, to "mask" the signs of disease not realizing that these animals are possibly spreading just as many of the infectious germs as the animal that displays an obvious nasal discharge and other respiratory disease signs. This practice is very difficult to comprehend and accept; but, the exhibitor must be given the "benefit of the doubt" that the reason this is done is that they do not totally understand the respiratory disease and the dangers that exist.

Basically, judges do not desire to remove an animal from competition for any reason; but, is oftentimes placed in a very precarious position as it relates to disease due tot he fact that they are trained as judges of breed characteristics and not a diagnostician of disease. This is complicated by statements in the Standard of Perfection that colds are to be an ailment for disqualifications (this makes the judge a disease diagnostician) and qualifies the statement by: "The animal must show a white purulent nasal discharge. (A wetness around the nostrils and roughened fur on the inside of the forelegs is not sufficient evidence of a cold)". This statement encourages "nose wipers". The white discharge can be present during exhibition, the animal disqualified by the judge, the animal then cleans its own nose; or, the owner wipes the white discharge away; and, later explains "I don't see a discharge". The other scenario is that the judge observes severely matted paws, rattling and all the signs of a cold; but, that animal must remain in competition due to the lack of an obvious white nasal discharge. This is even more frustrating to the judge when the exhibitors are observed wiping noses prior to placing the animals on the table. Again, these animals are spreading as many infectious germs as the rabbit with obvious white nasal discharge.

The above examples exemplifies the importance of excellent sanitation practices during exhibition. Certainly there is going to be exposure to disease and this mandates that one has a strain of animals with the most inherited resistance to varying diseases as possible. However, it is mandated that we keep the exposure of the animals to the various pathogens at a minimum through the enhancement and implementation of appropriate sanitation practices.

Most show tables, holding pens and etc. are stored between

periods of use at various locations. Finding storage space is oftentimes very difficult for a club and they are very grateful to store the materials in lofts and other places that are not totally ideal and the equipment can be exposed to various avian droppings and vermin contamination. On many occasions, the tables and holding pens have not been cleaned of organic debris and excretions from the previous show. Time is of essence and many volunteer show personnel just do not have the adequate time available after a long show and the pressures of getting the equipment torn down and the showroom vacated at the appropriate hour to clean the equipment. Unfortunately, the next time the equipment is needed, time continues to be at a premium and the show tables, holding coops and etc. are set up without any disinfection process to assist in reducing the exposure of the rabbit to the various pathogens. This situation not only allows for passing of disease from the previous show; but, allows for the passing of disease from the contamination of the equipment by birds and vermin during storage. Further, these conditions detract from the eye appeal and the beauty of the show and allows for the possibility of severe public health significance to the humans associated with the show. Clubs are encouraged to remove all organic debris upon completion of the show, cover the equipment during storage if bird dropping contamination exists and completely sanitize and disinfect the materials just prior to use, including the carpeted surface. It is important that the disinfecting agent be allowed the necessary "contact time" to be effective and that all surfaces be allowed to dry prior to use. This procedure can be time consuming, difficult to schedule and cost will be incurred; but, it is necessary to protect the rabbits from the exposure to disease and will be greatly appreciated by the exhibitor.

Caution should be used during the judging process to prevent the possible exposure of the rabbit to various disease causing germs. This is particularly true when a diseased animal has been identified. It is not feasible for the judges to wash their hands between each rabbit they handle. However, consideration must be given to sanitizing hands after handling infected animals and between classes. This would not totally eliminate exposure to infective agents; but , could greatly reduce the exposure. Again, this would take efforts by the sponsoring club to provide the facilities and encourage the judge to implement these practices. However, the effort for the benefit of the rabbit would be greatly appreciated by the exhibitors. It is time that all rabbit owners, exhibitors, judges and show officials show serious concern about disease control.

Carrying cases are essential to the exhibitor to show rabbits. It is extremely important that all exhibitors give strict attention to their carriers. IT is of utmost importance that all carriers have a sealed tray so the liquid

excreta does not contaminate the floor of the exhibition hall. Many sponsors have been evicted from their show buildings due to the fact that unthoughtful exhibitors have caused unintentional damage to the facilities.

The collection of excreta in the trays allows for an ideal site for various bacterial growth and the development of very strong odors. It is extremely important that carrying case trays be cleaned and sanitized after each show to prevent possible exposure of surrounding rabbits to the various bacterial organisms that have been proliferated in the trays for extended periods of time.

Ideally, each of the trays should be sanitized with a strong disinfectant after each show. One can place absorbent material in the bottom of the cages to assist in preventing the splashing and contamination of the surrounding area. IT would be suggested that individuals utilize some amounts of baking soda added to the trays to assist in keeping the odor at a minimum. This would certainly be appreciated by the sponsoring club, the exhibitors and the surrounding rabbits.

It is very discouraging to observe filthy contaminated cages that are reeking with odor at exhibitions. This indicates the entire sanitation program in the rabbitry and detracts from the entire image of the rabbit owner.

In summary, sanitation in the rabbitry and at shows is extremely important. All measures possible should be implemented to keep the exposure of the various bacteria at a minimum. It is extremely important that all exhibitors set examples of strict sanitation. The more sanitation practices that are implemented, the more aware of appropriate sanitation will be implemented in the various areas of the rabbit industry.

RODENTS, PREDATORS AND OTHER ANIMALS IN THE RABBITRY

Whether the manager of a large commercial rabbitry, a small backyard rabbitry; or, a hobbyist, each should be cautioned about the dangers of the presence of any of the rodents, predators or animals involved when they are present in the rabbitry.

Many individuals allow household pets and other domesticated animals to roam the rabbitry area. One should be cautioned that this can be dangerous from several aspects. The animals can carry with them many types of bacteria that may contaminate the rabbitry or the feed source; and, cause serious outbreaks of disease in the herd. The most docile and best "mouser" in the form of a cat can oftentimes wreak havoc in the rabbitry. This can be done through the excitement of the animals through the kindling process where they lose their young, or through the contamination of the

pellets through the use of the pellet containers as a litter box. The most playful can will oftentimes pursue the young kits in the nest box with outstretched paw and injure or kill the young kits unintentionally.

Predators, such as raccoons, opossums, owls and other small animals oftentimes seek out the rabbitry as a place for warmth and comfort as well as there is usually a supply of food and water available. the mere presence of these animals in the rabbitry can cause disruption of the kindling process, excite the animals to the point that they may fracture their spine and wreak havoc in the rabbitry. Many of the predators will use the young kits as a source of food when forced to do so when other food is not available. Many times the rabbit manager does not recognize the presence of these predators in the rabbitry.

The presence of rodents in the rabbitry should be of concern to all rabbit managers. To keep rodents from the rabbitry takes continual effort on the part of the manager, due to the presence of a food source and housing for these animals. Rodents are of grave concern in that they carry many types of bacteria that are very devastating to the domestic rabbit, such as Pasteurellosis and Tyzzer's Disease. Rodents in the rabbitry will also cause considerable financial loss to the rabbit manager through the contamination of the food source. This not only leads to the possible bacterial contamination; but, will oftentimes foul the food to the point where the rabbits fail to consume the pellets.

Rats and mice have the ability to crawl up the cage wire and to get into the feeders, as well as, get into the nest boxes and cause considerable damage. Rats and mice have been known to get into nest boxes and not only excite the doe and cause disbandment of the litter; but, they will oftentimes chew on the appendages of the young rabbit or even destroy them.

The rabbit manager must not only be concerned with the contact and presence of the rodents, predators and other animals in the rabbitry; but, they must be concerned with the contamination of the rabbitry equipment with these problem animals. Many times these animals will crawl over, through or use stored nest boxes and other equipment as a source of temporary housing or a "playground".

Regardless of the size of the rabbitry, one must take all measures to keep these animals from contaminating the rabbitry equipment, the feed, and coming into contact with the rabbits themselves. It is usually quite easy to keep the domesticated animals from the rabbitry. However, many individuals find it difficult to do because they like the presence of the "mouser" or their pet dog in the rabbitry. Preventing predators from entering the rabbitry oftentimes is a greater problem and one that necessitates special

structural arrangements so that they cannot get into the building or come into contact with the animals.

Wild and stray dogs are often very devastating in the rabbitry. One should have certain types of enclosures around the rabbitry, if at all possible, to prevent these wild and stray dogs from entering the rabbitry. In many of our suburban areas it takes this type of structure to prevent these animals from entering the rabbitry area in order for the individual to stay in the rabbit business.

Contamination of the rabbitry and equipment with rodents is a very severe problem and one that the manager must guard against at all times. It is almost totally impossible to construct a rabbitry that is completely rodent free. This necessitates the use of chemical rodenticides almost on a continual basks. These baits should be updated periodically and always kept current. The storage of rabbit equipment, such as nest boxes, extra water bowls and etc. should be stored in an area that cannot be contaminated by these rodents. It is very important that the feed by stored in rodent proof containers. This will eliminate the contamination of the feed at this point and will also assist with the prevention of deterioration of the pellet if they are kept in an air tight sealed container.

The use of ferret droppings and ferret urine spread periodically throughout the rabbitry has been an excellent method of controlling rodents. This method of rodent control is desirable in many rabbitries that produce rabbits for laboratory institutions.

In summary, predators, rodents and other animals are contraindicated in the rabbitry due to the fact that they disrupt the rabbits. There is a possibility of carrying serious disease from these animals to the rabbits. Control measure to prevent these animals from being residents in the rabbitry are varied and should be carried out o a continuing basis.

RABBIT SHOWS AND

RABBIT TUTORIALS

POSING AND HANDLING DOMESTIC RABBITS FOR JUDGING

It is of extreme importance that all American Rabbit Breeders Association licensed judges and/or registrars, or individuals assisting with the exhibit, handle each rabbit and cavy properly. This is essential from the time the animal is presented to the judging table until it is dismissed by the judge. the officiating judge is responsible for how the exhibit is handled during the judging process. This includes the actions of applicants working for the various licenses and assistants.

The show superintendent has the responsibility of seeing that "carriers" are properly trained in handling the exhibit as it is transported "to and from" the judging table in cooped shows, if not handled by the owner. It should be the goal of every ARBA judge that the judged animal is returned to the exhibitor, or carrier, in the same condition as presented. The only exceptions being the placement of the fiber on the Angora rabbit and the hair on the "long-haired" cavies.

The manner and style in which the exhibitor's rabbits are handled reflects upon the judge or registrar. It also reflects upon the entire judging and registration system recognized by the American Rabbit Breeders Association.

OBJECTIVES

The objectives of properly handling rabbits are that the animals must be handled in such a manner that:

1. The handler is not injured by the animal's teeth or sharp toenails.
2. The animal is not frightened or injured in the handling process.
3. The fur/wool and flesh is not damaged or injured in any way that will affect its present condition; or, alter the future appearance of the rabbit.
4. The animal can be examined completely for any physical or structural abnormalities in a thorough and rapid manner.
5. The animal is posed in the proper position, as per the breed protocol, to evaluate the animal's profile, fur, color, color distribution and markings.

PROCEDURE

There are many acceptable methods of handling the rabbit to comply with the previously stated objectives. Proper judging facilities complement proper handling techniques. It may be totally impossible to comply with the objectives of proper handling if the judging facilities are not adequate. The judging facilities must meet the physical needs of the

individual judge. show committees are urged to provide an ample number of safe judging coops, judging tables of correct height and properly structured holding coops.

Animals that are handled correctly and securely will be less frightened, struggle less and the possibility of injury to handler and animal will be decreased.

MOVING ANIMAL ABOUT THE JUDGING AREA

Ideally, the rabbit should be lifted from the holding pen by placing one hand under the belly and lower chest while the opposite hand is placed under the rump. The hand under the rump supports the major portion of the animal's weight. This is demonstrated the current Standard of Perfection. With the hands in this position, the animal will feel secure and can be moved about readily without causing damage to the fur/wool or flesh. If an animal is to be moved a considerable distance, the body of the rabbit can be gently placed against the torso of the handler for more comfort and security.

Removing the animal from any type of coop requires "extra" caution. This is to insure that the legs, that are normally in a semi-extended position when handling in this manner, do not become caught or entangled in the cage or the edge of the door wire.

Returning the animal to a judging coop or holding pen should be just the reverse of the above procedure. The rabbit is placed in the pen "rump first" to protect the extended extremities from the sides of the holding coop that are usually smaller than desired. Care should be given that the rabbit is set down gently and not shoved, dropped or "thrown" into the coop. These actions can increase the possibility of injury to the rabbit.

EXAMINATION OF THE RABBIT

To examine the animal completely mandates that the rabbit is "turned over" and examined on the underside; as well as, in an upright position. To accomplish the above, the head must be secured in one of several ways to prevent struggling. An excellent method of securing the head is described in the current Standard of Perfection. That being, that the ears are secured between the thumb and forefinger very close to the head (base of the ears) using the heal of that same hand to support the side of the head. Very little pressure is exerted upon the ears themselves and the grip only acts in stabilizing the head. The opposing hand is placed at the rump of the rabbit and gently brought toward the handler's body; while the hand supporting the head and ears is pushed away from the body. Simultaneous motion of the hands results in the rabbit being turned over in a very gentle and secure manner. Complete evaluation of the lower portion of the

rabbit's body, extremities, head, mouth and eyes may be done in this position. The hand stabilizing the head and ears is maintained in position. The opposing hand is removed from the rump and utilized to pull the upper and lower lips toward the top of the head. This exposes the teeth for complete evaluation.

The nape of the neck, just behind the ears, may be grasped with the outside fingers of the hand supporting the head and ears to assist in controlling the rabbit. Caution must be utilized so the "grasp" is limited to that small area and the grasp does not extend to the usable portion of the pelt. This may be very difficult in the smaller breeds of rabbits; or, if the handler's hands are large.

At the completion of examining the teeth, the head can be gently turned to each side to examine the structure and color of each eye. With the animal in this position (turned over), the majority of the animal's weight is resting upon the forearm of the hand securing the head; or, upon the judging table. Each extremity and foot can be evaluated completely by extension of each limb with the opposing free hand of the handler. Also, in this position, the dewlap area, lower chest, lower abdominal cavity and tail can be completely observed and palpated for the presence of abnormalities, formation and color. The sex of the rabbit can be substantiated and the genital area examined in this same position.

At the completion of the examination of the "underside", the rabbit can be set upright and the examination completed. One will continue to look for the presence of any abnormalities, the fur can be evaluated for quality, color and condition.

The examining procedure will be physically more demanding and possibly more difficult to meet the objectives of handling, for the longer and larger rabbits as compared to the smaller rabbits. This may be particularly true of an individual that is petite and small of stature. Consideration must be given to utilizing the judging table to support the major portion of the weight of the animal rather than totally "lifting" the animal. This can be successfully accomplished by "rolling" the animal over to examine, as described above, allowing the weight to remain on the judging table. To do this successfully, the judging table must be at a level that is comfortable and correct for the given judge's physical stature.

In comparison, the smaller and dwarf breeds must be handled with less force than larger rabbits. Adjustments must be made as it relates to the size of the handler's hands in relationship to the size of the animal. Consideration also must be given to the various special characteristics of some breeds (lopped ears, fine bone, long fragile bodies, etc.)

and adjust the handling procedure accordingly. One must always use care to handle the rabbit in such a manner to protect the animal from injury.

The specific order that the characteristics of the rabbit are evaluated ay be determined by the individual judge. However, it is highly recommended that a specific "routine" be established, and followed, in examining each and every animal. Developing a specific order of evaluation decreases the possibility of "missing" structural defects.

POSING

It is of extreme importance that each and every animal of a particular breed is evaluated in exactly the same posing position. The posing position will vary among the breeds recognized by the American Rabbit Breeders Association. It is important that one completely understands the various posing positions as recommended per the breed protocol.

It is generally accepted that the type (body, head, ears) is observed and primarily determined by sight; and, condition (flesh) is primarily determined by touch. Realizing the importance of type in most breeds, correct and consistent posing is essential to each judge in evaluating each rabbit correctly and consistently.

The various posing styles for the recognized breeds will be discussed below:

STANDARD POSITION

The majority of the breeds of rabbits recognized by the American Rabbit Breeders Association are posed in the "standard' position. This is demonstrated in the current Standard of Perfection.

The hind feet are placed flat on the table in a natural position with the toes of each rear foot even (perpendicular) with the haunches (thigh or stifle joint). It is important that the hind feet are positioned correctly to evaluate properly the depth of body over the loin and the development of the lower hip. Positioning the hind legs too far forward (tucked) can allow false evaluation of depth at loin and/or that the animal lacks fullness of the lower hip (pinched). Placement of the rear feet too far back will allow the rabbit to appear to have a lack of depth of the hindquarters and can alter the location of the "high" point. Positioning of the rear legs is very important.

STANDARD POSITION

The front feet shall be positioned flat on the table with the tip of the toes of each front foot perpendicular (even) to the eyes. Positioning of the front feet is extremely critical in breeds that have massive bone and deep shoulders. This is due to the physical relationship of the size of the shoulder blade (large) in comparison to the length of the bone of the front leg (short). Movement of the front feet, forward or backward, a small degree will exaggerate the movement and shape of the shoulders in breeds possessing these traits.

After the animal is placed in "standard position" one can evaluate the profile of the rabbit more correctly by stepping back and observing from various angles rather than "hovering" close to the animal. One must be very cautious not to "mold" the animal to the desired top line curvature by improper placement of the feet.

Flesh condition and the smoothness over the spine and hips should be evaluated with each animal in the same position. Evaluating this characteristic with animals in various poses will not be consistent. This is due to the alteration of the position of the various bones of the spine. This will affect the degree of smoothness and contour, depending upon the position rather than the actual flesh condition.

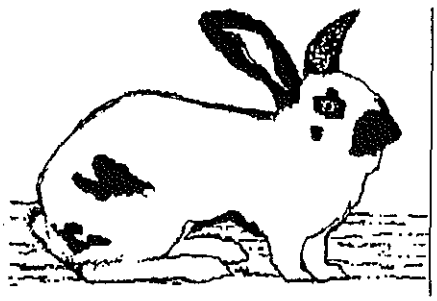
The French Lop is posed in the standard posing position; but, the Standard further directs that they rest lightly on the front feet. This allows the head to be raised slightly for more accurate evaluation of the ear and ear carriage. Positioning of the front feet in this breed is important. Due to the anatomical structure of the shoulder joint; a slight variation of the front foot position can greatly alter the shape and depth of the shoulder.

The Holland Lop, via instruction of the Standard of Perfection, is to be posed resting lightly on the front feet with the majority of the weight resting on the hind feet. The position of the feet will remain in the standard posing position; but, care must be taken that the rabbit is not "pushed down" on the show table. This allows for appropriate and consistent evaluation of the body profile, head shape and ear carriage. Holland's with correct bone structure will readily pose in this position. The Holland Lop must be allowed to relax prior to evaluation of the ear carriage and shape.

"NATURAL" POSING POSITION

After examining the individuals of the Checkered Giant, English Spot, Harlequin, Rhinelander and Tan breeds, the rabbit should be allowed to move about on a suitable judging table and pose naturally. This allows for evaluation of type in the natural position and the comparison of the markings

from "side-to-side" as they move about the table.



CHECKERED GIANT-NATURAL POSE-Front legs need to be extended further.

The animals of these breeds need not be handled after the initial examination procedure except to compare specific markings, if desired. One should use caution in the above named breeds that one does not dig, poke or tug at the animal causing a distortion of the specific markings. These breeds should not be "flattened" to the table due to the fact that it may alter their natural posing position and marking distribution.

Slapping or pounding on the table to encourage the animal to move will, on occasion, have the opposite effect. This can frighten the animals and inhibit their movement. The rabbit can be encouraged to move about the table by greatly lifting or slightly "nudging" the animal forward. Although movement of the animal is desired, caution should be used not to totally exhaust the rabbit from too much activity. Rabbits that get too tired will not pose naturally or display their type properly.

A substantial and rigid judging table (one that does not rock or spring) is essential to insure that the animals move freely. The table should be of sufficient length and width. This will allow these breeds to display their type and pose naturally without the possibility of falling from the table.

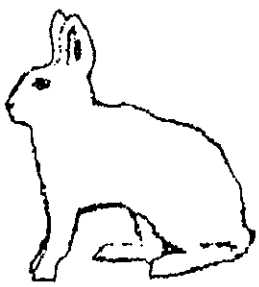
Animals posed in the natural position can best be evaluated by standing back from the judging table and viewing the animal from various angles as they move about the table and pose naturally.

The Harlequin standard mandates that this breed is allowed to move freely about the judging table. The purpose of evaluating the Harlequin in this manner is to allow the judge to stand back and view the color, the pattern of the markings, and the distribution of the color over the entire body. this breed will not move as energetically as other breeds.

The judge may wish to view various other breeds as they move to evaluate the bone structure and fullness of the lower hip. This is particularly encouraged in the giant breeds to evaluate the strength of the ankles.

POSING IN THE UPRIGHT AND ALERT POSITION

The Belgian Hare and Britannia Petite are evaluated in a posed position. This position is setting squarely on hind feet, front legs completely extended, alert and the head held high. This allows the evaluation of the extension of the limbs and the arch of the body. Due to the alertness of these breeds; particularly the Britannia Petite, a temperamental disposition should be expected.



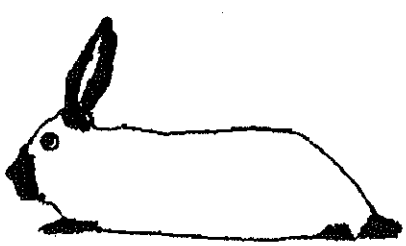
POSED POSITION-Front legs extended & alert

The mechanics of posing the Belgian Hare will vary depending upon the training of the animal by the owner. It is necessary for the judge to work with this breed a little longer than with other breeds to accomplish the desired posing position. Position the rear legs, slightly push the animal backward while lifting the front of the animal with the fingers between the front legs until the animal extends its limbs will initiate the posing position. A small amount of pressure, with the opposite hand, on the top of the shoulder, will encourage the rabbit to strike and hold the pose. in this position, one can stand back from the table and view the animal from various angles to evaluate the unique characteristics of these breeds.

The Britannia Petite may be posed by slightly "tossing" the animal back and raising the front end with the heal of the hand. The Petite will then extend the front legs and strike a pose for evaluation.

POSING IN A STRETCHED POSITION

The only breed of rabbit recognized by the American Rabbit Breeders Association that is dictated to pose in a stretched position by the Standard of Perfection is the Himalayan. The properly posed Himalayan is stretched out with the forelegs, stomach and hocks lying flat on the judging table.



STRETCHED POSING POSITION

The fore feet are initially positioned with the toes even with the eyes. With both hands securing the haunches, one then gently stretches the body to the rear and positions the hind feet and hocks flat on the judging table. Caution should be used to be sure that the hind legs have not been "spread apart" during the positioning procedure. They

may be gently pushed together with pressure from the palms of the hands along the sides of the hip. The fore portion of the animal may be secured with the fore arms of the handler. The feet must be flat on the table to insure that "over stretching" does not occur.

Properly positioning the Himalayan is essential in correctly evaluating the body type consistently from one animal to the other.

JUDGING MARKED ANIMALS

Caution must be used in evaluating all marked breeds of rabbits to insure that the markings are not distorted in the handling or examining process. It is extremely important that one does not dig, poke or tug at the various markings or skin around markings. Distortion of the various markings can enhance inconsistent evaluation and judging.

It is of special concern that the "underside" marking on the individuals of the Dutch breed are evaluated as if the rabbit was setting in the standard posing position. Caution must be used to insure that the Dutch rabbit is not "stretched out" when evaluating the undercut. The cheek marking may be distorted by the hand in securing the head. Again, improper handling will enhance inconsistent judging.

MEASUREMENT OF EARS

As per the Standard of Perfection, several breeds have maximum and minimum ear lengths. It is very important that the ear length measurement is taken accurately and correctly.

One can precisely measure the upright ears by placing a rigid straight edge between the ears with the lower edge resting on the crest of the skull (base of the ear). The measurement may be observed from the side at the tip of the ear. The placement of the end of the instrument at the base of the ears is very critical. There are some measuring instruments that have been precisely made for this evaluation. It has a small round notch on the end so it will fit over the skull crest and the measurement starts at the base of the ear. The measurement should be taken with these ears in an erect and upright position.

Ear length and width is important in the English Lop breed. The English Lop's ear length should be measured from the tip of one ear to the tip of the opposing ear. The ears must be measured at right angle to the body. The measurement must be taken with a rigid straight edge resting just behind the head at the origin of the ears. The end of one ear must be secured, with the thumb and forefinger, to the tip of the straight edge and both ears stretched taught to measure the total ear length on the opposite end. The mechanics of

measuring an English Lop's ear should be precisely followed with each animal so the ear measurements are consistent.

The width of the English Lop ear can be easily taken by opening the ear back and taking the width measurement from side to side at several locations. Due to the importance of the length and width of the English Lop's ear, it is necessary that one determines the measurement correctly and consistently from one animal to the other.

CONCLUSION

Handling and posing the rabbit during the judging procedure is extremely important. It is mandated that the handling procedure meet the objective set forth in the context of this article. It is particularly important that the animals are handled in such a manner that they are not injured and their physical condition is not impaired for evaluation at future exhibitions.

Due to the extreme variation in the physical characteristics of the various breeds, it is important that handling procedures are adjusted to accommodate the various characteristics of the breeds. The adjustment of the handling procedure is to insure that the objectives to handling are met.

Various posing positions are required by the various breeds to emphasize specific characteristics, markings and body style of that particular breed. It is important that each rabbit within a given breed is posed exactly the same to insure equal and consistent evaluation of the various characteristics of that breed.

Show committees are encouraged to give consideration to the fact that when special posing procedures are required, it oftentimes will require more time to judge the various breeds. It is important that this be given consideration in the total number of animals that the judge is expected to evaluate on a given day.

STANDARD POSITION
Holland Lop-resting lightly on front legs

STANDARD POSITION
Broken Satin-Right rear foot too far forward

TUTORIAL FOR RABBIT BREEDS
RECOGNIZED BY THE
AMERICAN RABBIT BREEDERS ASSOCIATION

POSING AND HANDLING REQUIREMENTS FOR EACH BREED

BREED	POSING INSTRUCTIONS	HANDLING REQUIREMENTS
AMERICAN	Standard position	N.S.I.
AMERICAN FUZZY LOP	Standard position	protect ears & fiber
AMERICAN SABLE	Standard position	N.S.I.
ENGLISH ANGORA	Standard position	protect furnishings & fiber; position furnishings & fiber prior to evaluation
FRENCH ANGORA	Standard position	protect fiber, position fiber prior to evaluation
GIANT ANGORA	Standard position	protect furnishings & fiber; position fiber & furnishings prior to evaluation
SATIN ANGORA	Standard position	protect fiber; position fiber prior to evaluation
BELGIAN HARE	Set hind feet squarely, gently elevate front until hare extends front legs, apply gentle pressure to top of shoulder until pose is complete. Head to be high with an alert expression	Handle gently, legs are long and can easily be caught on edges and injured
BEVEREN	Standard position	N.S.I.
BRITANNIA PETITE	Gently toss backward while raising front end with heel of hand on each side until	Expected to be sprightly and temperamental. Approach slowly, protect thin legs,

BRITANNIA PETITE (CON'T)	front legs extend. To pose up on tip toe with head high ears together and alert appearance. **FAULT FOR NOT POSING**	use care removing Petites from holding pens.
CALIFORNIAN	Standard position	N.S.I.
CHAMPAGNE D'ARGENT	Standard position	N.S.I.
CHECKERED GIANT	Allow to move about pose naturally. View from a distance after initial exam. Requires sturdy table that is of proper length & width. Do not frighten rabbit by "banging" on table to encourage movement.	Protect limbs and ears when handling. **DO NOT** poke and/or pull at markings as they may be distorted. Checker to be handled only during initial exam and to compare individual markings closely
AMERICAN CHINCHILLA	Standard position	N.S.I.
GIANT CHINCHILLA	Standard position	N.S.I.
STANDARD CHINCHILLA	Standard position	N.S.I.
CINNAMON	Standard position	N.S.I.
CREME D'ARGENT	Standard position	N.S.I.
DUTCH	Standard position	Do not dig, poke, pull or distort any marking. View undercut as if Dutch was posed in standard position. Do not distort undercut by stretching or cheeks with fingers when looking at underside.
DWARF HOTOT	Standard position	Blowing gently in each eye will cause closure of lids. This allows for accurate comparison of markings.

ENGLISH SPOT	Allow Spot to move about table & pose naturally. Do not flatten down on table. Evaluate type & markings a few steps away from rabbit.	Handle only for initial exam for defects & close comparison of specific marking. Do not dig, poke or pull at animal for the possibility of distorting marking(s).
FLEMISH GIANT	Standard position. Due to size, allow Giant to move on table to evaluate ankle soundness & balance.	Heavy weight & long bodies can present physical difficulty in handling. Protect legs as moved in and out of holding pens.
FLORIDA WHITE	Standard position	N.S.I.
HARLEQUIN	Pose in standard position to evaluate type. Allow to move naturally to observe pattern, color and how frequently it alternates.	N.S.I.
HAVANA	Standard position	N.S.I.
HIMALAYAN	Stretched out; hind feet (from toes to point of hock), body & forelegs laying flat on table, with tip of front toes under eyes.	N.S.I.
HOTOT	Standard position	Blow gently into eye to evaluate markings.
JERSEY WOOLY	Standard position	Protect fiber. Position fiber and ear cap prior to evaluation.
LILAC	Standard position	N.S.I.
ENGLISH LOP	Standard position	Protect ears throughout judging process. Measure with rigid straight edge from tip of

ENGLISH LOP (CON'T)		one ear to tip of other ear. Measuring device to be placed just behind ear base and at 90 degrees to long axis of body. Ears to be stretched as tight as possible.
FRENCH LOP	Posed in standard position; but, resting lightly on front feet to better display ear shape and carriage.	Protect ears. Position of front feet critical to shape & depth of shoulder
HOLLAND LOP	Front feet to rest lightly on table with majority of weight resting on rear feet. Do not push down.	Allow Holland to relax prior to evaluating ear carriage. Handle in such manner to keep rabbit relaxed.
MINI LOP	Standard position	Protect ears.
MINI REX	Standard position	Protect fur.
NETHERLAND DWARF	Standard position	N.S.I.
NEW ZEALAND	Standard position	N.S.I.
PALOMINO	Standard position	N.S.I.
POLISH	Standard position. Take care to position ears prior to evaluation.	N.S.I.
REX	Standard position	Protect fur
RHINELANDER	Allow to move and pose naturally. Do not flatten down. View type & markings from distance	Do not dig, poke or tug at animal to allow the possibility of distorting markings
SATIN	Standard position	Protect fur. Eliminate static electricity from hands by keeping dampened with wet cloth or spray.

SILVER	Standard position	N.S.I.
SILVER FOX	Standard position	N.S.I.
SILVER MARTEN	Standard position	N.S.I.
TAN	Allow to move about table & pose naturally. Do not push down on table. View color type and demarcation from distance.	N.S.I.

N.S.I. - NO SPECIFIC INFORMATION

BREEDS OF DOMESTIC RABBITS

There is a total of 45 breeds of domestic rabbits recognized by the American Rabbit Breeders Association (check the

current Standard of Perfection for possible changes since author's death).

The breeds are arbitrarily classed by size as follows:

MINIATURE RABBITS

These are rabbits that weigh about four pounds or under.

AMERICAN FUZZY LOP ****
BRITANNIA PETITE *1
DWARF HOTOT ****
HIMALAYAN **
JERSEY WOOLY ****
HOLLAND LOP ****
MINI REX ****
NETHERLAND DWARF ****
POLISH **

SMALL RABBITS

These rabbits weigh over four pounds and under eight pounds.

ENGLISH ANGORA ****
SATIN ANGORA **
BELGIAN HARE *1
STANDARD CHINCHILLA **
DUTCH ****
ENGLISH SPOT ****
FLORIDA WHITE ****
HARLEQUIN **
HAVANA **
LILAC *1

MINI LOP ****
SILVER *1
SILVER MARTEN **
TAN **

MEDIUM SIZED RABBITS

Many of these breeds are raised for commercial production to be harvested for a source of edible protein. They range from nine to twelve pounds.

AMERICAN *1
AMERICAN SABLE *1
FRENCH ANGORA ***
BEVEREN *1
CALIFORNIAN ****
CHAMPAGNE D'ARGENT ****
AMERICAN CHINCHILLA **
CINNAMON *1
CREME D'ARGENT *1
HOTOT *1
ENGLISH LOP **
NEW ZEALAND ****
PALOMINO **
REX ****
RHINELANDER **
SATIN ****
SILVER FOX *1

GIANT BREEDS

These weigh over twelve pounds. Some of these breeds must be raised on solid floors to prevent sore feet.

CHECKERED GIANT **
GIANT ANGORA *1
GIANT CHINCHILLA *1
FLEMISH GIANT ****
FRENCH LOP ****

FIBER (WOOL) PRODUCING BREEDS

AMERICAN FUZZY LOP ****
ENGLISH ANGORA ****
FRENCH ANGORA ***
GIANT ANGORA *1
SATIN ANGORA **
JERSEY WOOLY ****

****indicates the breed is very popular throughout the United States and quality breeding stock readily available
**indicates moderate popularity, availability of quality stock regionally available.
*1 difficult to raise and/or minimal popularity

TATTOOING THE DOMESTIC RABBIT

A legible tattoo in the domestic rabbit's left ear is extremely important and mandated by ARBA show rules to exhibit a rabbit. If a legible tattoo is not present, the animal must be eliminated from the exhibition. In addition, a legible tattoo is extremely important in maintaining the integrity and credibility of the American Rabbit Breeders Association registration system and is of importance in identifying rabbits that may be lost or stolen.

Many judges and registrars have complained about the increasing number of marginally legible tattoos. The common response is "bad ink". However, in most situations it can be related to a flaw in the tattooing procedure. The following is intended to enhance the quality of tattoos.

The placement of a permanent legible tattoo in the inside of the left ear is the most accepted method of permanent identification of rabbits in the United States. Tattooing is a simple, safe and successful method of identifying animals· if the proper procedures are followed. Tattoos are applied to the rabbit ear by plier tattoo (tongs), needle tattoo, or the automated tattoo needle.

The tong tattoos, or plier type, are probably the most common type of instrument used to apply permanent ear marks in the rabbit's ears. Most tongs on the market today have the ability to hold five interchangeable digits or letters. The available digits, letters or numbers are either 1/2 inch or 3/8 inch, the 3/8 inch is most commonly used; but, some of the larger breeds ears can readily accept the half inch tattoo.

The advantage of the tong type tattoo is that the procedure is relatively fast, successful, if applied properly; and, can hold a versatile amount of letters and/or numbers. The disadvantage of this type of tattoo is that the equipment is relatively costly if one has only a few animals to tattoo, can cause injury to the animal if not properly applied; and, takes extra time to change the numbers and/or letters.

The needle type tattooing is an older method of tattooing that is used by many of the "old time breeders". This method of tattooing can be performed with a regular tattooing needle or can be done simply with a straight type sharp pin. The advantage of needle type tattooing is that it is very economical, any variety or type of number and/or letter can be placed in the animal's ear and it is rather simply performed. The disadvantage of this method is that it usually takes more time as compared to the "tong" type tattooing to place the tattoo in the ear.

The automated tattooer can either be battery or electrically

operated and is not widely used in the United States. The advantage of this type of tattooing is that one can place a variety of letters and numbers in the animal's ear; and it is faster than the hand needle tattooing method. The disadvantage of this method of tattooing is that the instrument is very costly and it takes considerably more time as compared to the tong type method.

PHYSIOLOGICAL PRINCIPLES OF TATTOOING

The skin on the inside of the ear is penetrated with any of the above types of tattooing methods. Ink is incorporated into the puncture holes and it becomes permanently fixed in the area within the tissue of the skin as the puncture marks heal. If tattooed early in life before the ear acquires its permanent growth, the tattoo figure itself will enlarge as the ear enlarges. The ink becomes imbedded as a permanent structure within the cellular tissue of the ear after the puncture hole has healed. For the ink to become a permanent fixture within the tissue, it is imperative that the ink is rubbed into the puncture holes and that the ink is maintained in the puncture holes until the surrounding tissue has time to heal and incorporate the ink.

POSITION OF THE TATTOO

The private tattoo, regardless of how applied, should be placed in the **LEFT EAR.** The tattoo surface of the right ear is reserved for the registration number, if and when one desires to have the animal registered. The site of placing the tattoo in the ear should be deep down in the inner surface of the ear where the integument (skin) is void of any hair. If one places the tattoo in the fringe area of the ear where there is a small amount of hair, this will often interfere with the legibility of the tattoo.

After the exact site for the tattoo has been located, it is imperative that the skin surface be cleansed of all oil and dirt that may have accumulated in the ear. This is particularly true in older animals. If the oil and debris is not removed, when the tattoo points pierce the ear, it will often carry this material down into the puncture holes and will interfere with the incorporation of the ink with the tissue. This may lead to an illegible tattoo. The ear should be cleaned with any type of substance that will remove this oil and dirt; however, alcohol swabs appear to be the material of choice.

When positioning the tattoo, one should take care that the tattoo is positioned where it will not incorporate the folds that may be in the ear as this will alter the shape of the letter and/or number, making the tattoo illegible.

The tattoo should be placed in the ear so that it is readable

when the ear is opened and looked at from the left side of the animal. It is quite easy for beginners to place the tattoo in the ear "upside down". The base of the tattoo letters should be toward the posterior (back) edge of the ear.

INFORMATION PROVIDED BY THE TATTOO

The tattoo of an animal gives permanent identity to the individual rabbit. The animal can be tattooed with any digit, combination of digits, letters, combination of letters or any combination of letters and digits. The actual information provided by the tattoo can be either totally irrelevant. Some breeders use specific systems of the combination of letters and digits to relate bloodlines, as well as, birth dates and sex. The examples of the above can be that some breeders will tattoo the animals with a specific letter to denote bloodline. the remaining letters or digits may be placed in such a fashion so that it denotes the month and year that animal was born; and the last digit can be used to denote the sex of the animal. (example: odd last digit = male, even last digit = female; or, vice versa). What figures are placed in the animal's ear is left to the breeder's imagination.

RESTRAINT OF THE ANIMAL

In order to place a tattoo in the rabbit, regardless of method, it is imperative that the animal is restrained by a method that allows sufficient time for the tattoo to be placed in the ear and in a method that is safe for the animal. There are many different methods of restraining the animal. The method of choice is that method that is most successful for each individual. Regardless of the method used, it is much easier and safer to tattoo young animals.

The rabbit may be held in the arms with the left ear available. They may be restrained on a flat surface by another individual, by the individual doing the tattooing himself; or, another method is the use of a tattooing box.

The most prevalent danger in tattooing rabbits is the possibility that the animal will thrust its back legs backward very rapidly. This allows for the possible damage of the spinal cord, which may cause permanent damage and leave the animal paralyzed. One should use caution when restraining the animal, regardless of the method, so that the animal does not struggle and cause these severe injuries. Until one becomes experienced at tattooing, it is highly recommended that two individual perform the tattooing process. One actually doing the tattooing and the other assisting with the restraint of the animal.

INK

There are many types of commercial tattoo ink available on the market today that are very successful in the tattooing process. One can either use one of these commercial type inks available or just use plain India ink that is used by artists. Black is the most preferred color of tattoo ink; but, some individuals (in dark pigmented animals) use green ink with success. The color o fink is entirely up to the individual.

More important than the individual type of ink is that the ink be of consistency so that it is easily deposited into the puncture holes of the tattoo. It is imperative that the ink get into the tattoo punctures if it is going to be incorporated into the tissue as a permanent design. One must use caution that the ink does not deteriorate from the physical elements of the environment so that it will not readily "wash" from the tattoo punctures and cause an illegible tattoo.

After the ink has been vigorously rubbed into the tattoo punctures, one can prevent the "washing" or leaking of the ink from the puncture marks by covering the tattoo with a light film of vasoline after the excess ink has been removed from the tattoo.

THE TATTOO PROCEDURE

There are many successful procedures for tattooing and when one has success, they should remain with that procedure. A recommended procedure is as follows:

1. Prepare location for tattooing. One should prepare a site that is comfortable for the individual to tattoo the rabbit where there is plenty of room and ample light. The table should be covered with carpet or burlap so the animal does not slip and become frightened. The height of the tattooing table should be so that it is comfortable for the operator and the assistant.
2. Select the necessary equipment. One should have a site to rest the tools and the ink that is going to be necessary for the tattooing procedure. It is imperative that the site be so that the equipment does not get knocked on the floor during the tattooing process. Many types of "tongs" are very fragile. If the digits are kicked on the floor, it is very difficult to find the materials and they are very costly.
3. Select clean tattoo figures that are to be placed in the animal's ear. All digits must be free of contaminants to prevent the transfer of various diseases.

4. Check the tattoo number to be sure that all digits are in the proper sequence and placed in the tattoo "tongs" properly. This may be done by practicing on a piece of paper.
5. Place animal in the tattooing position.
6. Cleanse the ear thoroughly with an alcohol swab to remove oil and debris. Allow time for the area to dry.
7. Cover the points of the tattoo digits with a small amount of ink that has been thoroughly mixed.
8. Examine the site of where the tattoo will be placed and place the tongs over the site. Remember that the position of the tattoo should be deep in the ear where it will not be obscured by the fringe area of the fur and that there are no folds in the ear itself prior to the tattooing. The tattoo should be placed in the ear so that it is legible when observing the ear from the side of the animal. One should take caution to be sure that they do not place the tattoo in upside down. Left handed individuals have a tendency to place the tattoo upside down so that it is not legible when looking at the ear from a side view.
9. After positioning the tattoo instrument properly, one should <u>firmly</u> squeeze the tattoo tongs together. A common mistake is that the individual will squeeze the tongs until the animal responds and then release the tongs before they have been completely thrust through the inner skin of the ear. It is imperative that the tongs be completely closed. During this time, the individual doing the restraint must grasp the rabbit more firmly so it does not struggle.
10. The ink should then be vigorously forced into the puncture holes by rubbing the ink in with a soft surface. (example: eraser of a lead pencil or a soft brush).
11. After the ink has been "rubbed" into the puncture holes, the excess ink can then be removed from the surface of the tattoo with a tissue or cotton. The new tattoo should be distinct and legible.
12. Apply a light film of vasoline over the legible tattoo so that the ink particles will not "wash" from the tattoo.

THE DEWLAP IN THE DOMESTIC RABBIT

The body and all appendages of the domestic rabbit are covered with skin; from which the fur in varying lengths and density originates. The "tightness" that the skin adheres to the body structure will vary from animal to animal and from place to place on the same animal's body. The variation will

depend upon the condition of the rabbit and upon inheritance of the amount of skin present beneath the chin and around the throat area. The anatomical location that is prone to looser skin is that are around the shoulders, chest and throat. This is usually more pronounced in does than bucks. As the skin loosens and increases in amount, there is a tendency for the skin to fold outward in a "U" shaped fashion. In rabbit, the fold will extend horizontally around the throat and neck area. As the fold of skin matures, it becomes pendulous and is called the dewlap. In some species of animals, with extended necks, the dewlap will be a vertical fold of skin from the area beneath the chin to the area between the front legs. (Examples: cow, elk and moose)

This horizontal dewlap is required in some breeds (usually the larger breeds). It is acceptable in does and faulted in bucks in some breeds. The presence of a dewlap, in bucks and does, of some breeds will prevent them from competing for awards. Breeds that do not permit a dewlap include the Britannia Petite, Dwarf Hotot, Himalayan, Netherland Dwarf, Polish, Silver and Tan. The mandates are per the American Rabbit Breeders Association Standard of Perfection.

The Polish breed allows for a "pencil line" in the dewlap area. This may be described as a protrusion of fur around the throat area. This is a situation where the fur in the area will not lay flat but will tend to raise up as a result of the skin slightly bulging. The skin in the area does not completely fold on itself, in "U" shape, and become pendulous. The remaining breeds that restrict the presence of a dewlap does not allow for this deviation from the flat skin at the chest and neck area of bucks and does.

On occasion, this structural defect, and ugly distraction, is not identified by breeders and judges for some reason. This may be due to the lack of familiarity with the breeds that do not permit the presence of a dewlap; or, from not being able to identify the dewlap. The other factor may be "giving the rabbit the benefit of the doubt". This must be done, but should not give reason to overlook this defect. This allows for inconsistency of judging!

The presence of the dewlap can most consistently be identified by allowing the rabbit to pose in its natural position and viewing from the side. One must observe if the presence of the fur fibers in the throat area are not lying flat and the presence of the pendulous fold of skin. It may be necessary to physically "feel" with the thumb and forefinger to identify the folding of the skin.

Other terms used in the Standard of Perfection to describe the dewlap are:

SIMPLE DEWLAP - This is a neat single pendulous fold of skin

that extends from the throat area beneath the chin. This may be further described a small, medium-sized, large and excessive. These descriptions are all relative and subject to individual interpretation as it relates to actual size. The above terms are utilized in various breeds standards.

PROMINENT DEWLAP - This is a pendulous fold of skin beneath the chin that is readily noticeable. It is carried uniformly and evenly from the throat area.

EXCESSIVE; OR, OVERLY LARGE DEWLAP - This dewlap is of such size that it would hang down from the chin between the front legs. The loose skin on the neck area would outline the sides of the face and the lower chin. This would be to such extent that it would detract from the appearance of the rabbit.

DOUBLE DEWLAP - The fold of skin that extends from the throat is in the form of a "W" rather than a single "U" shaped fold. It will appear to be two dewlaps stacked on tope of each other and usually occurs in animals that have an excessively large dewlap.

SIDE CARRIED DEWLAP - This is a condition where the dewlap is consistently carried to one side or the other; outside either of the front legs. This is a result of the dewlap being physically too large to be carried between the front legs. The presence of growth, abscesses and previous infection also may cause the dewlap to be carried in this position.

Although a relatively simple structure, the dewlap is of importance and there is a variation in the description. This structure is not discussed in a specific location in each of the breed standards. Most times the dewlap is discussed under the body description; but, in other breed standards, it is discussed under the head, shoulder description or in other areas of the Standard.

The dewlap has some very serious management concerns. There is a predisposition for the development of this structure; and, for the size and the time that the structure demonstrates itself in the rabbit's life. Breeders of the breeds that prohibit the presence of the dewlap must always give this concern. Entire bloodlines have had to be destroyed because the dewlap occurred in an increasing percentage of offspring. One must be very cautious about mating two animals together with the predisposition of this condition and the predisposition of soft flabby flesh condition around the shoulders. The occurrence of this defect tends to increase with each generation when attention is not given to this condition in the breeding program. This situation can be of extra concern to those breeds that require well-developed shoulders. The extra skin of the

shoulder and chest area may be confused with actual structural shoulder development.

The dewlap is also of concern to those breeds that allow for the presence of this structure in varying sizes. This is an extremely common site of abscesses and moist skin infections (dermatitis). This is associated with the repeated trauma that the dewlap receives due to its location and size; particularly, in does. This is particularly true in animals with the dewlaps where the owners use water and feed crocks; or, metal feeders with rough edges. The dewlap is continually rubbed and dragged across the edge increasing the possibility of injury and exposure to various bacterium that may result in abscess formation. This situation is further enhanced when the dewlap area is continually wet from dragging the structure through the water in the watering crock. The dampness encourages bacterial growth and infections.

These conditions may be prevented through the implementation of the appropriate management techniques. Animals that are prone to these conditions should have the feeders raised a few inches off the floor. The rabbit will raise itself with the front legs to eat over the edge of the feeder and there will be less trauma to the dewlap. These rabbits should be watered form an automatic watering nipple or a siphon bottle to prevent the dewlap from getting wet. When crocks are used, the dewlap can be kept dry by placing an appropriate sized rubber or plastic ball in the water crock. This forces the dewlaped animal to drink from the outside edge of the crock and prevents the dewlap from getting wet. The same effect ma be achieved by placing a burned out light bulb in the water crock or by covering the crock with a piece of wood that has a two inch hole in the center. This allows the rabbit to drink without getting the dewlap wet. Once the dewlap becomes infected or abscessed, it may be very difficult to treat and have total recovery.

In summary, the dewlap on the domestic rabbit may appear to be an insignificant structure. There are some breeds that cannot compete for awards when this structure is present. Other breeds are faulted when it is not of the appropriate shape and not carried properly. There are some real management concerns as it relates to the trauma to the structure during the feeding and watering process. On occasion, special practices must be implemented to prevent infection and abscesses.

TUTORIAL FOR RABBIT BREEDS
RECOGNIZED BY THE
AMERICAN RABBIT BREEDERS ASSOCIATION

SUBJECT: DEWLAP

BREED	ELIMINATED FROM COMPETITION	FAULT	COMMENTS
AMERICAN	-	-	small dewlap in does
AMERICAN FUZZY LOP	-	-	not mentioned
AMERICAN SABLE	-	++++++	fault if excessive
ANGORAS-ENGLISH FRENCH, SATIN & GIANT	-	-	not mentioned
BELGIAN HARE	-	-	"tight chest"
BRITANNIA PETITE	+++++++		eliminated
BEVEREN	-	++++++	medium in does fault for excessive
CALIFORNIAN	-	-	mentioned only relating to allowance for color confined to dewlap
CHAMPAGNE D'ARGENT	-	-	not mentioned
CHECKERED GIANT	-	-	not mentioned
CHINCHILLA-AMERICAN	-	-	medium in does
CHINCHILLA-GIANT	++++++	-	permissible on does-**eliminated from competition or "overly large" double and/or side carried

CHINCHILLA-STANDARD	-	+++++	excessive
CINNAMON	-	-	not mentioned
CREME D'ARGENT	-	-	not mentioned
DUTCH	-	++++	severe cut for prominent dewlap
DWARF HOTOT	++++++		eliminated
ENGLISH SPOT	-	+++++	for prominent dewlap
FLEMISH GIANT	-	-	does to have a large, full, evenly carried dewlap
FLORIDA WHITE	-	+++++	for dewlap in bucks & large dewlaps in does
HARLEQUIN	-	+++++	for excessive dewlap
HAVANA	-	-	not mentioned
HIMALAYAN	++++++		eliminated
HOTOT	-	-	medium in does
JERSEY WOOLY	-	-	not mentioned
LILAC	-	-	not mentioned
LOP-ENGLISH	-	-	very small permissible on bucks; evenly carried well-rounded in does
LOP-FRENCH	-	++++	does have simple well-rounded dewlap-faulted for large dewlap on junior does
LOP-HOLLAND	-	+++++	small dewlap permitted in does. fault for large dewlap
LOP-MINI	-	+++++	small, simple

			dewlap permitted in does; faulted for large dewlap
MINI REX	-	-	small in does
NETHERLAND DWARF	+++++++		eliminated
NEW ZEALAND	-	-	medium in does
PALOMINO	-	-	not mentioned
POLISH	++++++		eliminated
REX	-	-	not mentioned
RHINELANDER	-	-	small in senior does
SATIN	-	-	not mentioned
SILVER	+++++++		eliminated
SILVER FOX	-	++++	fault in bucks
SILVER MARTEN	-	-	not mentioned
TAN	++++++++		eliminated

****BOLD TYPE** indicates breeds that cannot compete for awards when a dewlap is present.

DOMESTIC RABBIT EARS

These are skin covered cartilaginous appendages that attach to the head. The ears account for five to seven percent of the rabbit's total skin surface. Rabbits have ben bred and developed to have ears in various sizes, shapes, lengths and are carried in a variety of positions. The ear size, shape and carriage are the distinguishing characteristics of some breed of domestic rabbits.

The ears of the rabbit have two primary functions:

1. To assist in the collection of audible sounds for the individual rabbit's central nervous system to interpret.

2. To assist in the maintenance of the normal body temperature as 102.5 degrees Fahrenheit. This is done by the air that passes around the ears removes (convention) a portion of the excess heat from the body.

The latter function is extremely important to the rabbit person that can be confronted with hot rabbits during the summer. Particularly during the kindling process, the does are susceptible to suffer from heat exhaustion and prostration. Rabbits that are handled during hot weather are also susceptible to these conditions. Cooling the rabbit's ears with ice packs is an extremely important technique in relieving and controlling this critical situation.

The shape, structure, length and carriage of the ears are described in most of the breed standards in the Standard of Perfection. Most will allocate varying numbers of points to correspond to the importance of the ears for that particular breed. The majority of the breeds allocate 3 to 5 points to ear. The Britannia Petite, Dwarf Hotot, American Fuzzy Lop, Jersey Wooly, French Lop and Polish allocate 10 to 15 points on ears. The extreme ear length and size is the distinguishing characteristic of the English Lop (minimum: 21 inches long). The ears on this breed are allocated thirty points; the most of any recognized breed of rabbits.

EAR CARRIAGE

The majority of the breeds of domestic rabbits are required to carry their ears in an erect position. The manner and style that the ears are carried is determined by the auricular cartilage that forms a base against the skull from which the ears protrudes. The placement of the cartilage will determine the "position" each ear is carried in respect to the opposing ear.

In addition to carrying the ear erect, some breeds are very specific how the ears are carried in relationship to each other. The Polish breed requires that the ears "set" close together at the base of the ear and "touch all the way to the tip". If the ears touch each other only at the bottom and tip with space in the middle, they are "bowed" and must be faulted accordingly.

In other breeds that have erect ear carriage, there are statements in the Standard of Perfection concerning the position and carriage of the ear. Due t the mandated size and length of the Flemish Giant's ears, there is a mandate for a "strong" ear base to support the ears and prevent them from deviating from the erect position.

LOPPED EAR CARRIAGE

The French Lop, Mini Lop, Holland Lop, American Fuzzy Lop and English Lop all carry their ears in a "down" position. Each of these breeds of rabbits are bred to carry their ears in this position and surgical or mechanical manipulation is not used to enhance this type of ear carriage. the ears are carried from the same auricular cartilage as described in

the erect ear carriage; but, the shape and development of that cartilage is different in that the outside edges are not developed. Instead of an erect carriage, the ears fall to the side. The auricular cartilage is very strongly developed in the French Lop, Holland Lop and Mini Lop to exhibit a boldly and distinctive arched crown. The ears are to lop vertically on both sides of the head, hanging closely to the cheeks with the ear openings toward the head. The outline of the ears and crown should resemble a horseshoe shape. The manner the ear lops will depend on the width, development and location of the crown placement on the skull.

The crown on the American Fuzzy Lop should be flattened and not very prominent when felt.

The English Lop must have a 21 inch ear span from tip to tip on all classes of exhibition rabbits. With this length of ear, the appendages will fall to the side and drag on the floor of the cage as the rabbit moves. This can cause serious damage and blemishes to the ears. The ears of the English Lop are to be carried low on the head and there is <u>not</u> to be a noticeable crown.

"V" SHAPED EAR CARRIAGE

The <u>Standard of Perfection</u> mandates that the English Angora, Beveren, Harlequin, Standard Hotot and Rhinelander carry their ears in a "v" shaped position. This gives contrast to the body description and/or head characteristics. Be sure that the ear carriage remains stable and that the lateral (outside) portion of the auricular cartilage does not become weak. When weakened, the ears may drop below vertical. This would prevent the rabbits with erect or "v" shaped ear carriage from competing for awards. The dropping of the ears below vertical is particularly prevalent in these breeds during the hot weather.

EAR SUBSTANCE - TEXTURE

Ear substance is the thickness of the ear structure itself. The required substance of the ear is noted in the <u>Standard of Perfection</u> of those breeds that desire a specific light or heavily textured ear. The required substance of the ear usually closely follows the body type. Those breeds that are strong and massive usually require an ear that has more substance (thicker) and the breeds that have long narrow bodies and fine bone usually require a thinner texture ear.

EAR LENGTH

The length of the ear varies with the breed mandates. The Netherland Dwarf mandates an individual ear length of 2 inches and a maximum length of 2 1/2 inches, while the English Lop has a minimum length of 21 inches. Several of

the other breeds of rabbits recognized by the ARBA has minimum and maximum ear lengths.
The growth and development of the ears in the domestic rabbit are extremely interesting. The length and development of the ears are ultimately controlled within inherited limits. However, the physiological (functional) demand does have an effect upon the growth and development of the ears. The term "summer ears" is common lingo among rabbit breeders. This refers to young kits that have been kindled during the summer months. The ears have a tendency to develop more rapidly than the body and give the appearance that the ears are longer and thinner than normal. The ears develop longer and thinner in response to the hot weather to assist in keeping the rabbit's body temperature within the normal limits (102.5 - 103 degrees Fahrenheit). With time, the body usually develops to balance with the summer ears.

SUMMER EARS IN THE DOMESTIC RABBIT

The external ears of domestic rabbits vary in length, shape, texture, fur/wool covering; and, has three distinct types of ear carriage. The above characteristics are unique and must be consistent for each specific breed of rabbit. the external ear has the function to collect sound waves for interpretation by the central nervous system (hearing) and to assist in the dissipation of heat from the body.

Rabbits carry their ears erect, "V" shaped or in a lopped position depending upon the shape, size, structure and placement of auricular (ear) cartilage. Ear carriage is of much more importance to the fancier than the commercial grower; but, can be of concern to both. On occasion, each may be confronted with youngsters, kindled in the late spring or early summer, that exhibits "weak" ear carriage. This is a condition where the ears may droop laterally (to the side). This is more common in breeds that carry the ears in "V" shape, compared to those that normally carry their ears erect. It may; however, be observed in both types of ear carriage. If the condition is severe, the ears drop below the horizontal plane of the ear base. This would prevent the rabbit from competing for awards in exhibitions except in lop-eared breeds. Rabbits with ears that droop; but, not below the horizontal (ears extending horizontally) are guilty of poor ear carriage. Physical conditions and alterations (abnormalities) of the auricular cartilage are associated with weak ear carriage.

The above conditions are observed primarily during hot weather. The cause of this situation can be a combination of several factors. An increase in the environmental temperature will cause the rabbit ear to elongate (grow longer) more rapidly than normal. The length will be limited by inheritance. the ears will be longer than anticipated for the age of the rabbit (unbalanced). In response to the

increased temperatures, the blood vessels in the ears dilate (get larger) to allow more heat to be removed from the body as the air passes over and around the ear (convection). The result of the above physiological (function) phenomenon (more blood) is that the ears are longer and heavier than normal. This is due to the increased amount of blood contained in the ear. The blood vessel dilation is more pronounced when litters are crowded in the pen and on ears that have an increased amount of wool/fur. (Example: English Angora). Each ear is heavier from the increased amount of blood, within the blood vessels, and the weight of the extra wool and/or fur. The above, combined with a lack of structural development of the lateral (outside) auricular cartilage can account for the weak ear carriage. Lack of auricular cartilage development may be due to age or an inherited abnormality. Thin textured ear and ear cartilage can exaggerate the problem.

The above condition can be more pronounced in breeds that carry their ears in "V" shape. This would strictly be due to the "physics" of the situation. The heavier (blood filled ear), that is longer than normal and with thinner cartilage has a tendency to "break down" due to the increased pressure and stress on the outside of the ear cartilage.

The above condition is usually a result of an inherited abnormality of the auricular cartilage structure in combination with the elevated environmental temperature from the time of kindling until weaning. This condition can be prevented; or, reduced in incidents by:

1. Mating animals that have strong, well-developed auricular cartilage.
2. Controlling the exposure of the young kits to elevated environmental temperatures in the nest box. This can be accomplished by:
   a. controlling the environmental temperature in the rabbitry.
   b. removing excess fur/wool and bedding from the nest
   c. providing well ventilated nest boxes. (Small holes in all four sides and bottom)
   d. early removal of the nest box (14 - 16 days)
3. Prevention of over crowding. Oftentimes the ears will demonstrate their tendency to "lop" just prior to weaning when the density of the individual pen is at it slightest. Therefore, if the tendency is present, one should not crowd the entire litter by affording them larger cages.
4. Removal of developing fringe and tasseling of the wool from the ears (all Angora breeds).
5. Limit handling and excitement. When the tendency of this condition appears, one should not handle or excite the rabbits. With excitement, there will be

an increase amount of blood in the ears enhancing the lopped ear condition. It is extremely important that if there is a tendency for the ears to lop, stress should be kept at a minimum to allow for time to elapse so the cartilage can develop and mature. Simple tattooing of the rabbit when the above condition is marginal can cause serious irreversible lopping of the ears.

In summary, the structure and carriage of the domestic rabbit ear is controlled by the inherited structure of the auricular cartilage. However, environmental factors can contribute to the various degrees of lopping in the ear carriage. These factors can be controlled to some degree by the rabbit manager.

HEAD TYPE OR SHAPE

The size and shape of the head vary considerably between the individual breeds of domestic rabbits and will be the distinguishing characteristics of a breed. The Standard of Perfection mandates certain head characteristics that fancier's developed through the years. These are not always in the best interest of the individual rabbit's health and reproductive potential. These inherent problems will be discussed further as it relates to the various head types and shapes.

Head type or shape is discussed in each breed standard recognized by the American Rabbit Breeders Association. Head type is not always allocated a specific number of points and the description of the desired characteristics may be included with the discussion of general type. Head type is separately discussed in some breed standards and allocated varying amounts of points depending upon the importance of that particular characteristic. Head type is specifically allocated from a minimum of 3 points (French Angora, Giant Angora, Cinnamon, Lilac, Rex and Silver) to 30 points in the American Fuzzy Lop. The head is of extreme importance as it reflects how the body, ears, feet and legs harmonize and balance together upon evaluation of the individual rabbit.

HEAD TYPES

THE BALANCED HEAD (COMMERCIAL HEAD TYPE)

This is the type of head that is desired on the majority of the breeds of rabbits recognized by the ARBA. The shape of the head from the front and side is "oval" in appearance. The head is longer than wide but, the cheeks are full and the muzzle is somewhat rounded. This type of head must balance with the body and the ears. A larger body requires a head that is larger in the same proportion; and, the longer body requires a longer head and ears. This type of head does not

attract particular attention and is usually allocated a relatively small number of points. There are not any particular disease conditions associated with this specific head type.

THE ROUND HEAD

When viewed from any direction, this head type should appear round. There is an arc of the skull that is initiated at the base of the ear and rounded to the tip of the muzzle. There should not be any break in the arc when viewed from the side. The cheeks and muzzle are well filled and rounded to an equal degree; and, when viewed from the front, will appear round. Round heads are usually associated with a short compact round body. (Examples: English Angora, Dutch and Florida White).

Due to the curvature of the skull, in those animals that have rounded heads, there appears to be a slight increase in the incidents of "weepy eye". This is a result of the tear duct (nasolacrimal), that extends from the lower eyelid to the nasal canal, becoming narrow, or stenosed, and blocked. There is also an increased incident of maloccluded teeth with the "round" headed rabbits. This is due to the critical angle that the teeth meet to make sure the teeth are "worn off" uniformly.

BOLD HEAD (STRONGLY DEVELOPED)

This type of head demands immediate attention, when viewed, due to the large size of the head in proportion to other body structures. Breeds with bold head types may have varied shapes to the head. These may range from round to those skulls that are boldly curved from the base of the ears toward the nose. This type of head mandates that there is considerable distance between the eyes. The larger the head, the deeper the eyes will appear to be set in the skull. The majority of the breeds with these types of heads will have a well-developed shoulder, the head will be set very close to the shoulders without any apparent neck. They will usually have a massive or massive appearing bone.

The Netherland Dwarf, Dwarf Hotot, Holland Lop, Mini Lop, French Lop and Jersey Wooly are examples of breeds that have bold and strongly developed heads. This head type can predispose animals of these breeds to several disease conditions. Some of these conditions are as follows:

1. **WEEPY EYE -** Tears are produced by glands (lacrimal) located on the upper outside area of the eyeball. These tears flow across the surface of the eyeball, cleaning and nourishing the cornea of the eye. The excess tears collect in a "trough" formed by the lower eyelid. These tears then pass from the trough through a small duct that extends from the lower eye

lid to the nasal area for evaporation. This duct is the nasolacrimal duct.

Rabbits that have round and bold heads demonstrate an increased incidents of weepy eye due to this duct being pinched or distorted (stenosed). This obstructs the flow of tears through this duct. Obstruction of the flow will, on occasion, be to such a degree that the exes tears collect and overflow the trough formed by the lower eye lid. This allows for a wetness and matting of fur at the inside corner of the eyelid and below the eye itself. With continuous irritation, a secondary bacterial infection will develop and the condition of Weepy Eye exists. This can be due, in part, to the obstruction of the nasolacrimal duct by the skull formation.

2. **Malocclusion of the incisors -** The incisors of domestic rabbits grow throughout the life of the animal at a rate of 1/2 to 3/4 of an inch per month. It is mandated that the incisors must meet at an exact angle, so the upper and lower incisors are constantly abraded against each other. This wears both off appropriately to prevent uncontrolled growth of the incisors and malocclusion. The normal bite of the rabbit is that the upper incisors over lap the lower incisors. When this does not exit and the incisors are allowed to grow uncontrollably, a condition that is known as "buck teeth" or "wolf teeth" develops.

   In breeds with round, and particularly bold heads, there is a tendency for the lower jaw to develop (grow longer) prematurely, allowing malocclusion to occur. In addition, in comparison to the "normal head", in rabbits that have a round or bold head, the angle from where the tooth grows is extremely critical. Any maladjustment of the angle where they originate can result in malocclusion.

3. **Kindling problems -** Breeds that have "strongly developed" heads have an increased incidents of kindling problems. This is due to the head being relatively larger in proportion to the body, even at birth. This creates a situation where there is increased difficulty of the fetus passing through the pelvic canal of the doe. This problem is more prevalent if the dam is narrow or constricted at the pelvis.

FLAT FACED HEAD

This is a unique head type of the American Fuzzy Lop. The

head is to be wide, when viewed from the front, from between the ears, through the eyes to a well filled muzzle. When viewed from the side, the head will be round from the base of the ears to the area of the eyes. The face, from the eyes to the nose, should flatten and continue to a wide well-rounded muzzle. This described head type usually has an enhanced incidents of the problems described with the bold headed breeds.

These are the basic head types of the domestic rabbit that has been arbitrarily categorized for convenience and understanding. There are a variety of terms that may be utilized in the description of the various head types that are discussed below.

MASCULINE HEAD - This indicates that the head structure is more strongly developed (greater in all aspects) in males as compared to the female. Some breeds indicate this characteristic in the Standard of Perfection. (Example: French Lop. While others do not address this issue specifically. Therefore, it must be assumed that it is desired that the male and female have the same head development. However, in most breeds, the head of the male will be more masculine than the head of the doe of similar size.

BULLDOG HEAD - This is a description that relates to the general aspect of the canine bulldog breed. That being a head that has very masculine appearance being shorter, broader and bolder than anticipated for the breed.

ROMAN NOSE - Term used to describe the shape of the head where the nose has a high bridge and forms a convex line from the forehead (area between eyes and base of ears) to the tip of the nose.

SNIPEY NOSE - Term that refers to a very long and narrow head; or, can refer to the muzzle. "Snipey muzzle" where the muzzle is very narrow and pointed.

The head of the domestic rabbit has varying degrees of importance, as per the Standard of Perfection. The above discussion has attempted to categorize the head shapes of the various breeds of rabbits. It further discusses the terminology referring to those head shapes to assist in the complete understanding of various head types and shapes.

FUR COLOR IN THE DOMESTIC RABBIT

The domestic rabbit has a very wide range of color, color patterns and color structures. This is one of the characteristics that allows the domestic rabbit to be very popular. The importance of color to various breeds, as it relates in the Standard of Perfection, varies considerably.

Color is of least importance in the Holland Lop where only 2 points are allotted for color and markings. The Silver is allocated 50 points for color and this is the most points allocated for color of any of the breeds recognized by the American Rabbit Breeders Association.

Color is basically determined by the genetic input of each of the offspring's parents. The basic color unit of the rabbit is totally controlled by inheritance.

Various characteristics must be given attention when discussing color. They are:

1. Surface Color. This is the color one sees from a distance without breaking the coat open (stroking from head to tail). The surface color may be very uniform over the entire body, may have a color transition as in shaded animals, may be of broken colors; or may be a combination of colors as an example of the broken patterned groups and the Harlequin.
2. Mid-range Color. This would be the area from beneath the surface to an area next to the undercolor. (NOTE: This does not necessarily coincide to the color geneticists description; but, is simplified for the matter of explanation in this article). This area becomes important in the Agouti patterned animals as it has distinct bands of color. O the Self and Solid animals, this color will vary in depth of color, character of color; as well as, the length of color on the hair shaft.
3. Undercolor. This color is denoted as the color next to the skin.

Color is totally determined by genetic inheritance; but, other physical factors can influence the color from time to time. These will be discussed below.

1. **COAT LENGTH -** This is particularly a factor in the fiber producing animals. The longer the fur fiber, the less concentration of pigment there is at the terminal portion of the fiber. This will be very evident if one evaluates the normal fur on the fiber producing animal's head as compared to the surface color of the fiber. The reason for this is the pigment is deposited in the fiber as it leaves the hair follicle and is diluted in proportion to the length. There is more oxidation of the pigment at the terminal portion of the fiber.

2. **GUARD HAIR LENGTH AND COLOR -** The primary purpose of guard hairs is to protect the coat in normal furred animals and to contribute to the texture of the fur. The guard hair diameter, length, color

and uniformity of distribution becomes extremely important in many of the individual breed fur characteristics. They also become extremely important as it relates to color and the intensity of color. The underfur usually ha a darker color. The guard hair intensifies the color and gives luster. Lack of the uniformity of guard hairs will alter the uniformity of the luster.

The sheen of the Satin rabbit is provided by the guard hair being clear. This allows that structure to reflect light and give sheen to the coat. The guard hair disbursement must be very uniform to enhance the uniformity of the color of the coat over the entire body of the animal. The characteristics of the guard hair are inherited. Oftentimes, one has a color fault and rather than the fault being the pigmentation of the animal, it is related to a fur fault concerned with guard hair size and distribution.

3. **CONDITION -** The condition of the coat will enhance the inherited color characteristics. Coats that fail in condition and are molting will have a tendency to have surface color that lacks uniformity. In Shaded animals, this will cause splotchiness and an incompleteness of the smooth transition from darker to lighter color. Coats that are in the various stages of molt and regrowth also will alter the intermediate ring color and the undercolor in some individuals.

   Coats in various conditions may cause a failure in coat and color structure even though the animal is genetically correct in color.

4. **CLEANLINESS OF THE COAT -** In many rabbitries and exhibition areas, there is an abundance of dust present. The coat can become dirty. When there is an abundance of dust particles on the fibers, this will interfere with the luster and sheen of the coat. This may e so subtle that most individuals are not aware that this situation can occur. An animal with good coat color and condition may be faulted on color strictly to the presence of dust and dirt.

   Stains from urine are frequently on rabbits; especially, the bucks. This is due to the habit of rabbits "marking their territory" with urine. Males will spray the cage sides and then rub in it to place the scent on the body. This is not only unsightly on white rabbits; but, also alters the texture of the coat.

Rust that develops on cages from elevated humidity will stain the coat. It is easier to prevent stains than to attempt to remove them.

5. **STAGE OF COAT DEVELOPMENT** - The length of time necessary for the coat to develop and the amount of time the coat will retain its character is limited by genetic inheritance. Coats on young animals have a tendency not to have the development and uniformity of the guard hairs, which will not only interfere with the texture of coat; but, can interfere with the uniformity of the color of the coat.

   Once a coat ha become primed, as the length of time is extended that the coat is in prime condition, the vitality of the fur fiber decreases and there is a tendency for the pigmentation to oxidize altering the color of the coat. This is particularly noticed on blue and black animals when the tips of the hairs start to turn brown; and the brownish color intensifies with age. This characteristic will not change until the animal goes through a complete molt.

   Rabbits that are going from one coat to the other will have various stages of development of the fur on the body at a given time. This will alter the undercolor, the intermediate color and the surface color. This occurs in the normal molting process.

6. **EXPOSURE TO LIGHT** - The intensity of the light that the pigment in the fur is exposed to may cause a dramatic change in color. Increased intensity of the light encourages the oxidation of the pigment. This is termed "sunburned". The pigmentation develops a yellow cast and has a distinct color characteristic. It is recommended that animals with pigmented fur be kept where there is a limited amount of light to prevent the alteration of the color from pigment oxidation.

7. **NUTRITIONAL EFFECT** - Color and the intensity of color have been related through the years with magnesium and manganese. It has been shown experimentally that a deficiency of these elements will alter the color. Recent research is indicating that not only is magnesium and manganese important to color; but, the fact that zinc and cobalt may also be very important. In addition to the presence of these elements affecting color, research has shown that the relationship of the proportion of

these elements, one to another, is extremely important as it relates to color. A considerable amount of research must be done on this very interesting and important phenomenon.

8. **QUALITY OF THE LIGHT FOR EXAMINATION -** It is a well known fact that the shade of fur color varies considerably depending upon the color of light and type of light where fur color is examined. The halogen lights have an extremely important alteration factor on the darker pigmented colors. It is important that one examine all rabbits in quality light when evaluating color.

Color in domestic rabbits is important and interesting. The above factors may influence color that is garnered through inheritance.

SNUFFLES: IS THIS AN EXHIBITOR'S CONCERN?

This is certainly a topic that can "open a can of worms"; but, is a topic that should be considered and by of concern to all rabbit exhibitors throughout the country. Anytime one exhibits any type of animals they must be concerned about the possibility of contacting many types of disease and transporting these diseases back to their breeding herds. Exhibitors of rabbits are certainly no exception; but, the rabbit exhibitor is confronted with the disease "snuffles" that is caused by the organism Pasteurella multocida. This is of grave concern to the rabbit exhibitor because of the nature of the organism in the rabbit. Plus the fact that there is not a cure or a vaccine for this organism at the time of this writing, that is effective in the rabbit.

It is very discouraging and misleading to the producer to read literature and hear stories where "snuffles" has been cured or prevented with certain types of medication. To the best of our ability and knowledge, there are not any products on the market that will cure the "snuffles" caused by the Pasteurella multocida organism.

Some antibiotics will prevent the secondary invasion of other bacteria that oftentimes enhances the signs of "snuffles"; or, the signs may be suppressed if the signs are caused by a bacteria other than Pasteurella multocida. If signs are caused by Pasteurella sp. and they are suppressed, they oftentimes recur when the animal is placed under stress in the future.

The best prevention for the "snuffles" is excellent ventilation, good nutrition, minimum stress, strict culling and use of replacement animals that show signs of resistance to the disease. The development of resistant strains of rabbits to Pasteurella sp. is quite controversial; but, has

been quite successful in some herds. Along with good sound management, the incidents of "snuffles" can be decreased in the herd.

If one chooses to exhibit rabbits, this is a problem that one is confronted with and a problem that many individuals are concerned about. They must breed their herd so that there is a certain degree of resistance to the Pasteurella sp. organism and keep the stress factors to a minimum so the animals resistance to disease is not lowered and the animal remains free of the signs of this condition.

One is often confronted with the question of "what to do if sick rabbits are encountered in the showroom?" Most show catalogs address the issue that sick animals will not be allowed in the showroom and will be asked to be removed. This rule certainly has the proper intentions; but, who are the individual(s) to enforce these rules?

The judge, in accordance with the Standard of Perfection, is to eliminate the animal as it comes across the show table if it shows the signs of a cold. Or, disqualify the animal for "snuffles". Instantaneously, it is totally impossible for the judge to differentiate between the two: but, from either situation, the animal is eliminated from competition. The animal must show the signs of nasal discharge at the time of showing and cannot be eliminated for just the matting of the fur on the insides of the front feet. While the animal is on the show table, it is certainly a very short period of time in comparison to the remainder of the time that the animal will be in the showroom; or, it its cage at a cooped show.

The responsibility, if there are sick animal present in the showroom, lies with the show superintendent to ask that these individual rabbits be removed. The problem that is encountered is that the show superintendent certainly has other responsibilities than patrolling the aisles of the showroom to see if there are rabbits sneezing, discharging purulent material and showing other signs of disease. Also, what credentials do most show superintendents have to support his decision if someone wishes to challenge his decision that an animal is "sick"? This is a heavy burden upon the show superintendent.

One must consider that many animals harbor the Pasteurella sp. organism in their upper respiratory tract without showing any signs of this disease. These animals can be spreading the Pasteurella sp. organism through the showroom almost to the same extent as those showing the severe nasal discharge and other associated signs of the disease.

When speaking of disease control, one must also take into consideration the carriers that the animals are brought to the show in for housing or temporary transportation. Many

times these carriers are totally "filthy". These carriers can harbor viable bacterial organisms that cause disease just the same as the animals themselves. From experience, it is doubtful if some "carriers" have ever been sterilized, even after carrying several hundred different animals.

Where does the solution of this problem lie? The judge's power to expel the animals from competition is only limited. He has that power to eliminate or disqualify those animals showing sickness; but, he does not have the authority to request the animals to be removed from the showroom. Besides, these animals have already been in contact with many other animals that day.

The responsibility cannot be only that of the show superintendent. If he/she sees sick animals, he/she can request that the owners remove the animals from the building. However, time is of essence to the show superintendent with other responsibilities and I am sure that many exhibitors will be offended by a layman, without expertise in the field of rabbit disease; or, by an expert, requesting that their animals be removed.

The show superintendent does have the authority to request that the animals be removed and it is the fellow exhibitor's responsibility if they see animals with "snuffles" or other disease, to request that the show superintendent ask the owners to remove the animals from the premises.

The entire solution to the matter of disease control at our rabbit shows lies totally with the exhibitor and the pride of that exhibitor. It is totally impossible to prevent the liability that one takes when exhibiting animals that they may contact disease and bring that disease back to the colony. However, it takes the pride of each exhibitor to exhibit only those animals that are healthy to assist in decreasing the exposure of fellow exhibitor's animals to disease. Each exhibitor must work to control "snuffles" in their herd and to develop a herd that is "relatively" *Pasteurella sp.* free; and, have the animals that show resistance to the disease. Policing within the ranks of the exhibitors is the only way that one can control the presence of diseased animals in the showroom.

It is often ironic that the individual will note that the animal is allergic to the dust from the floor or other conditions. Allergies do exist and can cause the presence of a **CLEAR** nasal discharge. However, if the discharge is white and not clear, it is physiologically impossible for the condition to be present for less than at least three days. One should also be aware that many animals will carry the *Pasteurella multocida* organism within their system and will not show the signs of nasal discharge until they are placed under a stress. Moving the animals and taking them to shows

is certainly a stress. This may precipitate the presence of the signs of "snuffles" without the owner being aware. However, if this does exist, it appears that the owner should have enough pride to remove the animals from the premises without being prodded by other exhibitors or show officials.

HOW OLD IS THAT RABBIT?

The age of a rabbit is extremely important. It will determine the nutritional requirements, the time to mate for reproductive purposes and the class that it must be exhibited in at a rabbit show. From the date of birth to the exhibition date will determine the rabbit's chronological age. The age and weight of the rabbit will determine the age classification that the rabbit must be entered and exhibited.

All **junior** rabbits must be under 6 months of age! No Exceptions!!! Some breeds have a maximum weight for juniors. If above the maximum junior weight, they must be exhibited in an older age category. Check the Standard of Perfection very closely. Ten breeds do not allow moving the rabbit up in age classification. These are:

American Fuzzy Lop	Jersey Wooly
Britannia Petite	Holland Lop
Checkered Giant	Mini Lop
Dwarf Hotot	Mini Rex
Flemish Giant	Polish

In these breeds, if the rabbit does win a leg of grand championship in a higher age classification, it cannot be honored by the American Rabbit Breeders Association. Be familiar with the mandates of the various breeds.

Breeds that have an ideal senior weight of 9 pounds or more has an intermediate age classification for exhibition (six class breeds). This is for rabbits that are six to eight months of age. Some breeds have a maximum weight limit for intermediates and if they exceed that maximum weight, they must be exhibited as seniors. For Flemish Giants and Checkered Giants to receive a leg as an intermediate, they must be six to seven months of age. The Checkered Giant is the only breed with a minimum weight for juniors and intermediates.

Senior rabbits are those animals that are six months of age and older, for the four class rabbits, and those that are eight months and older for the six class rabbits. Senior rabbits that do not attain the minimum weight requirements for the age **CANNOT** be exhibited in a lower age classification!

The individual that kindles the rabbit is the only person that knows the "true" age of the rabbit. Individuals that

purchase rabbits must determine the age by that listed on the pedigrees. Weight is an important distinguishing characteristic in many breeds. It is essential that the breeds conform to the minimum and maximum weight for the age classification. If they do not, the entire purpose of producing the "ideal" rabbit is totally lost.

The determination of the true age of the rabbit depends upon the integrity of the exhibitors in the American Rabbit Breeders Association. In some countries, the verification of age is by tattooing preformed and recorded by individuals from the rabbit association. Others use dated "rings" of a specific size that must be placed over the hock of the hind leg at an early age.
There is absolutely no way to determine the actual age of a rabbit. When a rabbit does reach maturity there are changes that take place that gives indications that the rabbit is mature and has reached adulthood. These include, but are not limited to, the following.

TOENAILS

There are five toes on each front foot and four toes on each rear foot. The medial (toward the inside) toe on each front foot is the dewclaw. A toenail extends from a telescoping nail bed from each toe. Each toenail has 3 distinct characteristics: length of nail, length of blood vessels (quick) within the nail and the curvature of the nail.

LENGTH
Older rabbits have longer toenails. Age is proportional to the length of the toenail in the rabbit. This is of little value, in determining age in rabbits, when the nails are trimmed. Most breeders find it not necessary to trim the nails on rabbits that are under 6 months of age because of the lack of nail growth. Nails that are very long (in excess of 3/4 of an inch) will usually indicate that the rabbit is at least 6 months of age. This is particularly true when there is a lateral (to either side) deviation or a marked curvature of the nail.

Nails on mature rabbits must be attended to regularly. This is to prevent the nails from becoming injured and to prevent an extra amount of pressure from being forced on the foot pad. With increased pressure on the foot pad, there is an increased incidents of sore hocks.

LENGTH OF BLOOD VESSELS (QUICK) WITHIN THE TOENAIL

This is difficult to determine in dark pigmented nails. the vessels do not extend very far down in the toenail in rabbits under 6 months of age. As the rabbit gets older, the vessels extend further down the nail from the nail bed. Blood vessels that are close to where the toenail turns down

indicates the rabbit is mature. The more rabbits one observes, the easier it is to estimate correctly the age of the rabbit.

CURVATURE OF THE TOENAIL

Rabbits 6 months of age and younger have toenails that are relatively straight and curve slightly at the end. They are pliable, to an extent, and rather small in diameter. As the rabbit approaches 8 to 10 months of age, the toenail develops a distinct downward curvature and becomes very hard. The base of the toenail enlarges in diameter. The dewclaws develop a very distinct round curvature. As the age increases, the toenails will start to deviate laterally to one side or the other. The growth and character of the toenail development is an excellent indicator of age.

DEWLAP DEVELOPMENT

The area beneath the chin is the location of the dewlap. This area is non existent in some breeds and very well developed, and desired, in others. This area develops with age and the occurrence of sexual maturity in response to various hormonal levels. The dewlap does not develop into a large pendulous fold that can extend over the nose and be pulled up to the face until 8 to 10 months of age. The extent and development of the dewlap can give an indication of age.

SKIN THICKNESS AND DEVELOPMENT OF FAT PADS

These characteristics are in response to sexual hormonal production after maturity. Males have a tendency to develop skin changes at 8 to 10 months of age in response to the increased testosterone levels. The skin will become thickened all over the body to the degree that it is difficult to pick the animal up by the nape of the neck. Rabbits less than 6 months of age do not posses this trait.

In response to estrogen production, in female rabbits, there is a tendency for excess fat pads to accumulate about the shoulder area. This will cause the shoulders to be very loose and flabby at 7 to 9 months of age. This is usually not evident in rabbits under six months of age.

TESTICLE DEVELOPMENT

The testicles descend into the scrotum by ten weeks of age and then develop to maturity. The function of the testicles is to produce sperm and the male hormone testosterone. Between 5 and 8 months of age the testicle dramatically enlarges and becomes quite firm in comparison to the testicles of 4 to 5 months of age.

In summary, it is totally impossible to determine the exact age of a rabbit without actually knowing the dates of birth. Various physical characteristics change at about 6 months of age. These include the toenails, dewlap, thickness of skin, accumulation of fat pads and testicular development. Use of a combination of these changes allows one to make a good estimation of the rabbit's age.

RABBIT DISEASES, APPLIED AND PRACTICAL

DIAGNOSIS, TREATMENT AND PREVENTION

DISEASES OF THE DOMESTIC RABBIT

The presence of a disease in the domestic rabbit interferes with the intended purpose. This animal ha multiple uses and the effect of a disease on a rabbit will be perceived totally different, depending upon the owner's intended use.

Disease in a commercial operation will interfere with production. These operators must be aware of early diagnosis, preventing the spread of the disease to other animals in the herd and preventing the situation from returning in the future. Commercial operators are very conscious about the health and welfare of their rabbits. Mistreated rabbits will not produce to their maximum potential, will not have adequate rates of gain or efficient feed conversion. Performance is essential for this type of producer to have an economically profitable operation.

A rabbit that is ill will never attain it's maximum genetic potential as it relates to body type, fur quality, production and overall condition. These factors are of extreme importance to the hobbyist. It is essential that these rabbit owners give concern to exposure to disease as they exhibit their rabbits in the company of others from various rabbitries.

House rabbits receive individual care with the extrapolation of more advanced medical and surgical procedures from other species. The quality and consistency of health care for the pet rabbit is improving. This is a rapidly expanding area of the rabbit industry. Each phase of the rabbit industry may learn from the other, even though the perception is somewhat different. Health care of the domestic rabbit ha suffered through the years due to:

1. The lack of research on rabbit health care and production.
2. The industry has been so small that it has demanded little attention in mosts accredited veterinary school's curriculum.
3. The rabbit has some unique physiological characteristics. Some of these do not lend well to the extrapolation of medical procedures from other species without considerable variation.
4. Few drugs are "cleared" for the use in rabbits due to the cost of approval in relationship to the market potential.
5. "Off label" drug usage may create hazards of the possibility of contaminating the food chain from lack of knowledge concerning withholding times.

A disease is "a specific state of malfunction of the animal's body". There are several factors that cause the rabbit's body to malfunction. There are two classifications of

disease; infectious and noninfectious, discussed earlier.

SIGNS OF DISEASE

Any abnormality in the rabbit's behavior, anatomical structure or physiological function may be considered a sign of an ensuing illness. This demands that one spends considerable time with the rabbit to be totally familiar with the character of the rabbit. One must know the normal before the abnormal may be detected and investigated. Many diseases share similar signs. The most common sign shared by many diseases is anorexia (not eating). Remember that some does will eat less or quite eating entirely just prior to kindling.

The domestic rabbit has the following biological data that may be of value in determining disease.

	AVERAGE	RANGE
Body temperature (degrees Fahrenheit)	102.5	101-103.4
Respiratory rate (breaths/min.)	43	34-58
Heart rate (beats/min.)	196	120-310
Blood pressure (mm Hg)	110/80	132/55
Blood volume (ml/lb.)	30	24-45
Mature body weight-depends on breed		2-18.0+
*Food consumption (oz/day)		3-14
*Water consumption (ml/day)	92	70-115
*Urine production (ml/day)	30	22-37
*NOTE: Will vary considerably depending on size of rabbit, stage of the life cycle and concentration of pellets.		
Life expectancy (yrs.)	6	up to 14
Reproductive life (yrs.)	2 1/2	2-5
Gestation period (days)	30	28-32
Age of sexual maturity (months) males 1 mon. later than females		
small breeds (under 4 lb.)	4	3 1/2-5
med. breeds (4-10 lb.)	7	6-8
giant breeds	9	8-10
Eyes open (days)	10	8-11
Solid food consumption (days)	21	16-23
Kit size at birth (grams) depends on breed		35-65
*Commercial rabbits		
harvest size (lbs)	4	3 1/2-5 1/2
dressing %	60	55-65
feed conversion (amt. feed/lb gain)	3.7	3.0-4.5+
NOTE: Varies considerably with breed, strain within breed, ration and management factors.		

COMMON SIGNS ASSOCIATED WITH SICK RABBITS

Anorexia (failure to eat) and listlessness
This is the "sick rabbit" syndrome. Most rabbits that are ill exhibit these signs. They are not diagnostic but should

alert the owner to investigate further to find a specific cause of the abnormality.

Elevated body temperature, respiratory rate and heart rate.
These vital signs may be easily determined with minimal equipment. The normal body temperature may be determined with a rectal thermometer. Normal temperature should not exceed 102-5 degrees Fahrenheit. It will normally be about 1 degree lower unless the environmental temperature exceeds 80 degrees Fahrenheit. The respiratory rate may be determined by counting the number of breaths per minute. Any rates over 58 times per minute are abnormal and may indicate an illness. The heart rate may be determined by placing the thumb on one side of the chest, the four fingers on the opposite side just behind the elbows and count. The heart beats should be readily palpated and counted for one minute. Heart rates that exceed 310 beats per minute are abnormal.

Abnormality of these signs usually indicate the presence of an infectious process in or on the body. Further examination will be necessary to determine the malady and make a diagnosis. Appropriate treatment may be administered following the diagnosis of the condition.

Dyspnea (difficult breathing), Discharges from eyes and/or nose.
The presence of any of the above signs will indicate a condition that involves the respiratory system. Research shows that the bacterium *Pasteurella multocida* is responsible for about 88% of all respiratory problems in domestic rabbits. With this information, Pasteurellosis must be given first consideration as the cause of the respiratory problem.

Anytime these signs are present, one must give the quality of air the rabbit breathes consideration for possible contamination; especially, with ammonia. Air contaminated with ammonia in excess of 5ppm is irritating to the respiratory sinuses and may allow residential organisms to enter the system. The human olfactory system (nose) cannot detect ammonia in the air until it reaches 50-60 ppm. The increase in the incidents of respiratory disease in the herd usually indicates the need for better ventilation. A minimum of 10 total air changes in the rabbitry per hour is required. Other management factors will alter the exact air flow required.

Mucous membrane color alteration
This may be associated with the dyspnea. Inhalation of an inadequate amount of air, or air not containing ample oxygen, will cause the blood to be deficient in oxygen. The lack of oxygen in the blood allows the moist surfaced membranes (mucus) to lose the red coloration and they appear blue (cyanotic).

Diets that do not contain the appropriate nutrients may cause anemia. This may result in the lack of the intensity of the pink color of the mucus membranes. Lack of hemoglobin in the blood due to a deficiency of iron in the diet may be the cause of this condition.

Rabbits with severe coccidia may demonstrate mucus membranes that are pale and "muddy" appearing in color. This ma result from the interference of the absorption of nutrients from the ingested food through the small intestinal wall. Irritation of the intestinal lining is a result of severe parasitism. Blood may be lost through these areas daily in small amounts. This is usually not visible in the stool. Over a period of time, the loss may cause the mucus membranes to become pallor. This is a result of a low red blood cell count.

Lack of thriftiness
This is the initial sign of many diseases. The good rabbit manager will detect this from hours to days earlier than others. The alteration of the coat is the first change noticed. It will not have the character of a good coat in that it loses luster, rapidly becomes dull in color and appears different. The rabbit's eyes will lose the "glisten" and there is a change in the attitude of the rabbit. Gradually the appetite will decrease, the abdominal area may appear enlarged and the eyes will be half open. The rabbit just is not doing well and something is altering the normal physiological functions.

Blood in body excretions
This is a situation where there are actual red blood cells in the urine, feces, saliva and nasal discharge. This indicates disease or injury of blood vessels in the specific area.

URINE - This is not a common malady in rabbits. When present, there will be actual clots of blood in the urine. The most common cause of this sign is the presence of bladder stone sin the urinary bladder. This results in chronic irritation of the bladder wall, infection develops and it becomes so severe that blood gets into the urine from the blood vessel damage.

Blood also may enter the urine from the reproduction tract, particularly in the female. Uterine infections (metritis) may develop during or after the gestation period. A discharge may develop and enters the vaginal area. This will be noticed when urination occurs.

Red Urine is a condition in rabbits that may be confused with hematuria (blood in urine). This is most commonly detected when snow is on the ground; or, where the litter box of house rabbits has a light colored paper lining. This is normal condition in a small percentage of domestic rabbits. The urine will be a homogeneous

red-orange color. No clots are present. On snow or on a light paper surface, this is obvious and frightening. The color is due to an incomplete metabolism of a vitamin. This does not have any ill effect upon the rabbit.

FECES - The presence of bright red blood will indicate a loss of blood at the terminal portion of the gastrointestinal tract. This is not common in rabbits. Loss of blood in the fore portion of the intestinal tract will appear as a dark tarry black color instead of bright red. This is due to the digestive process affect upon the blood cells.

The covering of the fecal balls with a bloody substance may indicate a discharge from the reproductive tract. Be careful not to confuse these two totally different conditions.

SALIVA - This will usually indicate the presence of a laceration in the mouth, due to injury or tooth problems. On occasion, this may occur when the rabbit ha terminal heat exhaustion. Rabbits do not vomit.

NASAL SECRETIONS - The presence of blood in the nasal secretions indicates the rupture of blood vessels in the upper respiratory tract. This most commonly is a result of Pasteurellosis. Rabbits with severe heat stress will on occasion develop nose bleeds.

Neurological Signs

These usually relate to a malady of the brain or spinal cord. Paralysis is where the rabbit cannot move the area of the body and/or cannot feel pain from that area of the body. An example of this type of injury would be the paralysis of the hind limbs due to damage to the spinal cord from a spinal vertebrae injury. Twisting of the neck (Wry Neck) is another example of a neurological sign. The balance mechanism becomes infected causing the head to be carried in an abnormal position.

Loss of weight

Rabbits may lost weight, or fail to gain weight, and continue to eat their regular volume of feed. This will relate to an increased metabolism of the body due to a nutritional defect. Efforts will need to be made to identify the cause.

Diarrhea

This is a very common sign observed in several maladies associated with the domestic rabbit. The rabbit's digestive system is sensitive due to the microbial digestion that takes place in the cecum. Diarrhea is associated with many rabbit deaths each year.

Anytime these signs appear in a rabbit, or in a herd of rabbits, the fiber intake and the parasite control program must be examined. The lack of sufficient fiber in the ration relates to higher caloric intake of the rabbit. Elevated caloric intake can result in microorganism imbalance and this may result in diarrhea. The feed tag does not list the caloric content of the feed. Rabbit growers estimate the caloric content of a feed from the fiber present. Pellets with higher fiber levels will usually have lower caloric content and vice versa. Federal labeling laws further complicate this problem. By law, the **MAXIMUM** fiber content must be listed on the feed tag without any consideration for the minimum fiber content. With this information, one can see that there is not any accurate way for the grower to know the caloric content of the feed. This will vary from batch to batch, depending upon the quality of the ingredients.

Coccidiosis is a common protozoan parasite of rabbits. Most successful rabbit growers implement a chemical coccidia control program 2-4 times per year, plus excellent sanitation to prevent problems associated with this parasite. Low levels of coccidia infestation may chronically irritate the intestinal tract and allow microorganisms to infect the area and cause enteritis.

Loss of fur/wool with or without skin irritation
There is a multitude of causes for this very noticeable sign. The location, shape and length of time for the hair loss to develop is important.

Any irritation of the intestinal lining may cause the rabbit to chew fur from itself, rabbits in neighboring cages or litter mates. The cause of intestinal irritation may be related to diets with low fiber content; or, the presence of low grade coccidiosis. The presence of external parasite may cause varying degrees of fur loss with or without irritation. Some types of mite infestation may be associated with this type of fur loss.

The success of the treatment will depend upon the cause. Making a definitive diagnosis of the cause may be difficult and time consuming.

Death
Acute death may be the only sign observed. To identify the cause of death, a necropsy may be necessary. This is important to the breeder for the protection of the remaining rabbits in the rabbitry. To the house rabbit owner, it is essential to protect future pets from suffering from the same cause of death.

TREATMENT OF RABBIT AILMENTS

This may be as simple as implementing, or changing, a management practice to a very complicated regimen of chemical therapy or surgery. There is a tremendous amount of non-credible information printed on the domestic rabbit. This has resulted in the lack of consistent health care and many breeders improvising various treatment regimens.

All rabbit owners and breeders should locate a veterinarian interested in rabbit health and work with them to meet the health care needs of their animal. Those with larger rabbitries will do much of the physical treatment themselves under the direction of the professional for drugs to use, dosages and regimen of treatment.

ANTIBIOTIC AND ANTIMICROBIAL THERAPY

The rabbit has several anatomical and physiological features that does not allow for the extrapolation of medical treatment from other species. This is particularly important as it relates to the use of antibiotics and antimicrobials. These medicines are not selective in their action as they destroy pathogenic (disease causing) organisms and those that are beneficial to the body. The rabbit depends on a very strict balance of microorganisms in the cecum for complete digestion. A disruption of this balance will result in digestive maladies. These include anorexia (not eating), diarrhea and even death.

Some antibiotics alter the cecal flora more than others and some have a greater detrimental affect when administered orally compared to systemic administration. This is a very serious situation! Many rabbits die of antibiotic toxicity related to the use of inappropriate antibiotics, wrong dosage and regimen of treatment.

Anytime a rabbit is treated with antibiotics or antimicrobials orally (feed additive or in drinking water) one should consider the administration of microencapsulated probiotics. Probiotics are living organisms that assist in maintaining the balance of the environment to promote the growth of desirable microorganisms. The very acid stomach of the rabbit destroys the living organisms of normal probiotics (similar to the cultures in yogurt) and they never reach the cecum. For the probiotics to be effective, they must reach the cecum. This can only be done efficiently by using microencapsulated probiotics so that they pass through the acid stomach and maintain their activity.

MEDICATION DOSAGE AND WITHDRAWAL TIMES

Read the label on the medication!!! Follow the instructions accurately!!! If one does not understand the instructions,

find the correct information prior to use. A conversion of dosages may be necessary due to the packaging of drugs at various concentrations. Make sure the conversions are correct!!! If in doubt, seek the assistance of your veterinary consultant. "If a little does good, a little more will do better" does not apply to medications, particularly in rabbits. Medications used at the wrong dosage and at the incorrect regimen of treatment will not get the desired results. Always **READ** the label and **FOLLOW** directions for dosage, route of administration and regimen of treatment.

Rabbit breeders must be extremely careful in the use of medicaments as it relates to withdrawal times prior to the harvest of the animals for human consumption. Residues may contaminate the edible protein and other effects on the rabbit's system and offspring may not be known. The list of approved medications for use in the domestic rabbit is small in comparison to other species. This results in lack of knowledge about withdrawal times.

Organisms may develop resistance to medicaments and disinfectants. Indiscriminate use of antibiotics and antimicrobials must be avoided to prevent the development of resistant strains of pathogens. By developing resistant strains, the medicaments lose their effectiveness. When the disease does occur, there will not be any medication to treat the disease effectively. There is not any research that documents that routine feeding of antibiotics improves weight gain or feed conversion in the domestic rabbit.

Periodically altering disinfectants will prevent microorganisms from developing resistance to the chemicals. Disinfection and the selection of a disinfectant is an important factor in the preventative disease program.

WEIGHT, MEASURE AND TEMPERATURE CONVERSIONS THAT MAY BE IMPORTANT IN DETERMINING TREATMENT LEVELS

WEIGHT

1 pound (lb) avoirdupois---equals---16 ounces (oz)

VOLUME

1 pint (pt)----------equals---16 fluid ounces
1 quart (qt)----------equals---2 pints
1 gallon (gal)----------equals---4 quarts (8 pts)

METRIC SYSTEM

WEIGHT

1 milligram (mg)------equals-1,000 micrograms (mcg)
1 gram (gm)----------equals-1,000 milligrams
1 kilogram (kg)-------equals-1,000 grams

Equivalents (all approximates)

VOLUME/LIQUID

1 cubic centimeter (cc)---equals---1 milliliter (ml)
1 liter (L)----------equals---1,000 milliliters
80 milliliters (ml)-------equals---1 fluid ounce
500 milliliters----------equals---1 pint
1,000 milliliters---------equals---1 Liter
1,000 milliliters---------equals---1 quart
1 liter----------equals---1 quart
3.785 liters----------equals---1 gallon
250 milliliters----------equals---8 fluid ounces +
1 kilogram----------equals---2.205 pounds (avdp)
1 kilogram----------equals---35.275 ounces (avdp)
1 pound----------equals---454 grams
1 pound----------equals---0.454 kilograms

HOUSEHOLD MEASURES

20 drops----------equals---1 milliliter or cc
1 teaspoon (tsp)----------equals---4 milliliters
1 tablespoon (tbsp)-------equals---15 milliliters
1 tablespoon (Tbsp)-------equals---3 teaspoons
1 tablespoon (Tbsp)-------equals---1/2 ounce
1 teaspoon (tsp)----------equals---60 drops

IMPERIAL SYSTEM MEASURES

1 pint----------equals---20 fluid ounces
1 quart----------equals---40 fluid ounces
1 gallon----------equals---160 fluid ounces

COMPARISON (APPROXIMATE) OF LINEAR MEASURES

1 inch (in)----------equals---2.54 centimeters (cm)
1 centimeter (cm)-----equals---0.4 inch
1 millimeter (mm)-----equals---0.04 inch
1 meter (m)----------equals---39.37 inches
1 foot (ft)----------equals---30.48 centimeters
1 yard (yd)----------equals---91.44 centimeters

CELCIUS-FAHRENHEIT COMPARISONS/CONVERSIONS

*Freezing water--0 degrees (C) = 31 degrees Fahrenheit (F)
*Boiling water--100 degrees (C)= 212 degrees Fahrenheit (F)
*37.0 degrees Celsius (C) = 98.6 degrees Fahrenheit (F)
*39.0 degrees Celsius (C) = 102.2 degrees Fahrenheit (F)
*at sea level

CONVERSION
Fahrenheit to Celsius - (degrees F-32 X 5/9 = degrees C)
Celsius to Fahrenheit - degrees C X 9/5 + 32 = degrees F)

FEED ADDITIVE CONVERSION TABLE

Weight of additive per ton (2,000 lb)	Percent (%) in feed	parts per million (ppm)
1 gram	0.00011	1.1
10 grams	0.0011	11.0
100 grams	0.0110	110.0
1 pound	0.05	500.0
2 pounds	0.10	1,000.0

ROUTES OF ADMINISTRATION MEDICATION

The route of administration will depend upon the chemical state of the medicament at the completion of the manufacturing process. The normal routes of administration are:

1. **TOPICALLY.** This entails the application of the medication to a specific location on the surface of the body, in the eyes, ears, or on one of the body openings.

BODY SURFACE

The medicaments may be in an oil or salve type base to help maintain a prolonged contact time. To apply, the rabbit should be taken to a well-lighted area for the treatment and one's hands must be thoroughly cleansed. Clean the involved area (lesion) of noticeable organic debris with a dry sterile pad (4 x 4), read directions on medication one more time, and apply as directed. Application of ointments and salves should be from the center of the lesion to the outside to prevent further contamination. One does not want to carry germs from the fur to the center of the wound. Once a scab and healing is initiated, be careful not to disrupt the healing process. Repeat the procedure as directed. Due to rapid absorption and evaporation, it is usually necessary to apply topical medications two to four times per day.

Be careful not to apply excessive amounts of medication where there will be "extra" adhered to the fur around the lesion. Medication of the fur is not beneficial and provides the opportunity for the rabbit to ingest topical medications during the grooming process. This may be dangerous to the rabbit. This may cause the rabbit to go off feed, develop loose stools and even die.

Topical medications may be in powder form. Read the directions carefully. One may wish to cover the applicators nose and mouth with a protective mask to prevent inhalation of ingredients. The directions will suggest direct application to the lesion, which is self explanatory; or, general body application.

Most insecticide and pesticide powders are in the form of a dust. Dust to be applied in small amounts from between the ears to the tip of the tail down the middle of the back. As the rabbit moves, the dust will uniformly disperse itself over the entire body and face. Repeated treatment is necessary at 10 - 12 day intervals to cover the entire life cycle of the parasite. This is necessary, due to the fact that most insecticides and parasiticides have no detrimental effect upon the eggs.

INSTILLATION OF EYE MEDICATIONS

Application of eye drops or ophthalmics require the same preliminary procedures. Read the instructions completely, place rabbit in good light and wash hands thoroughly. To instill an ophthalmic in the rabbit's eye usually requires two persons, one to restrain the rabbit and the other to apply the ophthalmic correctly. Restrain in a sitting position on a roughened surface; or, hold in the arms with the eye to be treated free of obstructions. Control the movement of the head with one hand holding ears between thumb and forefinger. The remaining fingers support the cheek of the opposite side of the eye to be treated and the other hand holds and supports the body.

The individual with the medication will gently open the eye and hold the eye open. Opening the eye may be done by placing the thumb below the eye lid and the forefinger just above the upper eye lid. This allows a "gutter" to be formed by the lower eyelid for the ophthalmic to be placed. Ophthalmics are usually in an ointment or drop form. Using care not to contaminate the applicator tip, the medication may be placed in the created gutter. There is a tendency to use excessive amounts of medication. Use an ointment line just the length of the eyelid. The lids then close distributing the medication over the entire surface of the eye and associated membranes. Replace the medicament cover to keep clean. It is usually necessary to instill ophthalmics 3 to 4 times per day for several days in succession.

INSTILLATION OF EAR MEDICATIONS

Most ear medications are in oil or ointment form and are to be placed deep into the ear canal. Ear medications usually have an accompanying applicator. These will be a bulbed dropper or a 1-1 1/2 inch elongated tip attached to the medication container.

The ear canal (opening) descends vertically and then slightly turns toward the inside, or medial. The infection site will usually be located deep in the ear at the deviation of the canal. To be effective, ear medication must be deposited at the correct location.

Read the medication label completely. Restrain the rabbit on a roughened table top or hold in arms with ear to be treated in a position of easy access. After removing the protective applicator cat, hold both ears together in upright position and insert tip vertically downward. Insertion of applicator tip to continue until one encounters resistance. This indicates the proper position to deposit the recommended amount of medication. Be careful to keep insertion procedure on a vertical plane (straight up and down). Do not deviate top of tube laterally. This will turn tip of applicator medially and may allow excess pressure on delicate middle ear structures. This could cause damage. After the deposition of the medication, the applicator is withdrawn, the protective cap replaced and the base of the ear massaged for several seconds. The massage of the ear base distributes the medication to the bottom of the external ear canal through any debris that is present.

Removal of excess debris may be necessary prior to medication. This is particularly true when ear mite infection has been present for extended periods of time. All types of debris, including was, may be removed with cotton tipped sticks using the above procedure. To assist in the cleaning process, a small amount of mineral oil may be used on the cotton tip.

The above procedure should be followed as per the frequency and length of time on the medication directions. Be careful not to use excessive amounts of medication with each application.

2. **Oral medication administration.** These are medicaments that enter the rabbit via the mouth. These may be a pill, capsule, powder, liquid or in a form that may be added to the drinking water. The oral medication type will depend upon the content and is to be administered as per direction.

Giving the rabbit a pill or capsule is a simple procedure after a little experience and instruction. It usually will take two persons to complete the task. One to restrain the rabbit and the other to perform the procedure.

The animal should be restrained on a table with a roughened surface. The head can be controlled by placing the base of the ears between the thumb and forefinger of one hand. The remaining fingers of that hand supports the head by placing the fingers on the side of the cheek. The opposing hand supports the body. The front portion of the rabbit can then be raised to an angle of 45-75 degrees to allow the head to be higher than the rear.

After rechecking the dosage to insure correctness, one is

ready to give the pill or capsule. With the rabbit in the above restrained position, open (pull apart) the lips, on either side of the face, by spreading the thumb and forefinger. The thumb will be positioned on the lower lip and the forefinger on the upper lip. One can readily identify the upper and lower incisors, at the front of the mouth and the upper and lower cheek teeth to the back. The tongue will have an obvious arch present with an elevated portion toward the front. The free hand can position the pill or capsule on top of the tongue. It should be positioned at the bottom of the tongue arch and as far to the rear (posterior) of the mouth as possible. A blunt narrow object (eraser end of pencil) may be used to gently "push" the medicament to the rear of the oral cavity. The rabbit will then readily swallow.

The first attempt at giving a rabbit a pill can be frustrating. With practice, the procedure will become routine and easy. The most common mistake made is the failure to place the pill in the correct location for fear of getting bit. One must take advantage of the lack of canine teeth in the rabbit for this procedure to succeed.

Administering liquids is easier for the inexperienced owner than giving pills or capsules. Place the prescribed volume of liquid in a blunt tipped syringe or eye dropper and set aside for later use. Position the rabbit as described above with one exception. The holder must tilt the head further to the back by raising the chin. Gently grasp the skin just behind (posterior) the corners of the lips and pull away (laterally) from the mouth. This will create a cavity, or funnel, that leads to the throat area. Liquids can then be **SLOWLY** put in the cavity and the rabbit will swallow the materials. If administered too fast, the excess will overflow the pouch created by the cheek. Exhalation during the process will force the material from the mouth. Be careful to give slowly and allow ample time for the rabbit to breath. The disadvantage of this type of oral administration is the possibility of getting materials in the lungs. This problem will be minimized with slow administration of the liquid. It is common to spill small amounts of the materials during the drenching process.

Powdered medicaments may be dissolved in water and administered as described above. With approval of the directing professional, some pills and capsules may be mixed with water and given as a drench. This is not possible with some medications. Mixing with water may alter their chemical state and they may lose their effectiveness as they pass the very acid stomach of the rabbit.

Rabbits that are off feed (anorexic) can be maintained by drenching with water and a gruel 3 to 5 times per day. The gruel can be made by dissolving pellets in a sufficient

amount of water that the mixture will pass the opening in the syringe. Microencapsulated probiotics and nutrient additives may be mixed with the gruel to enhance the mixture.

Some medications may be added to the drinking water. It is essential that they are in the correct chemical form to maintain stability in water and added at the correct proportion to be effective. Some water additives have a bitter taste and the rabbits fail to drink the normal volume of water. This problem may be resolved by adding any flavor of gelatin to the medicated water at the rate of 1 - 3 tablespoonfuls per gallon of water.

Rabbits watered with crocks, bottle and other water limiting devices can be readily serviced with medicated drinking water. The use of automatic drinking water systems must be installed with a holding tank or an inline medicator to provide the rabbits with medicated drinking water.

There are many automatic mediators on the market and poor quality medicators are just as expensive as good medicators. Be sure to explore the market to find a medicator that meets the need of the rabbitry. It is essential that the medicator is simple to operate, have variable settings with the concentration of medicaments used and be accurate.

3. **Parental injections.** This route of administration is where the medication enters the body via injection with a needle and syringe. This method of administering medications requires special equipment and appropriate training by a professional. To use this method of treatment, it is essential to have an appropriate working relationship with a veterinarian. Even then, some medications are too dangerous for the average lay person to use. The various methods of parental injection will be described to accommodate those without formal training. there are 4 types of parental injection commonly used in rabbits.

1. Subcutaneous (Sub-Q). This is a very common route of parental injections in the rabbit. Deposition of the medication is between the skin and muscular tissue. Water soluble based medication will be readily absorbed from this site of deposit.
2. Intramuscular. This is the common site to inject oil based medications. Deposition of the medication is into muscular tissue of the body.
3. Intraperitoneal. This is not a common injection site for the inexperienced person. Injection of the medication is into the body cavity (peritoneal) that surrounds many vital organs in the belly (abdomen).
4. Intravenous. This route of administration involves the injection of the medication into a vein of the rabbit. Not a common practice by lay persons. Very valuable to the professional as it

allows rapid action of appropriate medications.

NECESSARY EQUIPMENT FOR PARENTAL INJECTIONS

Prior to the discussion of the applied procedure, it is necessary to have and understand the essential materials needed. They will include:

Syringe(s). These are available in many styles and sizes. Costly and time consuming sterilization equipment is not necessary when the disposable type syringes are used. The use of the disposable type syringe is recommended. Most find the 1 cubic centimeter diabetic syringe to the 2 cubic centimeter disposable plastic syringe idea and convenient to handle for most injections.

Larger 12-20 cubic centimeter syringes may be necessary when administering fluid therapy to large rabbits; or, using as an oral dose syringe. These are available in glass or disposable types.

Needles. Disposable needles are most often used as they are convenient, readily available and do not need sterilized. Needles are available in many lengths and gauges. The smaller the gauge size of the needle indicates that the diameter of the needle is larger. For most intramuscular and subcutaneous injections a 1 inch needle is the ideal length. Longer needles may be needed for intraperitoneal injections. The gauge of the needle to use will depend upon the viscosity (thickness) of the medication. The more viscous the medication, the larger the gauge of the needle required. Medications with a "watery" consistency may be readily drawn through diabetic needles or needles of 22 gauge or less. Oil based medications usually require a 20 gauge or below sized needle.

Selecting the appropriate needles is important. One desires a needle of sufficient length that the medicament may be placed at the desired location. Needles of excess length are more difficult to handle and may pose a threat to the rabbit or handler.

Alcohol Wipes. These must be available to cleanse the area prior to injection. Cotton balls with the appropriate alcohol solution may be used. Man find the use of individually prepared wipes manufactured for diabetics very convenient and economical to use.

Waste container. Proper disposal of syringes and needles are of extreme importance. Most counties have regulations for appropriate disposal of this type of materials. Follow the guidelines set forth in the area.

Medications. Have the necessary medicament set aside. Check the expiration date, method of storage and the route of administration required. Do not use expired medications or improperly stored medications. If used, adverse reactions may occur or the medicament may not be effective. IT is essential that medications are administered via the correct route of administration. Placement in the wrong location may render the medicament inactive or cause abscesses. Read label again and calculate dosage needed. After use, store properly.

Labels. Mark date of treatment and type of medication used to place on rabbit cage. This is to prevent medicated animals from being culled or harvested prior to regulated withdrawal times.

Note pad. . Always keep permanent record of medications used in the rabbitry. This allows purging of the records to determine effectiveness and any adverse reactions of medicaments used.

FILLING THE SYRINGE FOR PARENTAL INJECTION

Withdrawing the medication from the shipping container into the syringe is mechanically done the same way for all types of parental injections.

Cleans hands thoroughly with soap and water. Select the correct medication and cleanse the top of the bottle (withdrawal site) with an alcohol wipe. Allow surface to air dry. Remove syringe form container, open needle container allowing the needle cover to remain in place and place needle on the syringe. Do not touch tip of syringe or needle hub with fingers.

Remove needle shield, withdraw the volume of air in the amount of medication to be used. Insert needle through softened area on top of bottle, push plunger completely in, forcing the contained air into bottle. Turn medicament bottle upside down and withdraw plunger until medication starts filing syringe. When the volume needed is in slight excess, gently force the excess back into the bottle until the exact volume fills syringe. Use care that no air bubbles are present. If present, gently tap syringe with finger until air is at the top of syringe and then force back into bottle. Withdraw a sufficient amount of medication again to get the correct volume. Withdraw needle from bottle and replace syringe cover. The medication is ready for injection.

MECHANICS OF SUBCUTANEOUS INJECTIONS

Restrain rabbit on roughened surface and select the injection site. The injection site may be any where on the body as long as the medication may be injected between the skin and

the muscle. The most common, and recommended, site would be in the area around the shoulders. This would be the area from the base of the neck (posterior) to the elbow joint. It would extend from the right side over the top of the shoulders to the left side. Select the exact site, pinch the skin gently between thumb and forefinger just above the selected site. Gently pull the skin away from the body, like to form a tent. With the opposing hand cleanse the selected area, 1 to 1 1/2 inches in diameter, with an alcohol wipe. Dispose of the wipe, pick up the prepared syringe with that hand and remove the protective needle cap. Place the point of the needle against the skin, do not penetrate yet, at the selected site. The needle and syringe to be at a 45 degree angle with the skin. Gently, but firmly, pull the skin over the point and onto the shaft of the needle. The point of the needle is in the subcutaneous area and the skin may be released.

Prior to discharging the medication, one must be sure that the point has not been placed accidently into a vein. This may be done by pulling back on the plunger (aspirating) while examining the barrel of the syringe for blood. If blood is present there is no harm done, it just indicates the placement is in a vein. Withdraw the needle, repeat above steps 1/4 to 1/2 inch to right or left of original location. After aspiration without the appearance of blood in the syringe barrel, the medication is injected by **SLOWLY** pushing the plunger until barrel is empty. Withdraw the needle, swab with alcohol wipe, gently massage the area and properly dispose of equipment used.

A small amount of bleeding may occur. This does not indicate a problem or any faulty technique. To control, place a cotton ball or wipe on the site and apply pressure for 1 to 3 minutes. After hemorrhage is controlled, clean blood from fur with clean cold water.

When injections are to be repeated on same day; or, succeeding days, most the injection site within the general described area. After injecting, it is not uncommon to feel a thickened area for some time.

MECHANICS OF INTRAMUSCULAR INJECTIONS

Read the label of the medication again. Decide the volume of medication necessary, select the appropriate equipment, fill syringe and prepare as described above.

Have another person restrain rabbit on a roughened surface. Placement of the medicament in the muscle is the requirement of this route of administration. There are two recommended sites for this injection. The loin muscle or in the muscle of either hind leg. Each site has advantages and disadvantage and each will be described below.

LOIN INJECTION

This is a very safe location for intramuscular injections. The only disadvantage is that the site is very visible. If the rabbit will be exhibited shortly after injection, there may be a slight swelling at the injections site This would be an abnormality on the show table.

To define the injection site, one must find the last rib and palpate (feel) the spinal vertebrae (back bone) that rib is connected to. Place index finger at that point and move backward (posterior) 1 to 1 1/2 inches. At that location, move finger to the outside (lateral) either right or left. This is the site for injection. On larger rabbits, the distances may be increased slightly.

Clean the site with an alcohol wipe. Maintain pressure just to the side of the site (1/8 inch) with the index finger to mark site. With loaded syringe in opposing hand, position needle at tip of finger and direct the needle vertically through the skin and into the middle of the loin muscle. The depth of the injection must be from 1/2 inch to 1 inch. If less that 1/2 inch, one may be in the subcutaneous area rather than intramuscular. Pull back on the plunger (aspirate) to insure that the tip is intramuscular and not intravenous. When in a vessel, blood will enter the barrel during aspiration. If this occurs, there is no damage or reason for excitement. Withdraw and repeat procedure. After aspirating and there is not any blood in the barrel, gently empty the barrel b pushing the plunger completely to the bottom of the barrel. Entering a vessel during this procedure occurs less than 1% of the time. Withdraw the needle on the same line as it entered, massage the area an properly dispose of used equipment.

The advantages of this location for intramuscular injection are many. The site is easily accessible and visible. There is not any vital tissue in close proximity that could be accidently damaged. After becoming proficient in the technique, the injection may be made without assistance.

HIND LEG INJECTION

The mechanics of preparation and the actual discharge of the medication is the same as described earlier. The only difference will be site and the angle of injection.

With the rabbit restrained properly and the correct preparation of materials done, one is ready to identify the injection site. Insert the forefingers from the front of the rear leg on the inside (medial) and the thumb on the outside. Gently closing the thumb and forefingers on the leg bone (femur) can be readily palpated. Moving to the rear

(posterior) of the femur and above the knee, or stifle joint, the massive muscles of the rear leg may be identified. This will be the area for deposition of the medicaments.

The injection site may be identified on the lateral (outside) or the posterior (backside) of the hind leg. Clean the area with an alcohol wipe and place the thumb 1/8 inch from the site of penetration. While penetrating the skin, increase the pressure of the thumb to obscure the effect on the rabbit as the needle goes through the skin. The needle should enter on a horizontal plane rather than at an angle or vertically. TO insure that the tip of the needle is in the muscle, it must be 1/2 to 1 inch through the skin. When completed, withdraw needle on same line as entered, massage the area and properly dispose of equipment.

Either leg may be used and when repeating injections, alternate from right to left leg. The leg muscle is a good site for intramuscular injections. The disadvantage of this site is it usually takes two people to complete the procedure and the leg is much more mobile than the loin. If the rabbit attempts to move, the hind legs are very active participants. Any muscle movement during the procedure increases the possibility of injury during the injection process.

Evaluate both routes of intramuscular injection and select that method that best fits the need of the individual involved. Always keep hands clean, read directions, and understand the seriousness of the endeavor. Understand that medications are usually available in various concentrations per centimeter. The number of cc's a friend uses will only be accurate if the concentration is the same and the rabbit weighs the same. Using incorrect procedures, the wrong medications, inaccurate dosages and the wrong route of administration may cause adverse reactions and death to the rabbit.

INTRAPERITONEAL AND INTRAVENOUS INJECTIONS

These are very important and beneficial routes for various medications for the rabbit. These techniques require special one on one training in special classes for the individual to become proficient. It would be suggested that those interested seek a professional that would be willing to supervise these techniques in the rabbitry.

The above discusses the various signs of disease, what causes disease and how they may be differentiated. Diseases are transmitted in a variety of methods. Medications are important in treating certain diseases. For the medication to be effective, it must be administered to the rabbit via a certain route. The above is an effort to further the understanding of these situations.

A GUIDE FOR SELECTION OF SYRINGES AND NEEDLES

Tools commonly used in animal care are the hypodermic needle and syringe. They serve many purposes, primary in collection of blood and injection of various medications. A brief discussion of the many types of instruments and their uses should serve as a handy guide in your work. Select the proper syringe and needle for the work you need to do and make your task easier.

SYRINGES

Syringes can be made of glass, metal or plastic. Breakage and labor involved in cleaning and re-sterilization have made glass rather obsolete. Most facilities use disposable plastic syringes. It is intended that they be discarded after each use. However, it is possible to clean and re-sterilize them several times.

The unit measure of all syringes is the cubic centimeter or cc. One cc also equals one milliliter or ml.

The standard sizes of syringes and their suggested uses are:

1. one cc or tuberculin syringe. Graduations down to 1/100 of a cc (.01). Used when injecting very small amounts or for critical accuracy (e.g. TB testing, allergy testing, anesthesia or rodents)

2. 2.5 or 3 cc syringe. An old favorite for vaccinations, small injections, collecting small amounts of blood. Also handy for measuring medication into drinking water and picking up urine samples from litter pans.

3. 5, 10 and 20 cc syringes. Good for administering medication, collecting large blood volumes. Used in anesthesia or larger animals.

4. 35 cc syringe. One of the largest sizes available. Helpful in blood collection by cardiac puncture. Really good for administering oral medication or liquid diets.

When selecting a syringe, pick the smallest one that will do the job. Smaller syringes are easier to handle and costs less. Syringes may be reused to administer the same medication several times. When collecting blood, always use a new syringe. If you have an unsuccessful attempt to collect an unclotted blood sample and the syringe is contaminated, replace the syringe. This blood will clot and rush the clotting of your sample when you do hit the vein.

When disposing of a syringe, it is a good practice to pull

out the plunger, making it harder for a scavenger to reuse it. Also, rinse any dangerous materials down the drain. **DO NOT** discard them in the syringe.

NEEDLES

Hypodermic needles are also available in disposable and reusable types. Most facilities use disposable needles made of aluminum. This soft material will keep a point for 1 or 2 injections only and will bend if you misuse. A bent point is called a burr. A burr will make the injection much more painful for the animal and will make it very difficult to do a proper puncture. change needles if you are having difficulty.

Sterile technique should always be observed. Keep the cap on the needle unless you are using it. Any needle that enters a vial of medication or enters an animal should be sterile.

For best efficiency when collecting blood, the syringe and needle should be manufactured by the same company. If you are having trouble with air leaks at the hub, switch to needles and syringes of the same brand.

Needles come in different lengths and sizes. Needle lengths commonly use are: 5/8 inch for TB tests and injecting rodents; one inch for general usage; 1 1/2 inch for cardiac puncture.

The size or diameter of the needle is determined by gauge just like wire. Higher numbers signify a smaller gauge, thinner needle. Thus, 25 gauge is smaller and 14 gauge is larger. Most needle manufacturers color code the caps by size. However, this may vary between manufacturers. You should become accustomed to referring to needles by gauge. The Monoject company color codes their needle caps in the following manner:

A. 25 gauge (red) - very fine needle used for intradermal TB tests, injecting rodents, allergy testing.

B. 22 gauge (blue) - best for blood collection from cats, vaccinations, easy flowing medications; makes a fairly painless injection.

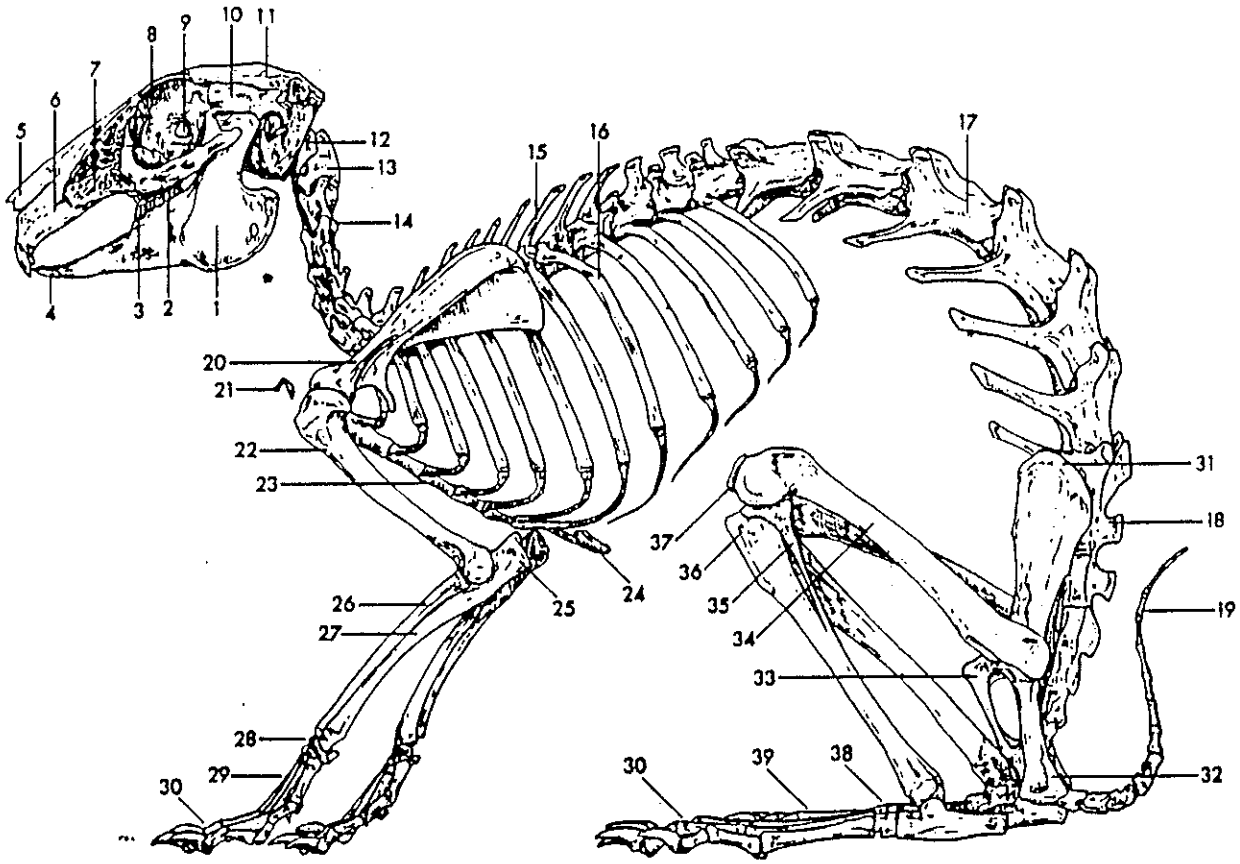
C. 20 gauge (pink) - standard needle; thick medication (e.g. penicillin) flows easily through; usually used for IV's.

D. 18 gauge (gold) - large size needle; used primarily for rapid administration of subcutaneous fluids.

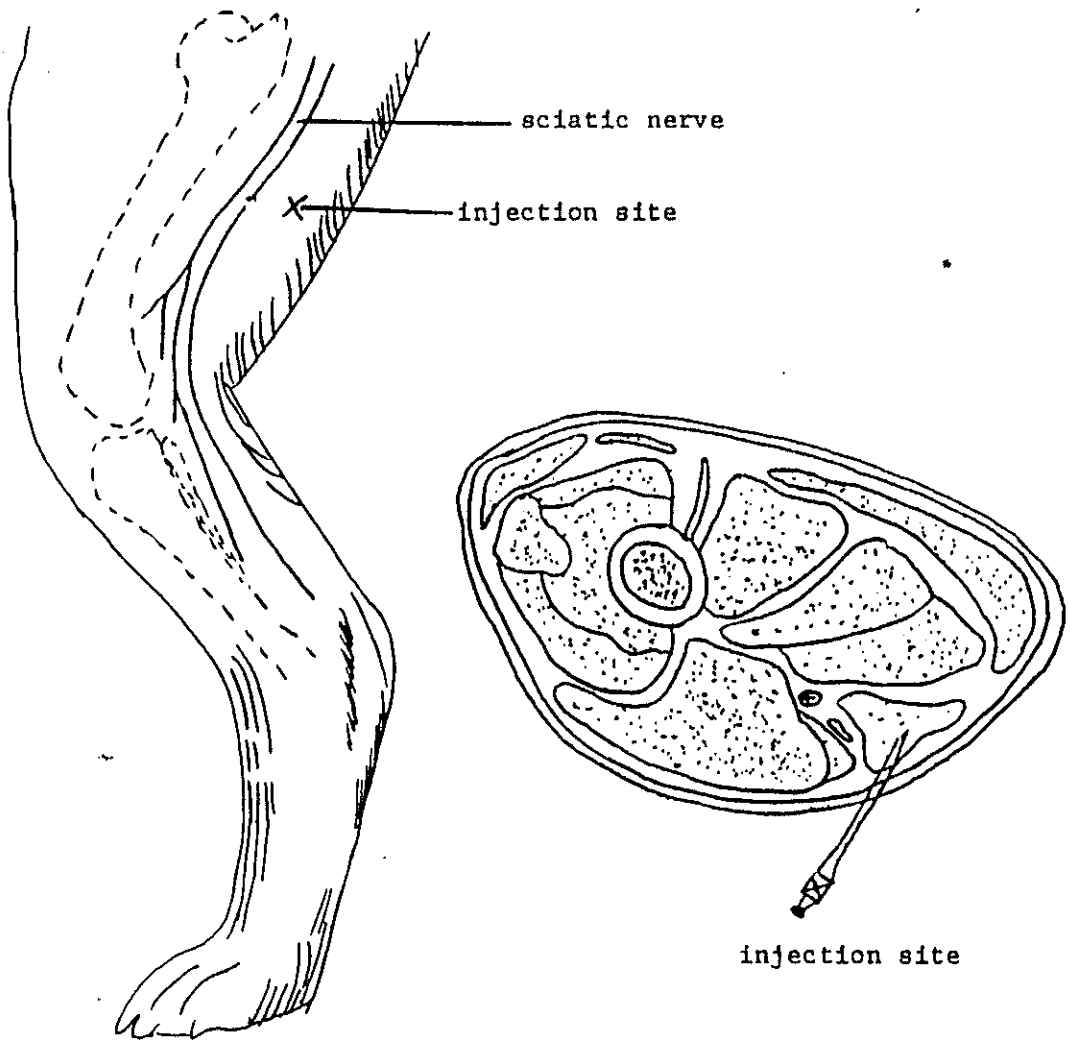
When disposing of needles **ALWAYS** replace the cap. A good

practice is to bend the needle sharply at the hub before replacing the cap. It will break off and be useless. You may also use Destruclip which destroys the tip of the needle.

RABBIT SKELETON



1. Mandible
2. Molar
3. Premolar
4. Incisor
5. Nasal
6. Premaxilla
7. Maxilla
8. Frontal
9. Optic foramen
10. Squamosal
11. Parietal
12. Atlas
13. Axis
14. Cervical vertebra (7)
15. Thoracic vertebra (12)
16. Ribs (12)
17. Lumbar vertebra (7)
18. Sacral vertebra (4)
19. Caudal vertebra (16)
20. Scapula
21. Clavicle
22. Humerus
23. Sternum
24. Xiphoid process
25. Olecranon process
26. Radius
27. Ulna
28. Carpals
29. Metacarpals
30. Phalanges
31. Ilium
32. Ischium
33. Pubis
34. Femur
35. Fibula
36. Tibia
37. Patella
38. Tarsals
39. Metatarsals



Intramuscular injection in the hindleg

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RABBIT DISEASE CHART

prepared by
DR. T. E. REED, RABBIT SPECIALIST

DISEASES ASSOCIATED WITH THE RESPIRATORY SYSTEM

DISEASE OR CONDITION	SIGNS	CAUSE	TREATMENT	PREVENTION
PASTEURELLOSIS -There are 3 forms of this disease. They are: 1. **"SNUFFLES"** (a chronic form of the disease)	Will depend upon the form and related stress factors present. Periodic sneezing, nasal discharge (colored or clear), matting of the fur on inside of the front legs, watery eyes, discharge from one or both eyes, anorexia (will not eat), decreased production (reproductive and growth), and increased susceptability to other diseases. Elevated incidences of Wry neck, abscesses and uterine infections. Acute pneumonia may develop. When death occurs it is usually the result of secondary infections.	*Pasteuella multocidia*. This is a bacterial organism that is very common in the domestic rabbit. A large percentage of the healthy rabbit population will have this organism present in the respiratory tract as a normal respiratory inhabitant. When the rabbit is stressed this allows the disease to present itself in one of the forms described.	There are not any antibiotics approved for use in rabbits that will cure this disease. Some medications will suppress the signs of the disease for a period of time, but the animal will remain infected and shed the pathogenic (disease causing) germs. -Administer antibiotics in drinking water to decrease secondary infections. Improve the air quality. -Enhance sanitation practices. -Provide quality nutrition. NOTE: A) House rabbits may be treated totally different for this disease than rabbits used	-Keep all stresses at a minimum. Particularly, the ammonia contamination of environmental air. Ammonia in the air must not exceed 5 ppm. This may be done by: 1) Ventilation-provide at least 10 total air changes per hour. 2) Decrease ammonia formation by frequent removal of the excreta and feeding substances that prevent ammonia from forming in the gut and in the collection trays. -Decrease exposure to the germ by: 1)Enhanced sanitation of all equipment and chlorinating the drinking water. 2)Isolating sick rabbits.

DISEASES ASSOCIATED WITH THE RESPIRATORY SYSTEM (CONTINUED)

DISEASE OR CONDITION	SIGNS	CAUSE	TREATMENT	PREVENTION
Pasteurellosis (continued)			for other purposes. B) Care must be used when administering antibiotics to rabbits. Some antibiotics are FATAL to rabbits, even in small dosages. C) Always follow withdrawal times of all medications when animals may be harvested for human consumption.	3) Isolate additions to herd for 2 wks. 4) Cull any rabbit showing signs of disease from herd. 5) Retain replacment animals that show resistance to the disease.
2. **HEMORRHAGIC SEPTICEMIA**	Most commonly seen in young rabbits 6-14 wks. of age; but, may be seen in all age groups. More acute (shorter duration) than rabbits with "snuffles." Respiratory distress with signs similiar to pneumonia. Gastro-intestinal upset with diarrhea (can be confused with other types of enteritis).	Same as above.	Same as above.	Same as above.
3. **ABSCESSES**	Distinct, circumscribed masses ("lumps") anywhere on the body. Most commonly observed on the head, on the jaw-line and in the shoulder area. May be seen as an open wound draining thick, tooth paste like material if opened.	*Pasteurella multocida.* Infective organism gains entrance to tissue via injury. Such as, bruise, scratches or toe-nail wounds in nest box. Also, may result from injury when a septicemia has been present. May take extended periods of time to develop. (Example: nest box injury and appears when a Jr.)	Seek professional consultation. In breeding herd give consideration to culling animal from herd. Materials from abcesses (pus) will contain many pathogenic germs that will contaminate the rabbitry. Removal of the abscess is preffered to lancing and draining.	Complete sanitation of the nest box and the use of bedding materials that are free of pathogenic organisms. Removal of nest box at 14-16 days after kindling. Keep cages free of materials that may cause superficial injuries to the rabbit.

DISEASES ASSOCIATED WITH THE RESPIRATORY SYSTEM (CONTINUED)

DISEASE OR CONDITION	SIGNS	CAUSE	TREATMENT	PREVENTION
PNEUMONIA	Labored breathing, increased respiratory rate and head tilted back with nose in the air. Bluish discoloration to lips, tongue and ears. -Sneezing, coughing and nasal discharge may or may not be present.	Multiple types of bacteria may be associated with this condition, including *P. multocidia*. Stress factors increase the incidences of this condition.	Utilization of broad spectrum antibiotic that organism causing pneumonia is sensitive to. Some antibiotics may be fatal to rabbits. Always adhere to withdrawal times prior to using for human consumption.	Proper ventilation to keep air contaminants of ammonia and pathogenic microorganisms at a minimum. -Minimize all other stress factors. -Appropriate sanitation practices. -Isolate all additions to the rabbitry.
HEAT EXHAUSTION and/or **HEAT PROSTRATION**	Respiratory rate in excess of 100/minute (panting). Drooling with wetness around mouth. Head tilted as far back as possible. Rabbit stretches out trying to get as much skin on cage floor as possible. Will convulse in final stage.	Temperatures in excess if 80 degree F. with elevated humidity. Rabbits in the direct sunlight. Animals that are extra fat, being handled, in the kindling process or have a respiratory disease are more susceptible to this condition.	Cool down immediately by placing in cool area. Wet or place ice on inner and outer surface of ears. As last resort submerge in tempid water from neck down.	Use open wire type carriers. Transport and handle coolest portion of day or night. Keep rabbits from direct sun light. Provide rabbits with plastic bottles that contain frozen liquid to lay next to to keep cool, especially does about to kindle. Reduce bedding materials and remove portions of fur from nest.
CONJUNCTIVITIS	"Milky" discharge from eye(s), whites of eye red and inflamed. May be intermittent. Observed in all breeds.	May be secondary to snuffles or eye injury infected with any type of bacteria.	Instill general ophthalmic without cortisone 2-3 times per day for 3-5 days.	Control *P. multocida* in herd. Prevent injuries.

DISEASES ASSOCIATED WITH THE RESPIRATORY SYSTEM (CONTINUED)

DISEASE OR CONDITION	SIGNS	CAUSE	TREATMENT	PREVENTION
WEEPY EYE	May be confused with primary CONJUNCTIVITIS. More chronic. Frequently observed in breeds with large round heads. -Fur wet and matted below the inside corner of the eye. Secondary infection develops and a loss of hair in the area occurs. -Constant tearing.	Blockage of nasolacrimal duct. This duct carries tears that collect in the lower eyelid to the nasal area for evaporation. Duct may be narrowed by the shape of head and/or collection of debris from infection. May have inherited predisposition for this condition to develop and/or be associated with Pasteurellosis.	Various ophthalmics instilled in the eye 2-3 times/day for 3-5 days in succession. -Have nasolacrimnal duct opened by veterinarian.	-Prevent respiratory disease in rabbitry. Utilize breeding stock not predisposed to this condition.
WRY NECK (Sometimes called **TORTICOLLIS)**	Turning the head to the side (torticollis), and loss of balance. In late stages of disease will continuously roll if not supported. Appetite will be maintained throughout illness.	Otitis media. Inflammation of the balance mechanism with any type bacteria. *P. multocida* most commonly isolated. Usually considered an extension of an upper respiratory infection. NOT associated with ear canker.	Very difficult. Effective drugs NOT approved for use in Domestic Rabbits. HOUSE RABBIT owners should seek veterinary care for the possibility of using "off-label" medications. These are effective when used at the appropriate dosage and regimen of treatment.	Proper ventilation of 10 total air changes per hour keeping the ammonia level below 5 ppm in the air that the rabbit(s) breath. Keep respiratory infections to a minimum.

RABBIT DISEASE CHART

prepared by
DR. T. E. REED, RABBIT SPECIALIST

DISEASES ASSOCIATED WITH THE DIGESTIVE SYSTEM

DISEASE OR CONDITION	SIGNS	CAUSE	TREATMENT	PREVENTION
DIARRHEA COMPLEX	Varried depending upon cause. From just a minor soft stool with fecal material stuck to the genital area to profuse watery diarrhea. May sit with feet in water, grind teeth and/ or die very suddenly.	Varied-each cause will be discussed separetly.	Immediately- reduce stress, give bland, high fiber/ low energy diet and support microflora in cecum.	Will depend on cause. Generally, keep stress at a minimum, use high fiber/low energy diets and keep as free as possible from the protozoan parasite coccidia.
"SOFT FECES" SCATTERING	Feces that are soft, green in color, clustered together like a bunch grapes and covered with a thin membrane. Attached to the wire floors or scattered about living quarters. No signs of illness	Rabbit being frightened during the ingestion of the "soft feces" (cecotrophy). May indicate the presence of rodents or other predators.	Remove source of the problem that is frightening the rabbit(s).	Utilize proper rodent control at all times.
MUCOID ENTERITIS	Diarrhea with an abundance of "jelly-like" material in stool. Usually seen in growing rabbits. Pot-bellied with liquid sound when moved rapidly, will not eat, grinds teeth and usually a high mortality rate.	Not a specific disease. Associated with multiple causes. Cecal impaction often observed on necropsy.	Maintain hydration and body temperature. Individuals may be treated enema 2-3 times per day to relieve impaction. Use microencapsulated probiotics to assist in reestablishing microflora in cecum.	Use high fiber low energy feeds. Assist the early establishment of microflora balance in cecum through the use of microencapsulated probiotics. Good nest box sanitation.

DISEASES ASSOCIATED WITH THE DIGESTIVE SYSTEM (continued)

DISEASE OR CONDITION	SIGNS	CAUSE	TREATMENT	PREVENTION
ENTERO-TOXEMIA also called **CARBOHYDRATE OVERLOAD**	Acute foul smelling diarrhea with high death losses. Severe dehydration. Gross necropsy findings include a distended cecum with gas and/or fluid and hemorrhages on the cecal wall.	Associated with high energy feed intake that allows a microflora imbalance in the cecum. The imbalance allows for the proliferation of certain types of bacteria that produces very potent toxins.	Give grass hay, rolled oats and microencapsulated probiotics. Utilizing oxytetracycline in drinking water may provide temporary relief. Gradually increase commercial pellets back into diet.	Use low energy feed with a minimum of 16% fiber. When adding hay to commercial pellets use grass hay rather than legume hays.
TYZZER"S DISEASE	Acute massive diarrhea. Very rapid loss of weight. Death within 1-3 days. Most common in young rabbits 3-8 weeks of age. May be observed in adults. On necropsy small white spots on liver and/or spleen and inflammation of the cecum.	The bacterium *Bacillus pilifoemis* is the cause. Must be differentiated from other causes by gross necropsy findings and the demonstration of the infective bacteria.	Medicate entire herd with tetracyclines in drinking water. Effectiveness of treatment varies depending upon the strain of organism infecting the herd.	Effective rodent control. Proper storage of feed and bedding to prevent rodent contamination. Good sanitation practices and husbandry in the rabbitry.
NEST BOX ENTERITIS (diarrhea) sometimes called "Wet-Tail"	Yellow "liquid-like" diarrhea. Tail and fur around tail wet. Entire kit may appear wet and wrinkled. Nest wet and soiled. Occurs from 3-10 days of age. Mortality varies widely. 60%-100% mortality not uncommon	Various types of bacteria may be the cause; including: *Staphylococcus* sp., *Streptococcus* sp., *E. coli*, *Campylobacter*, and others. May enter through umbillical cord (navel) at birth.	Depends upon cause. Tetracyclines, Neomycin and Erythromycin. Must be used at appropriate dosage! May cause microflora imbalance in cecum. Support microflora growth in cecum.	Sanitize nest boxes prior to use. Use bedding that is free from disease causing bacteria. Practice good nest box management.

DISEASES ASSOCIATED WITH THE DIGESTIVE SYSTEM (continued)

DISEASE OR CONDITION	SIGNS	CAUSE	TREATMENT	PREVENTION
SALMONELLOSIS	Pasty diarrhea with accumulation in the genital area and to the cage floors. Rabbits are lethargic, will not eat and have elevated body temperatures. Observed primarily in young growing rabbits.	*Salmonella sp.* bacterial organism.	Isolate infected rabbits from remainder of herd. Seek professional assistance to confirm diagnosis. Treat entire herd with antibiotic in drinking water that infective organism is sensitive to at the time.	Isolation of all stock brought into rabbitry. No dogs, cats or visitors premitted in barn. Be cautious of rabbits that recover as they can become infective carriers of the pathogenic organisms.
RECTAL PROLAPSE	Varies from a small cherry red protrusion from the inside the rectum to a complete prolapse of the entire rectal lining. Appears as a "donut" of firey red tissue attached to anus. Bleeding may or may not be present.	Non-specific. May or may not be associated with diarrhea. Most probably associated with an irritation of rectal lining and external pressure on abdominal wall. Commonly observed during, or after kindling in the doe or in bucks after mating a doe. May have inherited predisposition for this condition to develop.	Immediate attention necessary to prevent a progressive severe condition from developing. Application of hemorrhoidal cream 2-3 times per day until signs disappear. Severe prolapse may require surgery and prognosis may be poor.	Cull any strain that has increased incidence of this condition from herd. Do not over crowd weanlings. Keep incidence of diarrhea at a minimum.
HEPATIC &/OR INTESTINAL COCCIDIOSIS	*SEE SECTION ON INTERNAL PARASITES*			

RABBIT DISEASE CHART

prepared by
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DISEASES ASSOCIATED WITH THE REPEODUCTIVE SYSTEM - BREEDING, KINDLING AND LACTATION

DISEASE OR CONDITION	SIGNS	CAUSE	TREATMENT	PREVENTION
VENT DISEASE also called Rabbit Syphilis	Scabs that appear on the external genitals of the male &/or female. Scabs may appear around nose and mouth. Rabbit may be infected without any visable signs. Decreased breeding agressiveness in males and lowered conception rate in females. Increased incidences of metritis that causes increased absorptions and abortions. Lifting of scabs reveal varying amounts of infective material.	A spirochete organism named *Treponema cuniculi*. Usually spread through the mating act. May be observed in virgin rabbits that pass through the birth canal of an infected doe. The organism may be present in latent (not showing signs) form. This allows the infection to be spread to other rabbits without the owner being aware of the fact	Infective organism sensitive to Penicillin G. May be used as a topical ointment applied to genitals daily for 3-5 days in succession or the utilization of Penicillin G injected intramusculary at the dosage of 150,000 IU's per 10 lb. of body weight for 2-3 days in succession. The microflora in the cecum must be supported with a microencapsulated probiotic when treating with injectible Penicillin.	Examine buck and doe for visible signs prior to mating. When signs present do not mate until treated. -Isolate purchased breeding stock for 10-14 days before mating to animals in the herd. -Use care when treating rabbits that the correct medications and dosages are used. Penicillin can be very dangerous when not used correctly.
METRITIS (Uterus Infection)	Low conception rate, does that mate but don't kindle, abortions, does that scatter litter, loss of kits in first 3 days after kindling and does that fail to milk.	Any type of bacterial infection of uterus. May be associated with Vent disease or "Snuffles." Signs may not be present.	Seek professional assistance to direct appropriate hormone/antibiotic therapy. Large portion of some herds infected.	Maintain clean herd from Vent disease and "Snuffles." When problem exist routine injections hormone/antibiotic after kindling.

DISEASES ASSOCIATED WITH THE REPRODUCTIVE SYSTEM (continued)

DISEASE OR CONDITION	SIGNS	CAUSE	TREATMENT	PREVENTION
DOES FAIL TO BE RECEPTIVE TO THE BUCK	Does sit in corner and will not raise to be mated. Bucks will be active and attempt to mate. May be seen in does that have been barren in excess of 45 days or 3-6 months past sexual maturity and have not been bred. -Observed in older does that have had complications with previous kindling.	Lack of hormone fluctuation from being too fat. Rabbits have tendency to be seasonal breeders in spring and summer. -Waiting too long to mate after sexual maturity. Rabbits 4 lbs. and under mature at 4-5 mo. of age and 9-11 lbs. rabbits sexually mature at 6-8 mo. age. -Retained placenta, feti or infection from previous kindling.	Reduce caloric intake & increase exercise. Colony or forced mating. Artificial insemination. Maintain exposure to 12-14 hours of light each day. Attempt to mate during warming trends. Treat retained placenta, feti, or infection appropriately. Use hormonal therapy as last resort and under the advice if a veterinarian.	Appropriare nutrition. Adding wheat germ and other vitamin supplementations not necessary, and may cause problem, when fortified commercial rabbit pellets are utilized. Mate when sexually mature. Provide a constant 12-14 hrs. of light each day. Add replacement does during spring and summer. Monitor kindlings and use appropriate medications within 24 hr. after kindling to prevent retained placentas, feti and infections.
DOES THAT ARE RECEPTIVE BUT FAIL TO CONCEIVE	Does mate with buck but does not kindle 28-32 days later. No other abnormalities noted.	Bucks that are sterile. (see buck section). Ovum do not reach uterus to be fertilized due to doe being excessively fat. Mummified fetus, placenta or uterus infection (IUD).	Use fertile bucks. Maintain does in breeding condition. -Treat infections and prevent retained placentas and feti through proper management practices. Difficult to treat.	Maintain bucks in proper environment. Use low calorie rations to maintain breeding condition. Monitor kindlings and implement management practices to prevent retention of materials.

DISEASES ASSOCIATED WITH THE REPRODUCTIVE SYSTEM (continued)

DISEASE OR CONDITION	SIGNS	CAUSE	TREATMENT	PREVENTION
BUCKS THAT WILL NOT ATTEMPT TO MATE	When doe placed in bucks cage the buck will not be interested or minimal sexual aggressiveness will be demonstrated. Male genitals may show 1 or both testicles smaller than normal, grossly enlarged and painful or no abnormalities present. Penis may be normal, inflamed or scabs present.	Obesity, especially in hot weather. Infection or injury to testicles or penis causing pain to the buck during the mating process. -Germ causing respiratory disease may locate in testicle causing severe problems. -Abnormalities may not be observed; but, infection present causing painful adhesions on penis. -Bucks that have had a bad or painful prior breeding experience.	Maintain on low caloric diet and increase exercise. -Treat injuries as required. -Treat any systemic disease as required with appropriate medications and husbandry techniques, if recommended. -Clean penis and sheath. Apply antibiotic to area for 3-5 days.	Feed the proper caloric intake for work extended to prevent obesity. -Use care handling rabbits and proper cages to prevent injuries. Control doe with young males to prevent bad experience and/or injuries. Control vent disease in herd and treat males even when obvious signs are not present. -Do not retain non-agressive breeding strains in the herd.
STERILITY OF THE BUCK (The buck successfully mates the doe without conception.)	No obvious signs, The buck will be very aggressive sexually, mate with the does successfully and does fail to conceive. History of elevated environmental temperatures approaching 80-85 degrees F. and above or history of systemic disease with an elevated body temperature. Normal body temperature 102.5 degrees F.	The quality of the buck's semen lowers when exposed to high temperatures. When exposed to temperatures of 85 degrees plus for 5 days in succession the male may become sterile for 45-60 days. Some males are not affected by temperatures, others are very sensiitive.	None. Once sterile no treatment will enhance the fertility until the buck has the oppurtunity to form new sperm. This takes from 40-60 days. During this time the buck should have high quality nutrition and be housed in a cool environment. 65-70 degrees F.	Maintain bucks in the coolest (lower) portion of the rabbitry. Temperature must not exceed 80 degrees F. -Be cautious of bucks that become ill and fevered. -Remove wool from genital area on wool breeds during summer months or harvest wool completely.

DISEASES ASSOCIATED WITH THE REPRODUCTIVE SYSTEM (continued)

DISEASE OR CONDITION	SIGNS	CAUSE	TREATMENT	PREVENTION
FALSE PREGNANCY	Observed 16-26 days after mating. Increased nervousness, pulling of fur, attempts to build a nest, mammary glands may become swollen and milk may be present. Length varies from 1 to 7 days. May occur in virgin does. A reason for "House Rabbits" to be spayed. Very messy!	Hormonal imbalance within rabbits system relating to estrogens. -Stimulation may occur from other rabbits or from casual petting over the loin. Rabbits ovulate in responce to stimulation of the reproductive organs. This condition is related to an imbalance of the sexual hormones.	No specific therapy to prevent or cure the condition. In breeding rabbits mating the doe immediately when noticed will stop the signs. Conception rate to that mating is very high.	Do not allow mature does to be caged together. -Spay "House Rabbits" at 4-6 months of age.
LISTERIOSIS	Sudden death of doe, abortions, failure to eat, and very rapid loss of body weight. On necropsy there will gray-white small spots on liver and spleen and the uterus will be inflamed when pregnant. Adult animals may show neurological involvement such as incoordination.	*Listeria monocytogenes* Diagnosis made by clinical signs, necropsy findings and demonstration of pathogenic agent.	Early treatment with tetracyclines in drinking water.	Isolation of additions to the rabbitry for a minimum of 14 days. Good sanitation and husbandry within the rabbitry.
ABSORPTIONS	The doe is palpated pregnant at 12 days and fails to kindle at termination of pregnancy. No other abnormalities.	Anything that interrupts blood supply or nutrients to feti. (See other sections for cause)	Will depend totally upon cause of the pregancy disruption.	See other sections for specific cause and the necessary preventative measures to implement.

DISEASES ASSOCIATED WITH THE REPRODUCTIVE SYSTEM (continued)

DISEASE OR CONDITION	SIGNS	CAUSE	TREATMENT	PREVENTION
ABORTIONS	Observation of undeveloped feti and/or placenta on cage floor or under wire bottomed cages. Usually, from the 15th to the 27th day of the gestation period. Doe may chew, or eat, portions of material; but, usually shows no other abnormalities.	Several possibilities. Listeriosis, Metritis, Vitamin A deficiency or toxicity. Possible injury to abdominal cavity. Other systemic disease, such as Snuffles."	Will depend upon cause. Very important to find definitive cause immediately and treat accordingly to curtail further losses. Prevention more relevant than treatment.	See individual discussions. Injury very seldom the cause of abortion. When trauma sufficient to cause abortion, other injuries will be obvious.
DYSTOCIA (difficult birth)	Common in breeds with large heads and small bodies. Does will be observed sitting in nest box, excess straining without results, excess blood in box, around mouth and genital area. Portion of kit (usually hind feet) protruding from vulva. Kits delivered but appendages may be missing. Doe will consume while assisting the kindling process with the mouth. May consume portion of kits body due to pain.	Fetus with head too large for birth canal. Doe with small birth canal due to "pinched" lower hips. Fetus that is not presented correctly. Does that are excessively fat. Does that their uterine muscles become easily fatigued from some systemic disease. Prolonged gestation period and fetal giantism.	Seek professional advice and direction. May implement use of the hormone, Oxytocin U.S.P., after assurance that birth canal is clear at direction of veterinarian. Keep doe cool. When kit lodged in birth canal, lubricate and gently pull kit toward the bottom of the does feet. Use of oxytocin in discriminately may be dangerous and rupture doe's uterus.	Use does with well developed lower hips and pelvis. Prevent does from becoming excessively fat by using proper nutrition for the appropriate stage of the life-cycle. Prevent long gestation periods and fetal giantism by implementation of management practices to increase litter size above 1-2 kits per liter.

DISEASES ASSOCIATED WITH THE REPRODUCTIVE SYSTEM (continued)

DISEASE OR CONDITION	SIGNS	CAUSE	TREATMENT	PREVENTION
CANNIBALISM (during and/or after kindling)	Kits with a portion or all of an appendage (leg, ears or tail) missing; or, a portion of the body consumed. May not be noticed until kits leave nest box.	Usually associated with a difficult birth (dystocia) or a young doe that uses excess aggressiveness in cleaning young after birth. Water deprivation.	See dystocia. Not associated with nutritional deficiency when using commercially pelleted feed as only source of food.	Use does with well developed pelvis. Prevent obesity. Provide ample supply of water. During winter give water 3-4 times per day. Ice not an adequate supply.
FETAL GIANTISM	Gestation periods that are 32-35 days (extended 2-5 days). Kits that are abnormally large. May have the start of hair growth and eyes may be partially open. Does may have difficulty kindling. Kits usually dead.	Prolonged gestation allows kits to over develop. Observed when litter size very small (1-3), does obese and fed excess calories prior to and during gestation period.	Caesarian section. Induction of labor at direction of veterinarian. OXYTOCIN ALONE will not induce labor and may be dangerous.	Proper nutrition prior to and during gestation. Implementation of management practices to increase litter size in does prone to small litters
SCATTERING OF KITS DURING KINDLING	The termination of pregnancy, 28-31 days after mating, arrives and the doe fails to make a nest in the provided box and kindles kits on the cage floor. Does may make nest in box but have kits on floor. Kits usually die from exposure. More common in first litter young does.	Inheritance of poor maternal (mothering) instincts. Presence of metritis and the absorption of toxins that decrease the maternal instincts of the doe. Incompatible nest box or the presence of a foreign odor in box or bedding. Presence of predators or disturbance in kindling area.	Monitor kindling process very close. Rescue kits prior to death from exposure. Place in box and encourage doe to care for her young. Foster to another doe with kits of similar age. Feed as orphans on formula for rabbits. Milk subsitutes for dog or cats not usually successful.	Use breeding stock with good maternal instincts. Prevent metritis utilizing prophylactic measures. Keep kindling area free of predators and disturbances. Use nest boxes and bedding that is free of predator contamination and odors.

DISEASES ASSOCIATED WITH THE REPRODUCTIVE SYSTEM (continued)

DISEASE OR CONDITION	SIGNS	CAUSE	TREATMENT	PREVENTION
AGLACTIA (failure of doe to lactate)	May occur anytime during the lactation period. Most common during the first 7-10 days. Kits will dehydrate (skin wrinkles), bellies sunken and lack observable "milk spot." Kits will squeal, be restless, lose body temperature and soon die. NOTE: Does usually nurse the litter only 1 to 2 times each day. Owners usually do not observe this proceedure.	Milk production is an inherited trait. Lack of caloric intake. Absorption of toxins from systemic infection in body (metritis or respiratory). Mastitis. Hormonal imbalance.	Increase caloric intake by adding milk product pellet to regular ration. Treat systemic infections with appropriate medications. Administer milk releasing hormone (Oxytocin) 1-2 times per day (1/4-1/2 cc subcutaneously) at the direction of veterinarian.	Use breeding stock that has inherent ability to produce an abundance of milk. Implement prophylactic measures to prevent systemic disease, especially metritis. Prevent mastitis through appropriate sanitation and management of caloric intake through the gestation and lactation periods.
ORPHANED KITS	Kits dehydrate, skin becomes wrinkled with a rough appearance, squeal frequently, become restless and loose body temperature. Does nurse kits only 1-2 times per day.	Doe dies during or shortly after kindling. Doe fails to lactate (milk) or has severe mastitis. Does that kindle more kits than they can adequately care for at the time.	Foster to another doe that has kits that are within 3-5 days of same age. Feed milk substitute at 12 hr. intervals only the amount that they will readily consume. Maintenance of temperature very important. Must be stimulated to urinate and defecate every 2 hours until kits are 14 days of age.	Implement management practices to keep the number of orphaned kits at a minimum. FORMULA FOR MILK SUBSTITUTE 1 pint 2% cows milk 2 egg yolks 2 Tbsps powdered milk 2 Tbsps Kayro syrup 2 tsps bone meal Mix thoroughly and keep cool until used.

DISEASES ASSOCIATED WITH THE REPRODUCTIVE SYSTEM (continued)

DISEASE OR CONDITION	SIGNS	CAUSE	TREATMENT	PREVENTION
CAKED MAMMARY GLANDS	Firm enlargement of the entire, or a portion of, mammary gland. No systemic signs of illness. Body temperature normal (102.5 degrees F.). Commonly observed just after kindling, when the entire litter suddenly dies or just after weaning.	Retention of milk in mammary gland. Does milk production exceeds removal from gland. Increased caloric intake enhances milk production to the genetic limit of the doe. May predispose doe to mastitis.	Reduce feed intake immediately. Apply Camphor oil and massage twice a day for 3-4 days to break down caked milk. Manually "strip" excess milk from gland through teat.	Control milk production by limiting feed intake just prior to and just after kindling or loss of litter. Feed according to milk production needed.
MASTITIS (BLUE BREAST)	ACUTE FORM -Rapid onset. May or maynot follow caked breast. Entire gland or 1 section of mammary gland may be involved. Tender and hot when touched. Initially, bright red in color turning to a dark blue then a necrotic black. Temperature 105-106 degrees F. Will not eat. Death in 2-3 days. CHRONIC FORM-Slow onset. May or may not follow caked beast. Usually, only 1 or 2 sections involved. Swollen, hot and tender to touch. Red to blue in color. Tends to abcess and drain a white "tooth paste-like" material. Death may or may not occur.	Any bacteria that gains access to the mammary tissue. This may be from injury, through the teat canal from the nursing kit; or, through the cirrculating blood from a systemic disease like "Snuffles" The most common organisms involved: *Staphylococcus sp.*, *Streptococcus sp.* and *Pasteurella multocida.* The latter most commonly observed in chronic mastitis.	Intramuscular injection of Penicillin G at the rate of 200,000 IU per 10 lb. body wt. for 3 days in succession. Support the micro flora in the cecum with microencapsulated probiotics. Early treatment is essential. Do not let kits nurse from infected gland. Foster or feed kits as orphans. Consideration must be give to surgical excision of infected gland and/or culling doe from rabbitry.	Prevent caked mammary glands by controlling milk production to meet the need by feed intake. Prevent trauma to mammary gland. Implement good disease control and sanitation in the rabbitry. Use surrogate doe for future litters when doe must be retained in herd to propagate important genetic traits.

DISEASES ASSOCIATED WITH THE REPRODUCTIVE SYSTEM (continued)

DISEASE OR CONDITION	SIGNS	CAUSE	TREATMENT	PREVENTION
KETOSIS also called **PREGNANCY TOXEMIA**	Sudden death of doe just prior to or just after kindling for no apparent reason. Usually, the doe will have an abundance of fat deposits and have the history of being barren for a variable period of time. Death so sudden usually other signs are not present. Necropsy will show an enlarged liver with a distinct yellow-orange appearance.	This stage of the life-cycle requires extra calories. The body utilizes the stored fat. One of the end products of fat metabolism is ketones. When in excess these depress all body functions, including the appetite. This requires more fat to be metabolized. A vicious cycle develops and the rabbit suddenly dies.	Difficult due to acutness of the disease. When observed give 1-2 Tbsps full of molasses per day for 2-4 days. Seek professional assistance to administer 50% Dextrose and cortocosteroids parenterally. Good success when treated early in course of disease.	Prevent obesity in working does by providing proper nutrition. Enhance caloric intake during last 1/3 of the gestation period.
YOUNG DOE DEATH SYNDROME	Does that suddenly die 1-2 wks after kindling. Most commonly observed in 1st litter does; but, may be seen in older does. Other signs very inconsistent;but, may included being off feed and diarrhea.	Enterotoxemia is the major cause and the sudden death attributed the toxins produced by the *Clostridia sp.* organism in the intestinal tract. Acute Staphylococcal mastitis may also be the cause. Unable to differentiate without a necropsy. Enterotoxemia has lesions inflamed cecum.	Close monitoring and the implementation of immediate antibiotic therapy when the cause is acute mastitis may be successful. (See treatment for acute mastitis) Enterotoxemia so acute treatment is impossible.	Restrict feed intake 1-2 days prior to and the 1st 24 hrs. after kindling and then gradually increase (1 oz. per day) until on full feed. Implement preventative measures described with acute mastitis.

DISEASES ASSOCIATED WITH THE NEST BOX

DISEASE OR CONDITION	SIGNS	CAUSE	TREATMENT	PREVENTION
EARLY NEST BOX DEATHS May be associated with one of the following:	Death of one or multiple kits within the first 14 days after kindling. Signs will vary depending upon the cause.	Several conditions may be the cause. When cause unknown it is of extreme importance to have kit(s) necropsied to identify definitive cause.	Will depend totally upon cause. Be cautious about using medications in young rabbits. May be very dangerous.	Sanitize all nest boxes completely. Use sterile nesting materials that have not been contaminated in storage.
1. EXPOSURE	Kit(s) cool to the touch and will be motionless or stretch limbs and extend head back over body. Blue tinge to skin and membranes. Does not have to be associated with cold weather.	Core temperature of nest drops below 95 degrees F. as a result of poor nest structure by the doe, lowered enviromental temperatures or poor nest box management.	Rewarm kit(s) immediately. Place in sealed bag with plenty of air and submerge bag, with kit in bag, in 100 degree F. water for 5-10 minutes. Then place in warm area until returning to nest.	Use nests that are 1" longer and 1" wider than doe. Nests that are too large encourages the doe to "foul" the box with urine and feces. Place the box on 1-2" of insulation to prevent heat loss.
2. MILK ENTEROTOXEMIA	Acute loss of the entire litter of kits 2-7 days after kindling. Kits will be in good nest, appear to be healthy at last checking, will be well hydrated and an obvious "milk spot" will be present showing through the abdominal wall.	Ingestion of excess milk that allows the *Clostridia sp.* organisms present in the kits stomach to proliferate very rapidly and produce a very potent toxcin. Death occurs very rapidly.	Death is so rapid that there is not any time for treatment. Efforts must be exerted to prevent this condition. Prevention difficult due to the variation in does inherent ability to lactate.	Maintain appropriate body condition on producing does (not too fat). Reduce caloric intake 48 hrs. prior to kindling and start gradually increasing 24 hrs. after kindling until food in front of doe at all times at the 7th day after kindling.

DISEASES ASSOCIATED WITH THE NEST BOX

DISEASE OR CONDITION	SIGNS	CAUSE	TREATMENT	PREVENTION
3. NEST BOX ENTERITIS	Nest wet with the matting of nest fur. Kits wet over entire body with the appearance of "peeling" of the skin surface. Liquid yellowish diarrhea with soiled genital area and tail (wet-tail). Usually occurs at 5-14 days of age. Kits gradually dehydrate and become weak over a 2-5 day period and die intermitently	Excessive milk intake. Infection of small intestine with one of several enteric bacteria. Infective organisms may enter kit through contamination of doe's nipples, the milk or through the navel at birth. Paint navel with tincture of iodine within first 24 hr. to prevent the condition.	Reduce caloric intake of doe 10-20%. Keep nest dry and warm. Administer 2-5 drops of Kaopectate to each kit 2-3 times per day until stools become normal. Do NOT use human antacids! Use of broad spectrum oral pediactric antibiotics at the direction of a professional.	Strict sanitation of the nest box just prior to placing with doe. Use of sterilized bedding materials in nest box. It is essential that an effective disinfecting agent be used, that it be diluted correctly and that the materials to be sanitized be maintained in contact for the correct length of time.
4. DELAYED AGLACTIA Decreased or total loss of milk production	Occurs 7-21 days after kindling. Kits dehydrate, feel light in wt. for age, sides of abdominal area "sunken-in" and fur stands in end. Doe's appetite may be voracious to decling. Body temperature will vary from normal to very high (106.0 degrees F.) Mammary gland may be enlarged to shriveled.	Inherent condition where milk production cannot be maintained. The presence of mastitis and milk toxic to kits. Feed lacks sufficient caloric content to maintain milk production. The acidity (pH) of the stomach is not as acid (pH 5.2) while nursing as when consuming solid food. pH 1.6	Identify and treat specific cause. Add calories to does feed intake by adding milk pellets to diet. Wean kits immediately from does with mastitis. Feed as orphans. One of the more difficult situations to manage, identify, correct and control.	Use does that have inherent ability to sustain lactation. Utilize ration that has sufficient calories to maintain lactation. Implement practices to eliminate mastitis from rabbitry.

DISEASES ASSOCIATED WITH THE NEST BOX

DISEASE OR CONDITION	SIGNS	CAUSE	TREATMENT	PREVENTION
NEST BOX CONJUNCTIVITIS	Eyes that fail to open on the 10th day after kindling. Lids stuck together with roughened fur on eyelid. When lids gently opened considerable amounts of white tooth paste-like infectious material oozes from between the lids. One or both eyes may be involved. Membranes of eyelid reddened and swollen. Surface of eye ball may be cloudy. Multiple kits in litter may be involved.	Bacterial infection of the conjunctival membranes. Most common organisms involved are *Staphylococcus sp.* and *Streptococcus sp.*. Exposure occurs in a contaminated nest box. Access gained directly or through navel.	Using gentle pressure open eye lids. Cleanse with boric acid eye solution. Instill ophthalmic that infective organisms are sensitive to 3-4 times per day for 3-5 days. A bacitracin-neomycin-polymyxin ophthalmic is a good broad spectrum eye medication for general purpose use. If this treatment not effective a culture and sensitivity test may be necessary to identify specific organism causing the problem.	Use nest boxes and bedding materials that are free of pathogenic organisms. After the nest has been sanitized properly it is essential that it be stored in a location where they do not become recontaminated. A good disinfecting solution is 1 part Household bleach (5.25% Sodium Hypochlorite) in 4 parts water. Contact time is a minimum of 20 minutes.
YELLOW SCOURS sometimes called "WET TAIL"	Wettness around tail, genitals and inside of hide legs. Diarrhea yellowish in color. Kits active; but, may appear boney. Death losses usually low unless kits are very young.	One of a wide variety of enteric bacteria. When problem persists it may be necessary to identify bacteria and treat with a specific antibiotic that bacteria sensitive to at the time.	Reduce feed of doe 50% for 3 days. Give individuals 3-5 drops of kaopectate 2-3 times per day until stool is normal. When severe a broad spectrum oral pediatric antibiotic may necessary.	Good nest box sanitation with controlled density. Controlled feed intake to control milk production.

DISEASES ASSOCIATED WITH THE NEST BOX

DISEASE OR CONDITION	SIGNS	CAUSE	TREATMENT	PREVENTION
STAPHLOCO-CCOSIS "NEST BOX PIMPLES"	Common cause of Mastitis. See Mastitis, page 15. Kits from 7-25 days of age develop small white/yellow pus filled abscesses on the skin. There may be varying numbers of abscesses from 1 to many over the entire body. The abscesses gradually increase in size, the kit gets diarrhea then dies. When only a small number, they may be treated individually and a small percentage will recover (may become carriers).	*Staphylococcus aureus*. Young kits become infected by ingesting milk containing the organism (mastitis) or from high concentrations of resistant bacteria in area that contaminate injuries. After gaining access, a septicemia develops and the pustules develop on the skin.	Have each small abscess opened, drained, apply antibiotic creme 3-4 times per day and give ora antibiotics at the direction of veterinarian. Treatment very difficult.	Prevent mastitis. Enhance sanitation in the entire rabbitry, giving special attention to nest box sanitation. Use nesting materials that are not contaminated. Be sure to use disinfecting agent that is effective against the *Staphlococcus sp.* organism. Development of resistant organisms are common. to prevent one must alter disinfectants every 6-10 months.

NON INFECTIOUS CONDITIONS OBSERVED IN THE DOMESTIC RABBIT

DISEASE OR CONDITION	SIGNS	CAUSE	TREATMENT	PREVENTION
WET DEWLAP	Fur on dewlap wet, matted, discolored and on occasions there will be a distinct gangrenous odor. Loss of hair and abrasions that develop into abscesses are common. More frequent during summer months.	Dragging the pendulouse fold of skin below the chin, normal in some breeds, through a wet area in the pen or water crock. The chronic irritation and abrasion allows infection from a variety of bacterial agents.	Change watering system to prevent wetness and abrasions to dewlap. Clip hair from irritated area to allow skin to dry. Apply broad spectrum antibiotic ointment to area 2-3 times per day until healed.	Prevent dewlap from getting wet. Use water bottles, automatic drinking waterers, or raise the water crocks above the floor 3-4 inches.
SLOBBERS	Profuse salavation that allows fur around face, mouth and dewlap to become very wet. Nose appears narrow and pointed. May go off feed, loose weight and die.	Abscessed, infect, or irritated cheek tooth. Feeding excess greens or greens contaminated with insecticides	Correct tooth abnormality. Remove greens from diet. Seek professional assistance to administer fluids and vitamin B-12.	Feed dry rations only. Avoid contaminated feeds. Use breeding stock free of tooth abnormalities.
FUR CHEWING	Rabbit with "scissored" (fur fiber of varying lengths) any where on body. May be in localized area or over the majority of the body. Rabbit may chew fur off of itself, from other rabbits in same cage or from other rabbits through the cage wire.	Chronic irritation of intestinal tract from chronic enteritis or coccidia infestation. Low fiber in the diet, a vice, boredom or maloccluded teeth. Usually, not associated with any specific nutritional element when on commercially prepared pellet.	Add grass hay or straw to diet if ration is not assured of having a minimum of 16% fiber. Treat coccidia when present. Control enteritis. Individually cage rabbits with bad teeth. Maintain magnesium oxide levels in non-commercial feeds.	Use rations that have a minimum of 16% fiber or higher. Implement a coccidia control program in the rabbitry. Use breeding stock free of tooth abnormalities. Use commercial pellet that has sufficient magnesium oxcide present.

NON INFECTIOUS CONDITIONS OBSERVED IN THE DOMESTIC RABBIT

DISEASE OR CONDITION	SIGNS	CAUSE	TREATMENT	PREVENTION
FUR/WOOL BLOCKAGE	Depressed appetite, increased intermittent periods of anorexia. Change of stool character. Increased fiber present present giving "fecal chain of pearl" effect, decreased volume of fecal material and ranges from very hard dry fecal balls to intermittent diarrhea. Usually observed in only 1 animal in the rabbitry at one compared to several when infectious process present. Frequently observed in rabbits that are molting severly or in does that have just kindled.	Obstruction of the opening to the small intestine due to a mass developed from ingested fur from the grooming process. The fur forms a matrix for the glutens of the pellets to attach and accumulate. There are not any digestive enzymes produced in the gastrointestinal tract that are capable of digesting and/or breaking down this fur matrix.	Administering 1-3 papya tablets orally 3-4 times per day for 4-5 days. If no change give 1 human stool softner per day for 1-2 days. 1 tsp. of raw pineapple juice may be substituted for the papaya tablets. If no improvement surgical intervention may be recommended. Use of lubricants and cat laxitives usually not effective until mass has been digested by the enzymes.	Groom rabbits regularly to decrease the amount of ingested fur. Limit volume of fur in nest box. Utilize diets high in fiber and fiber that has large particle size. Use feed, add to daily diet, enzymes to asssist in lowering the incidences of fur blockage. Periodically allow digestive system to empty itself of ingesta. Provide plenty of fresh drinking water. Select breeding stock that is not prone to fur blockage.
HUTCH BURN	Genital and inside of rear legs most common area affected. Fur damp, yellow and stuck together. Skin moist, discolored and inflamed. Genital opening inflamed and gapping open. Secondary infection common with yellowish discharge	Dirty wet hutches or resting boards. Splashing of urine on crotch area from urine guards. Often present in males that attempt to mark their territory by spraying urine. Anatomical defect of genitals.	Cleanse and dry afected area. Apply general antibiotic creme and drying substances to affected area as needed. Move to different location in attempt to alter spraying habit.	Strict sanitation. Give concern to placement of urine guards and the location of males and females in rabbitry. Use animals without anatomical genital defects.

NON INFECTIOUS CONDITIONS OBSERVED IN THE DOMESTIC RABBIT

DISEASE OR CONDITION	SIGNS	CAUSE	TREATMENT	PREVENTION
SORE HOCKS	Foot pads that are denuded of fur, skin very red, and/or the presence skin ulceration. The ulcerations characterized by "scabby" encrustations of dried serum and blood of various size. Secondary infection, with the presence of pus and/or blood, may or may not be present. Most commonly observed on the hind foot pads; but, may also be seen on the front foot pads. Rabbit may appear nervous and shift weight from side to side. Mating difficulties in both bucks and does.	Increased trauma and/or pressure applied to foot pad. Trauma may be due to roughened cage floor surface (rust corrosion, manure) or floor wire that is incorrectly installed (1/2" side to be toward foot). Increased pressure on foot pad may be due to the amount relative body wt. to the size of foot pad, the protection of the pad by the fur (density & length) as well as the activity of the rabbit. The latter items are related to inheritance.	Very difficult. Relieve trauma to pads by placing in cages bedded with straw. When infected, antibiotic creme must be applied 2-4 times per day until infection is eliminated. Astringent ointments must be applied when no infection is present, or after treatment, 2-4 times per day to encourage healing. Various hemorrhoid preperations are good astrigents. Any treatment must be implemented eary in the course of the condition.	Use breeding stock that has large well furred foot pads in relationship to body size. It is usually recommended that breeds in excess of 11-12 lbs. be housed on solid or partially solid floors. Use of "sitting boards" may not be recommended due to the increased exposure of foot pads to unsanitary conditions. Install cage floors correctly and be sure they are smooth. This condition observes in all breeds; but, most common in larger breeds and the Rex furred breeds.
ADULT CANNIBALISM	Usually observed in growing rabbits caged together. Portion of ear, or other appendage chewed. The presence of exposed tissue or various amounts of blood on rabbit or about cage.	Lack of drinking water, over crowding or boredom. When on commercial rabbit pellets the condition is usually not associated with a nutritional deficiency.	Place in individual cages. Apply antibiotic ointment to wounds 2-3 times per day until healed.	Give ample supply of palatable drinking water at all times. Do not over crowd fryer pens. Utilize breeding stock that is not predisposed to boredom.

NON INFECTIOUS CONDITIONS OBSERVED IN THE DOMESTIC RABBIT

DISEASE OR CONDITION	SIGNS	CAUSE	TREATMENT	PREVENTION
RED URINE	Urine discolored various shades of red. Oftentimes, beginners think condition is blood in the urine when observed in snow beneath the cages or on paper in litter box. Urine will be clear red without blood clots.	An inherited condition related to the incomplete metabolism of a vitamin. This condition is not detrimental to the health of the rabbit. The intensity of the red color may be altered by diet.	None necessary. Increasing the volume of legumes or adding "greens" to the diet may intensify discolorization. Presence of this condition does not indicate vitamin deficiency.	Do not use breeding stock that has this condition in lineage. This is of particular importance to breeders that produce pet rabbits.
COPROPHAGY (CECOTROPHY)	Rabbit sitting on either hip, with head extended between front legs, back arched (flexed) and licking "soft feces" directly from rectum. Coprophagy, or more correctly termed cecotrophy in the rabbit, is only seen when closely observed for extended periods of time. This practice may occur anytime during the day or night.	Normal functional process in rabbits. There is a direct excretion from the cecum, through the rectum, (soft feces or cecotropes) that is consumed. The cecotropes are bright green in color, soft, are grouped together in clusters and are covered with a thin membrane.	None. This process enhances the digestion of some of nutrients from the ingested feed. Particularly, the the protein from fiber, vitamin K and the B-complex vitamins. Raising rabbits on wire bottomed cage floors does not interfere with this natural process.	The presence of excess "soft" feces clinging to the cage floor may indicate that this process is being disrupted. This may be due to predators or other unwanted excitment occurring in the rabbitry.
MOON EYE OR **WALL EYE**	Milky-white discoloration of surface (cornea) of 1 or both eyes. Pupil may be obsecured by the "clouded" cornea, in various stages of dilation and may not respond (constrict) to light.	Increased pressure within the eyeball. This is due to an inherited malfunction of the absorption of the eye fluid produced.	These rabbits must not be used for breeding. May be used as house rabbits. Seek professional advice for daily treatment schedule.	Use breeding stock free of this defect. May be associated with diabetes.

NON INFECTIOUS CONDITIONS OBSERVED IN THE DOMESTIC RABBIT

DISEASE OR CONDITION	SIGNS	CAUSE	TREATMENT	PREVENTION
SPOT ON THE EYE (CORNEA)	A white spot, or a white spot with a red center, of varying size located on the surface (cornea) of the eye. Usually, only one eye affected. Fur around eye may be wet from excessive tearing and may tend to close eye when exposed light. May become larger in size with time, develope a red center and become infected.	May result from an injury, a foreign in the eye or a scar from a previous infection (nest box eye). The white spot with a red center and visible blood vessels indicate a corneal ulcer which may be very serious.	When a result of scar tissue from a healed injury there is not anything to remove spot other than surgery. A white spot with a red spot in center, watering of the eye and sensitive to light is very serious and needs professional attention to prevent loss of eye.	Protect eyes from becoming injured. When injury does occur treat properly to prevent infection, corneal ulcers and scar tissue from developing. Prevent nest box eyes. A spot on the cornea is a disqualification from exhibition; but, the rabbit may be used as a breeder.
SPOTS IN THE EYE	An area of the iris, the colored portion of the eye that surrounds the pupil, that is void of color. May be of any shape-spot (round), irregular, half-mooned and etc.	A portion of the iris that is void of pigment. This is due to inheritance. More common in some breeds as compared to others.	None to cure. Does not interfere with health or sight of rabbit. A disqualification from exhibitions.	Use breeding stock that is free of this genetic defect. On some animals this defect may be very difficult to detect.
MISMATCHED EYES OR **GLASS EYE**	The iris of one eye is not the same color of the opposing eye. The pigment from iris of one or both eyes is absent. This will give a glossy or shiny appearance to the eye.	Total absence of pigment from the iris due to inheritance.	None. Does not interfere with rabbits health.	Use breeding stock that is free of this genetic defect. Some breeds more prone to this condition than others.

NON INFECTIOUS CONDITIONS OBSERVED IN THE DOMESTIC RABBIT

DISEASE OR CONDITION	SIGNS	CAUSE	TREATMENT	PREVENTION
PARALYSIS	Any limb that the rabbit cannot move voluntarily or cannot feel pain. May ocurr in any limb; but, most commonly observed as a bilateral paralysis of hind legs. The rear legs extend to rear of the rabbit as they pull themselves about the cage with the front legs. Urine and/ or feces pass uncontrollably when picked up due to paralysis of these structures. Very rapid onset of signs. Will be fine upon one observation and paralyzed upon the next visit.	Spinal cord or associated nervous tissue damage. Often associated with subluxation (temporary dislocation) that does permanent spinal cord damage. Difficult to demonstrate radiographically. May occur when placed on slick surface where traction is poor and hind legs extend forcefully to the rear. Also may occur when tattooing, during predator attacks, or at regular activities.	Nerve damage is most always permanent and treatment not effective. Cystitis (urinary bladder infection) and bowel impaction common complications. Must give consideration to humane euthanasia. Spinal damage usually occurs between the 10th thoracic and the 3rd lumbar vertebrae. Violent scream may occur when injury occurs.	Avoid placing on slippery surface. Handle correctly and tattoo at young age. Prevent animals from becoming frightened, especially prevent predators from entering the rabbitry. Some strains within some breeds appear to be predisposed to this condition. Avoid using these strains as breeding stock.
SPLAY LEG OR **SPRADDLE LEGGED**	Most common in kits coming out of nest box and in weanlings. Rabbit will look and appear totally healthy with the exception that the front and /or rear legs will extend latterly. They will not have the ability to pull the legs under (adduct) the body.	An inherited predisposition where hip or stifle joints of the hind leg or the elbow joint of the front limb lacks depth and proper development. Traumatization of these joints alter their function and the function of surrounding muscles.	After condition develops there is not a cure other than extensive surgery. This usually not practical other than in House Rabbit situations. The trauma in the nest box is associated with slick floors and the kits repeated extension of hind legs and the resulting damage to hip joint.	Use breeding stock that does not have this predidposition present. Use nest boxes that have rough floors. Keep cool during warm weather so weanlings will not stretch out as long and as often damaging the stifle and elbow joint that re sults in the muscles not being able to pull legs under.

NON INFECTIOUS CONDITIONS OBSERVED IN THE DOMESTIC RABBIT

DISEASE OR CONDITION	SIGNS	CAUSE	TREATMENT	PREVENTION
MALOCCLUSION 1. SIMPLE OR "BUTTING" OF THE INCISORS	The upper and lower incisors meet surface to surface. The normal and correct position of the incisors is for the uppers to be in front of (anterior) and to over lap the lower incisors. More common in the breeds that have the large, "rounded" heads. On occasion this condition is incorrectly termed "Peg teeth." Peg teeth are the small residual set of incisors located just behind the primary incisors.	The lower jaw longer proportionally than the upper jaw preventing the over lap of the incisors. The position of the incisors may vary depending upon age as related to skull development. Some rabbits may demonstrate teeth that butt as youngsters and have properly aligned teeth later in life; and, vice-versa.	None necessary other than to observe closely that the condition does not develop into complicated malocclusion. The rabbit's skull is not completly developed until 18 months of age. This should explain the variation of the teeth at different times. It would be vary rare for this form of malocclusion to result from pulling teeth on wire.	Utilize breeding stock that is not predisposed to this condition. Rabbits DO NOT need hard substance to chew on to keep teeth in alignment! Proper length is maintained via the chewing process where the upper and lower incisors wear each off when properly aligned. Rabbits with this condition are disqualified from exhibition.
2. WOLF TEETH or BUCK TEETH	Upper incisors behind lower incisors, elongated and turn back into mouth like "rams horns." Lower incisors in front of uppers and elongated to the degree that they may be growing into nostrils and lip of upper jaw. May be out of condition from not being able to eat properly. Chewing of fur from other rabbits in pen or from self.	May be a progressive stage of "Butting" malocclusion. Lower jaw too long in proportion to upper jaw due to inheritance. May occur in 1 of the pair of incisors from pulling on wire. When not in proper position to wear opposing incisor off they elongate uncontrollably.	There are no nerves in the incisor teeth and they may be easily trimmed every 2-4 wks. in pet or until young are of size to harvest. On occasion. after trimming teeth may align normally. Due to inherited nature of this the ethics of this practice is questioned.	Utilize breeding stock that is free of this condition. Mating of 2 strains that have drastically different skull development time frames may result in offspring with tooth maladies even when original strains were free of these conditions. This is a disqualification.

NON INFECTIOUS CONDITIONS OBSERVED IN THE DOMESTIC RABBIT

DISEASE OR CONDITION	SIGNS	CAUSE	TREATMENT	PREVENTION
YELLOW FAT	The fat on harvested rabbits is a deep yellow color. This does not atler the taste or the quality of the meat; but, consumers find the appearance objectionable.	An inherited metabolic defect in the meatabolism of the carotenoid pigment xanthophyll. These are fat soluble and contained in plant materials.	None. One cannot detect until animal is harvested. This condition relates to the absence of an enzyme in the liver to metabolize the pigment to a coloeless material.	Of primary importance to the commercial meat rabbbit producer. Cull breeding stock from the herd that produces offspring with this defect.
ANTIBIOTIC TOXICITY or **OVERDOSE**	Rabbit goes off feed (anorexia) 24 hours to 6 days after antibiotic therapy. Intermittent to acute dirrhea and sometimes followed by death.	Sterilization or disruption 0f micflora balance in cecum. This may be due to overdosage, or extended use of antibiotics. amoxicillin, lincsosin' and long acting penicillin may be involved with these problems.	Discontinue antibiotic use at onset of signs. Administer clinical support and parental fluids as needed. Give microencapsulated probiotics.	Administer microencapsulated probiotics prior to and after antibiotic therapy in food or drinking water. Use only antibiotics that have minimal effect on upsetting the microflora balance in the cecum. Do not overdose.

CONDITIONS OBSERVED IN THE DOMESTIC RABBIT CAUSED BY EXTERNAL PARASITES

DISEASE OR CONDITION	SIGNS	CAUSE	TREATMENT	PREVENTION
WARBLES or **BOT FLY**	Isolated "lump" or swelling anywhere over body. Most common around neck and shoulders. May be singular or in multiples. Close examination will display a small hole (breathing pore) in upper portion of lump. The head of the larva may be observed moving through breathing pore.	Larva of bot fly, *Cuterebra sp.*, located between skin and flesh (subcutaneously). May be observed in caged or uncaged rabbits that are given only dry feed or greens. Adult fly rarely seen, eggs layed in fur, hatch, and penetrate skin to develop.	Seek professional assistance to administer local anesthetic, surgically enlarge breathing pore, remove larva (1/2 -1 inch long, 1/4-1/2 inch in diameter with black spines covering body). Caution must be used not to crush larva in removal as a toxic reaction may occur.	Keep Bot fly from rabbits by screening rabbitry area, keep area dark and the use of safe insecticides. The larva may be present in rabbit for extended periods of time before demonstrating itself. More severe some years than others in the same area.
FLY STRIKE	May be observed in all breeds but most common in wool breeds. May occur at any location on body where there is localized irritation with the fur/wool being damp. Most common in genital area were fur commonly becomes soiled. On close examination maggots, and eggs in various stages of development may be observed on the outer edge of involved area. In lattter stages the animal will become luthargic and will not eat.	Several species of Blowflies may cause this condition. A small injury or soiling of fur from fecal material provides a suitable site for the adult fly to lay eggs. They are layed beneath the fur in a moist location, hatch within 24 hr. and attaches to skin to feed and develop. The "strike" may progress very rapidly and attracts more flies.	Clip fur/wool from infected and surrounding area. Flush all maggots from infested area with antiseptic solution, apply antibiotic creme 2-4 times per day until wound is healed. Keep in dark fly free area until wound is completely healed to prevent further fly strikes.	Keep exposure to a minimum. Prevent soiling of fur and injury. When soiled clean immediately and apply appropriate insecticides to prevent fly strike or place in protected area free of flies.

CONDITIONS OBSERVED IN THE DOMESTIC RABBIT CAUSED BY EXTERNAL PARASITES

DISEASE OR CONDITION	SIGNS	CAUSE	TREATMENT	PREVENTION
EAR CANKER	Scabs in one or both ears varying in degree from just a small amount deep in the ear to where the scabs extend from bottom up the entire inside of the ear. The scabby encrustations are a result of dried blood and serum from the irritation of the skin. May shake head and/or scratch at ears leaving trauma marks on shoulders and back of neck. When severe, may interfere with production. Secondary bacterial infections with the presence of pus common.	Infection of the deep portion of the ear with the mite *Psoroptes cuniculi*. The presence of this mite causes irritation of the skin cells as they feed upon the epithelia cells. This mite breathes through little holes (pores) in the side of the body. While feeding on the cells the adults lay eggs in the debris to hatch at a later time.	Must destroy mite and future generations of mites as eggs hatch. This may be done by placing mineral or vegetable oil in ear at the correct treatment scheudle to smother the mites by covering the breathing pores. The efficiency of the treatment may be increased by using oil that an insecticide has been added. Place 1-2 drops in each ear for 3 days in succession repeated at weekly intervals for 3-4 applications,	Do not bring infested rabbits into the herd. Use hay and bedding free of parasites. Control birds and rodents from inhabiting the rabbitry. An injectable parasiticide, Ivermectin, has been used in rabbits. This is not an approved medication for rabbits in the United States. It is suggested that one seek professional advice prior to using this medication.
"PUFFED" EAR sometimes called Elephant or Cauliflower Ear	May be observed in rabbits with all types of ear carriage. One or both ears may be involved. Area between inside and outside skin filled with fluid (blood) giving a "puffy" look. Ear will be wrinkled when healed in several weeks.	Blood vessels between skin ruptured due to physical injury or from trauma that results from shaking head or scratching the ears when foreign body or mite present in the ear.	Very difficult without resulting in a deformed ear. Periodically drain fluid from ear at 3-5 day intervals. Keep constant pressure on each side until healed.	Do not allow rabbit to get too hot. Keep cage free of materials that may cause physical damage to ear. Control ear mites in the rabbitry.

CONDITIONS OBSERVED IN THE DOMESTIC RABBIT CAUSED BY EXTERNAL PARASITES

DISEASE OR CONDITION	SIGNS	CAUSE	TREATMENT	PREVENTION
RINGWORM	Most commonly observed in young growing rabbits but may be seen in adults. Lesions usually on legs and around face but may be seen any where on body. Hair may be lost in a circular pattern that enlarges to the periphery. The center will initially be bald, red and progress to a yellowish crust. Heals from the center of the lesion and hair 1st regrows in center. May or may not be irritating to the rabbit.	Several species from the 2 genera *Microsporum* or *Trichophyton*. Can only differentiate in laboratory. There is some public health significance as some species may affect humans. Special care must be given when handling infected rabbits to prevent human exposure. Wear gloves and clothing that may be disenfected or discarded.	Individuals may be treated by application of tincture of iodine to outside edge of lesion 2-3 times per day for several days in succession. More severe situations may be treated with Griseofulvin individually at the direction of a professional. When several animals in rabbitry involved consideration must be given to treating entire herd with Griseofluvin added to pellet or in drinking water.	Isolate additions to herd to insure that they are not infected. Exclude all birds and other species from rabbitry. Utilize bedding and hay that is free of animal contamination. Appropriate disenfection of cages and equipment with a disinfecting agent containing iodine. Use care in handling infected rabbits due to the public health significance involved.
MYCOTIC PODODERMATITIS	Loss of hair from around 1 or more toes and from the bottom of the front and/or rear feet. Toes may be inflamed. Irritation may be so severe that rabbit will cannibalize the toe and foot. Increased incidence of sore hocks due to protection of pad by fur is gone.	Fungus from the *Microsporum* genus that lives deep in telescoping nail bed. May be observed in all breeds and usually only 1-4 rabbits in herd will be affected.	Dipping entire foot in tincture of iodine, with nails extended, each day for 3 days in succession for 3 applications at 10-14 day intervals. Provide microencapsulated probiotic to protect microflora in cecum.	Prevent exposure to infected rabbits and areas where infected rabbits has been. Provide good nutrition.

CONDITIONS OBSERVED IN THE DOMESTIC RABBIT CAUSED BY EXTERNAL PARASITES

DISEASE OR CONDITION	SIGNS	CAUSE	TREATMENT	PREVENTION
FUR MITES	General fur loss over the entire body. May be confused with summer molt. No skin involvement or irritation. May encourage epithileal cell sloughing (dandruff.)	Several species of mites from the *Listrophoridae* family. These external parasites do not feed off of animal tissue; therefore, systemic parasiticides are not effective.	Use of cat flea powder sprinkled from back of ears to tail at 10-14 day intervals for 2-4 applications. When severe seek professional advice for possibly dipping entire herd with prescribed medication.	Isolate new stock before introducing into herd. Do not share grooming equipment. Keep birds and other animals from the rabbitry. Do not use bird or other animal contaminated hay or bedding.
MANGE	Hair loss in patches or on greater areas of body depending upon parasite population. Common sites of hair loss are on face, head, neck and on the shoulders. Certain mites will cause considerable skin irritation and scratching.	Mites of the *Cheyletiella sp.*, *Listraphorus sp.*, or *Sarcoptes sp.*. These mites feed off of the tissue and fluids of the host's body	Same as above (Fur mites. Seek professional assistance for possible use of systemic insecticides.	Same as above.
DANDRUFF	Small white particles in the undercoat and "flaking" of skin. Most commonly observed just behind ears and down the middle of back. Seen in all breeds but most common in fiber producing breeds with a lot of density, webbed and matted coats.	Early stages of mite infestation where coat is in such state that the surface area is deprived of air. This allows the surface epithileal cells to cornify (die) and slip away from skin.	Initially, letting air to skin and application of hydrogen peroxide or mouth wash 2-4 times a day. In more advance situations, clipping fiber animals down and/or the treatment for body parasites.	Groom regularly so skin receives ample air. Prevent matts by harvesting fiber on a regular time schedule. Prevent mite infestation.

CONDITIONS OBSERVED IN THE DOMESTIC RABBIT CAUSED BY INTERNAL PARASITES

DISEASE OR CONDITION	SIGNS	CAUSE	TREATMENT	PREVENTION
COCCIDIOSIS 2 forms observed 1. Hepatic Coccidia 2. Intestinal Coccidia	The Hepatic (Liver) form is more serious and more acute. Both have great effect, with associated death from enteritis, in young growing and juvenile rabbits. This is due to the development of some immunity as they mature. Young rabbits will grow slow, coat will be dry and rough, some will be "potbellied," there will be increased incidence of soft stool stuck to the fur around the genitals and death. The susceptibility of the rabbit to other diseases will be increased. In adults, the fur condition will be impaired and the rabbit will not "finish" in coat and will go from molt to molt. When harvesting fryers, or upon necropsy, rabbits with Hepatic coccidia will demonstate livers with "sawdust" sizes white spots. Rabbits with intestinal coccidia will not have any obvious abnormalities present although infestation may be high.	A protozoan parasite. Hepatic coccidia primarily due to *Eimeria steidae*. Intestinal coccidia may be caused by 1 or multiples of 10 species of the genus *Eimeria*. Each species is very specific in the location that it lives in the intestinal tract. Infestation is proliferated via contamination of food and/or water; or, in the grooming process when an infective oocyst (egg) is ingested. Oocyst pass in fecal material and must be exposed to air for at least 24-72 hrs. (sporulation) to become infective. Ingested eggs hatch into larva and locate in the linings of the bile ducts or small intestines to develop into adults and initiate the laying of eggs.	To be successful, treatment must address the entire 12 day life cycle. The coccidiacides available are only affective against the adult parasites and have NO affect against the larva or eggs of the coccidia. Sulfaquinoxaline is the coccidiacide of choice administered in the drinking water at the rate of 0.1%. It should be given for 5 consecutive days (all adults destroyed), medication removed from drinking water for 10 days (larva and eggs develops into adults), and then medication repeated for 5 more consecutive days. Other Sulfa drugs may be used; but, not as effective as Sulfaquinoxaline. Repeat process 2-4 times year. Follow withdrawal instructions prior to harvest.	Excellent sanitation. Daily scraping of wire floors, use of drinking and and feeder systems to prevent exposure to infective eggs. Use treatment program on does prior to mating to keep exposure to a minimum in nest box and during high density periods of nursing. NOTE: Kits much more susceptible to coccidia than adults. Administering medication 3 days per month is NOT a preventive measure as it does not "cover" the life cycle. It may lower the population for a few days but it will be as large or larger in just a couple of days after treatment. There are newer coccidiacides on the market but they have not been approved for use in rabbits.

CONDITIONS OBSERVED IN THE DOMESTIC RABBIT CAUSED BY INTERNAL PARASITES

DISEASE OR CONDITION	SIGNS	CAUSE	TREATMENT	PREVENTION
PINWORMS	Small white worm 1/4-1/2 inch in length within or on the surface of a fecal ball; or, the worm stuck to the hair around the anus. May be unsightly and annoying. Causes very few systemic signs unless population of parasites in rabbit is very high or the animal is debilitated from some other condition.	Ingesting feed or water contaminated with the egg of the *Passlurus ambigus* parasite. This is a common parasite of rabbits found in the cecum. Very little significance medically or economically.	Not reccomended unless eggs demonstrated in a stool sample. Use of piperazine citrate in drinking water. Other effective parasiticides available but not approved for use in rabbits.	Good sanitation. Prevent food and water contamination with feces of infected rabbit. Not reccomended to routinely treat for this parasite.
WHIPWORMS	Rarely observed in rabbits. Poor growth, rough hair coat, flecks of blood in loose stool and high death loses.	*Trichuris sp.* Filthy conditions with other species of animals present.	Seek professional assistance to treat individual rabbits and control problem in rabbitry.	Strict sanitation. Keep other species and predators from rabbitry.
TAPEWORM 1. Adult form	Very rare in rabbits. Small white square segments passing with feces	Adult tapeworm observed in other small animal species.	Seek professional advice. Not common.	Sanitation.
2. Larva form	More common than the adult form. Most signs are observed when harvesting the carcass or upon necropsy. Liver may have white streaks one will find a bladder like cyst in the abdominal cavity. Usually no physical signs associated with this condition.	Consumption of feed contaminated with dog feces containing eggs of the adult tapeworm *Taenia pisiformis*. The larva migrate through the liver and develop into a cyst in the abdominal cavity.	No practical treatment. The dog will become infected by eating the viscera of a rabbit containing an infective tapeworm cyst. The cyst develops into an adult in the dog and the life cycle repeats.	Keep dogs from the rabbitry. Be sure bedding, feed and other materials are not contaminated with dog feces.

CONDITIONS OBSERVED IN THE DOMESTIC RABBIT CAUSED BY INTERNAL PARASITES

DISEASE OR CONDITION	SIGNS	CAUSE	TREATMENT	PREVENTION
NOSEMA ENCEPHALITOZOONOSIS	Most infected rabbits do not exhibit any signs. May demonstrate neurological signs-unilateral or bilateral paralysis, twisting of neck, tremors or partial paralysis of any muscle. Usually, diagnosed during the harvesting process or upon necropsy. The kidneys have a pitted appearance on the surface.	The protozoan parasite *Encephalitozoon cuniculi*. The adult lives in the kidney and the eggs pass in the urine. Other rabbits become infected by consuming food and/or water contaminated with the infective eggs.	None. Definitive diagnoses may be made by identifying the egg microscopically in a urine sample. Infestation usually occurs when the density of animals in the pen is at highest (weaning). Meat of infectected rabbit is safe for human consumption.	Prevent ingestion of infective egg. This may be done by preventing the contamination of the food and drinking water with the urine of an infected rabbit. Also, the infective egg may be ingested in the grooming process.
TOXOPLASMOSIS 2 Forms 1. Acute	Rabbit will not eat, slow to move about, elevated body temperature and may show neurological involvement. Death usually occurs within 1 week after onset of symptoms.	The protozoan *Toxoplasma gondi*. Not commonly observed in the Domestic Rabbit. May have public health significance.	Not practical. Give concern to public health significance.	Keep cats out of rabbitry. Prevent cats from contaminating food, water, bedding and other supplies. Transmission may occur by an infected cat passing the organism in the stool and contamination of the rabbits food or water. The infected rabbit may pass the disease to kits as the infective protozoan may pass through the placenta.
2. Chronic	Slow loss of weight that terminates in paralysis followed by death. Diagnosis of either form usually made during the necropsy proceedure. Serological test available for diagnosis.	Same as for the acute form.	Same as for the acute form.	

CONDITIONS OBSERVED IN THE DOMESTIC RABBIT CAUSED BY INTERNAL PARASITES

DISEASE OR CONDITION	SIGNS	CAUSE	TREATMENT	PREVENTION
GIARDIA	Prolonged chronic soft stool and intermittent diarrhea in multiple rabbiits in the herd. May have occasional death loss. Usually, attributed to another cause or from secondary infections after debilitation.	A flagellate protozoan parasite. Infestation occurs as a result of feed and/or drinking water being contaminated with feces of an infected animal.	Seek advice of professional for specic treatment instructions. Has public health concerns.	Use drinking water free of infective parasite. Prevent animal contamination of drinking water source.

VIRAL DISEASES OBSERVED IN THE DOMESTIC RABBIT

DISEASE OR CONDITION	SIGNS	CAUSE	TREATMENT	PREVENTION
PAPILLOMATOSIS "WARTS"	Small growths usually located on the head and ears. The masses may be in multiples with a narrow soft pink attachment. The "warts" are easily rubbed off and will bleed freely.	A virus. Most common in the cottontail rabbit. Virus spread by the flying insects and other parasites.	Usually, self eliminating after 30-60 days. Surgical removal, control bleeding and the application of an antibiotic creme 2-4 times a day for 3-5 days.	Control flying insects in rabbitry by screening the doors and windows and/or keeping the interior darkened.
FIBROMA	Small benign mass under the skin anywhere on the body. Multiple nodules may appear together. Not common in domestic rabbits.	A virus. Most common in cottontail rabbits. Transmitted from rabbit to rabbit by blood sucking insects.	Not practical under most conditions.	Control biting
MYXOMATOSIS Two forms: 1. ACUTE FORM 2. CHRONIC FORM (Big Head Disease)	Sudden death of rabbits at all ages. Reddened eyes, body temperatures in excess if 106 degrees Overwhelming swelling of the ears, eyelids, lips, and face. The above associated with swelling of the genitals is almost a sure diagnosis of Myxomatosis. Usually occurs in late summer and fall.	Both forms caused by the same virus. The Brush Rabbit acts as a reservoir for the virus and the only effect is small skin tumors that gradually disappear. Mosquitoes transmit the virus to the domestic rabbit population and there is a total different responce. Primarially observed in the Pacific northwest.	No treatment is effective. When disease is suspected have rabbit necropsied and disease confirmed at a diagnostic laboratory. Euthanasise and properly dispose of all sick animals and implement proper prevention techniques. Antibiotics not effective against viruses.	Vaccines not approved for use in the United States. Prevention is through keeping flying insects from the rabbitry, do not allow any contact of sick rabbits, and use special precautions not to carry the virus into the rabbitry. Do not attent exhibitions in late summer and fall where disease is common.

VIRAL DISEASES OBSERVED IN THE DOMESTIC RABBIT

DISEASE OR CONDITION	SIGNS	CAUSE	TREATMENT	PREVENTION
VIRAL HEMORRHAGIC DISEASE (VHD)	NOT IDENTIFIED IN THE UNITED STATES. Severe nose bleed, congestion of the lungs and high mortality rate. Must be a very severe concern to all rabbit growers due to the rapid spread from rabbitry to rabbitry and the high death losses.	A non-classified virus. Has been identified in Mexico. Caused many deaths.	None. Notify authorities if disease is anticipated in rabbitry for definitive diagnosis.	Control imports of rabbits and all rabbit products from countries infected with disease. Vaccines not available for use in United States.
RABBIT POX	Occurrence rare. Occasionally observed in laboratory rabbits. Swollen lymph nodes anywhere in the body. Blisters on any or all mucous membranes. High mortality in growing rabbits.	Virus.	Isolation of infected rabbits. Strict sanitation.	A vaccine is available. Not observed to date in exhibition or commercial rabbits in the
RABIES	Not thought to be of concern in Domestic Rabbits. See local veterinarian for latest information.			

OTHER CONDITIONS OBSERVED IN THE DOMESTIC RABBIT

DISEASE OR CONDITION	SIGNS	CAUSE	TREATMENT	PREVENTION
TULAREMIA "Rabbit Fever"	Rarely observed in the Domestic Rabbit. Lifeless, lethargic and just gives the appearance of a sick rabbit.	*Francisella tularensis*. Very contagious in wild rabbit population.	Seek professional advise. May be transmitted to other vertebrates.	Prevent exposure to wild rabbits. Has public health significance.
PSEUDOTUBERCULOSIS	Will not eat, lethargic, slowly looses weight and dies. Rabbit slowly "wastes" away. Necropsy shows granular nodules throughout abdominal cavity, the liver, spleen and somtimes in the lungs.	*Yersinia pseudotuberculosis*. Gains entrance to body orally and through injuries to skin. Seen in rabbitries with poor sanitation and overcrowding.	Not practical. Remove and properly dispose of all affected animals. Do not harvest for human consumption. This disease has public health significance.	Enhance sanitation in rabbitry. Use appropriate disinfecting solutions. Decrease density in the rabbitry.
DOG OR WILD ANIMAL ATTACK IN THE RABBITRY	Degree of severity will vary. Toes and feet of rabbits chewed and pulled through cage floor. Death due to malling of the rabbit, internal injuries, blood loss and severe trauma. Paralyzed rabbits from fractured vertebrae. Bred does may absorb or abort kits and if they do kindle may loose kits from lack of mothering instincts. Does may never again kindle successfully due to emotional trauma.	Stray or owners dog may be the culprit. They usually do not kill to consume the carcass from hunger. Once the dogs get into rabbitry they will usually return. Even small dogs may do extensive damage.	The actual physical damage may be very extensive. The unknown effect upon future production may even be greater than current physical loss. Call city or county authorities immediately. Apprehend and/or identify culprit. Take pictures and have witness to damage prior to clean up.	Use barriers to prevent critters from entering rabbitry. Review insurance protection prior to any incident.

BREED CHARACTERISTIC POINT ALLOCATION (1/1/1991 TO 1/1/1996)

BREED	GENERAL TYPE	BODY	HEAD	EARS	EYES	FEET & LEGS	TAIL	FUR/WOOL	COLOR	CONDITION	MARKINGS
AMERICAN	55	40	5	4	1	5	0	20	15	10	NA
AMERICAN FUZZY LOP	75	30	30	10	X	5	X	15 density-8 texture-5 length -2	5*	5	*included with color
AMERICAN SABLE	50	40	together 8		2	0	0	20	25*	5	*shadings included
ANGORA-ENGLISH	33	15	5	5	2	5	1	57 density-25 texture-20 length -12	5	5	NA
ANGORA-FRENCH	35	20	3	4	2	5	1	56 density-25 texture-20 length -10	5	5	NA
ANGORA-GIANT	20	10	3	2	2	2	1	65 density-25 texture-20 length -20	5	5	NA
ANGORA-SATIN	29	15	5	4	X	5 includes tail		60 density-15 texture-15 length -15 sheen -15	6	5	NA
BELGIAN HARE	50	25	5	5	5	10	2	10 ticking-10	20	5	NA
BEVEREN	60	40	10	5	X	5	0	15	5	5	NA

BREED	GENERAL TYPE	BODY	HEAD	EARS	EYES	FEET & LEGS	TAIL	FUR/WOOL	COLOR	CONDITION	MARKINGS
BRITANNIA PETITE	65	25	10	10	15	5	0	25	5	5	NA
CALIFORNIAN	65	**58** hindquarters-22 midsection -19 shoulders -17	3	2	0	2	0	20	5	10	included in color
CHAMPAGNE d'ARGENT	55	**50** hindquarters-20 midsection -15 shoulders -15	5 together		x	x	x	15	20	10	no points
CHECKERED GIANT	41	30	4	4	x	8	x	7	7	7	38 head -16 body -22
CHINCHILLA -AMERICAN	45	30	8 together		2	5	x	25 under color---5 ring/ defin---8 surface color-12	**25**	5	NA
CHINCHILLA -GIANT	60	40	7	3	2	7	1	15 under color---3 ring color----5 surface color-7	**15**	5 10	NA
CHINCHILLA STANDARD	30	X	X	X	X	X	X	30 under color---8 ring/defin----12 surface color-15	**35**	5	NA
CINNAMON	58	50	3	2	1	2	0	15	11	5	11
CREME d'ARGENT	60	50	3	3	1	2	1	15	20	5	NA
DUTCH	25	17	5	2	1	X	X	10	10	5	50

BREED	GENERAL TYPE	BODY	HEAD	EARS	EYES	FEET & LEGS	TAIL	FUR/WOOL	COLOR	CONDITION	MARKINGS
DWARF HOTOT	65	35	15	15	X	0	0	10	5	5	15
ENGLISH SPOT	23	X	X	X	X	X	X	8	8	5	**56** head---28 body---28
FLEMISH GIANT	55	35	7	4	2	6	1	15	20	10	NA
FLORIDA WHITE	65	55	10 together		X	X	X	20	5	10	NA
HARLEQUIN	10	X	X	X	X	X	X	10	15	5	**60** head & ears-20 feet & legs-20 body--------20
HAVANA	45	25	5	5	4	5	1	20	25	10	NA
HIMALAYAN	37	25	5	5	2	10	0	10	5	5	43
HOTOT	60	45	5	5	0	5	0	15	5	5	15
JERSEY WOOLY	51	20	15	12	2	2	0	39 density--15 texture--12 length---12	5	5	NS
LILAC	45	30	3	3	4	5	X	20	20	15	
LOP-ENGLISH	81	28	13	33	X	5	2	5	4	10	included in color
LOP-FRENCH	83	40	15	15	X	3 bone-10	X	8	4	5	included in color
LOP-HOLLAND	88	35	25 crown--8	10	X	10 includes bone	X	5	2	5	included in color

BREED	GENERAL TYPE	BODY	HEAD	EARS	EYES	FEET & LEGS	TAIL	FUR/WOOL	COLOR	CONDITION	MARKINGS
LOP-MINI	80	43	16	16	X	5	X	10	5	5	included in color
MINI REX	50	35	5	5	2	2	1	35	10	5	
NETHERLAND DWARF	70	35	15	15	5	X	0	10	15	5	
NEW ZEALAND	60	**55**	5		X	0	0	10	15	5	
	hindquarters--20 mid section---18 shoulders-----17		together								
PALOMINO	55	X	X	X	X	X	X	15	25	5	
POLISH	75	25	15	15	15	4	1	10	10	10	
REX	45	35	3	3	1	2	1	40	10	5	broken group-5 color-5
RHINELANDER	30	X	X	X	X	X	X	5	**30**	5	**30**
								body color----5 distribution-25		body--18 head--12	
SATIN	45	**42**	3		X	X	X	20	15	10	
	hindquarters-16 mid-section--14 shoulders----12		together					SHEEN--10			

BREED	GENERAL TYPE	BODY	HEAD	EARS	EYES	FEET & LEGS	TAIL	FUR/WOOL	COLOR	CONDITION	MARKINGS
SILVER	30	15	6	3	X	5	1	15	**50**	5	
						surface & undercolor--15 evennes of silvering--20 brightness of silver--15					
SILVER FOX	52	40	4	2	1	5	0	20	8	5	
								silvering--15			
SILVER MARTEN	40	X	X	X	X	X	X	20	22	5	13
TAN	25	X	X	X	X	X	X	10	**25**	5	35
								body color-10 tan color--15			

DIFFERENTIATING THE POLISH AND NETHERLAND DWARF BREEDS OF RABBITS

The Polish and Netherland Dwarf are two very distinct and unique breeds of domestic rabbits recognized by the American Rabbit Breeders Association. Although similar on casual observance, it is of extreme importance that each be evaluated appropriately in their specific breed. Below is a list of distinguishing characteristics that may be utilized to differentiate the two breeds.

CHARACTERISTIC	POLISH	NETHERLAND DWARF
Varieties (colors)	Black, Blue, Chocolate, Blue-eyed White, Red-eyed White.	5 groups/ several varieties in each group; including Black, Blue, Chocolate, Blue-eyed White and Red-eyed White
Weight	Not over 3 1/2 lbs.	Not over 2 1/2 lbs
Body type	25 points-compact, close-coupled; tapered (hips wider than shoulder), well-rounded	35 points-compact, shoulders as wide at hips-parallel; well-rounded.
Head type	15 points-medium full, short with full cheeks and muzzle. Convex curvature from base of ears to nose & along lower jaw; roundness between eyes	15 points-Big, round, in all directions
Ear type	15 points-small-to balance with head, set close together & touching all way up-disqualification for ears over 3 inches.	15 points-short, erect, rounded tip not necessarily touching; ideal length 2 in.-disqualification for ears over 2 1/2 in.
Eye	15 points-large, bold bright & expressive	5 points-round, bold and bright
Feet & Legs	4 points-fine bone	----------
Fur	10 points-short, fine, dense flyback coat	10 points-soft, dense, rollback coat

TUTORIAL FOR RABBIT BREEDS
RECOGNIZED BY THE
AMERICAN RABBIT BREEDERS ASSOCIATION

The purpose of a BREED TUTORIAL of the American Rabbit Breeders Association's Standard of Perfection is to assist judges, registrars and applicants for judges and registrars licenses; as well as, interested breeders, in studying, comparing and comprehending the many approved breed standards.

The rabbit fancy attracts individuals of varying age groups and educational abilities. Their learning abilities may be equalized through the implementation of various learning and tutoring skills. The tutorial is one of these techniques.

Each recognized breed possesses several characteristics of varying importance as it relates to the **STANDARD OF PERFECTION.** To apply the information from the **STANDARD** it is essential to be aware of the general and relative importance of the characteristics for the various breeds. This information is presented in detail through many pages of text. Professional educators relate that for individuals, particularly adult learner, to comprehend it must be done through association and comparison in individual increments of small quantity. The **STANDARD** emphasizes several main characteristics of each breed in a very systematic order and in detail.

The tutorial will break some of the important characteristics down into a minimum number of "frames" for easier comprehension. "Key" words and/or phrases will be utilized for description and association. Associated with each characteristic is a summary of the extremes of that characteristic for the various breeds.

Tutorials are not intended to replace or be used as a substitute for the **STANDARD OF PERFECTION;** but, only as an aid in comprehension. The **STANDARD** must be referred to repeatedly for clarification and understanding.

A secondary asset of the tutorials is that it will allow for the development of unique and educationally sound questions, with emphasis upon practical application, to evaluate ones retention. In addition, a review of the tutorials will allow for the demonstration of inconsistencies in the word description that may need attention when revision is required. Simply, tutorials break down a complicated text into smaller fragments that may be further sub-divided until comprehension is possible for understanding and application.

TUTORIAL FOR RABBIT BREEDS
RECOGNIZED BY THE
AMERICAN RABBIT BREEDERS ASSOCIATION

WEIGHT COMPARISON - JUNIOR WEIGHTS-MAXIUM WEIGHTS

BREED	WEIGHTS (RANGES FOR SR.)	LIMIT ON JUNIORS	MAXIMUM WEIGHT (lb)
AMERICAN Blue, White	Bucks: 9-11 lbs Does: 10-12 lbs	yes; 9 lbs	yes
AMERICAN FUZZY LOP Groups: Agouti, Broken, Pointed White, Self, Shaded, Solid Ticked	Bucks: & Does Not over 4 lbs.	no	yes
AMERICAN SABLE	Bucks: 7-9 lbs.	no	yes
ANGORA-ENGLISH Groups: Agouti, Pointed White, Self, Shaded, Solid & Ticked	Bucks: 5-7 lbs Does: 5-7 1/2 lbs	yes; not over 5 1/2 lbs.	yes
ANGORA-FRENCH Groups: Agouti, Pointed White, Self, Shaded, Solid & Ticked	Bucks & Does 7 1/2-10 1/2 lbs	no	yes
ANGORA-GIANT White only	Bucks: 8 1/2 lbs and over Does: 9 and over	yes; not over 8 lbs	no
ANGORA-SATIN Groups: Agouti, Pointed White, Self, Shaded, Solid & Ticked	Bucks & Does: 6 lbs & over	no	no
BELGIAN HARE	Bucks & Does 6-9 1/2 lbs	no	yes
BEVEREN White, Blue and Black	Bucks: 8-10 lbs Does: 9-11 lbs	yes; not over 8 lbs yes; not over 9 lbs	yes
BRITANNIA PETITE White only	Bucks & Does: Maximum 2 1/2 lbs	no	yes

CALIFORNIAN	Bucks: 8-10 lbs Does: 1 1/2-10 1/2	yes; not over 8 lbs	yes
CHAMPAGNE D'ARGENT	Bucks: 9-11 lbs Does: 9 1/2-12 lbs	yes; not over 9 lbs	yes
CHECKERED GIANT Black, Blue	Bucks: 11 lbs & over Does: 12 lbs & over	Minimum of 6 lbs on juniors	no
CHINCHILLA AMERICAN	Bucks: 9-11 lbs Does: 10-12 lbs	yes: not over 9 lbs	yes
CHINCHILLA GIANT	Bucks; 12 lbs & over Does: 13 lbs & over	yes; not over 12 lbs	no
CHINCHILLA STANDARD	Bucks: 5-7 lbs Does: 5 1/2-7 1/2	no	yes
CINNAMON	Bucks: 8 1/2-10 1/2 Does: 9-11 lbs	yes; not over 8 1/2	yes
CREME D'ARGENT	Bucks: 8-10 1/2 Does: 8 1/2-11	yes; bucks not over 7 lbs Does not over 8	yes
DUTCH Black, Blue Chocolate, Gray, Steel, Tortoise	Bucks & Does: 3 1/2-5 1/2 lbs	no	yes
DWARF HOTOT	Bucks & Does Maximum 3 1/4 lbs	no	yes
ENGLISH SPOT Black, Blue Chocolate, Gold, Gray, Lilac and Tortoise	Bucks & Does 5-8 lbs	no	yes
FLEMISH GIANT Black, Blue, Fawn, Light Gray, Sandy, Steel Gray and White	Bucks: 13 lbs & over Does: 14 lbs & over	no	no
FLORIDA WHITE	Bucks & Does: 4-6 lbs	yes; not over 4 1/2	no

HARLEQUIN Groups: Japanese & Magpie	Bucks: 6-9 1/2 Does: 7-9 1/2 lbs	no	yes
HAVANA Black, Blue, and Chocolate	Bucks & Does: 4 1/2-6 1/2	yes; not over 5 lbs.	yes
HIMALAYAN Black and Blue	Bucks & Does: 2 1/2-4 1/2 lbs	no	yes
HOTOT	Bucks: 8-10 lbs Does: 9-11 lbs	yes; bucks not over 8 Does not over 9 lbs	yes
JERSEY WOOLY Groups: Agouti Pointed White, Self, Shaded, Tan Pattern	Bucks & Does: 3 1/2 lbs and under	no	yes
LILAC	Bucks: 5 1/2-7 1/2 Does: 6-8 lbs	yes; bucks not over 6 does not over 6 1/2 lbs	yes
LOP-ENGLISH Groups: Agouti Brindled, Broken Self, Shaded, Solid and Ticked	Bucks: 9 and over Does: 10 and over	yes; not not over 9	no
LOP-FRENCH Groups: Agouti Brindled, Broken, Self, Shaded, Ticked	Bucks: 10 & over Does: 11 & over	yes; not over 10 lbs	no
LOP-HOLLAND Groups: Agouti, Broken, Pointed White, Self, Shaded, Solid, Ticked	Bucks & Does: Not over 4 lbs	no	yes
LOP-MINI Groups: Agouti, Broken, Pointed White, Self, Shaded, Solid & Ticked	Bucks & Does 4 1/2-6 1/2 lbs	yes; not over 6 lbs	yes

MINI REX Blue, Californian, Castor, Chinchilla, Lynx, Opal, Red, Seal, Tortoise, White and Broken Group	Bucks: 3-4 1/2 lbs Does: 3 1/4-4/12	yes; bucks under 3 1/2 does under 3 1/4	yes
NETHERLAND DWARF Groups: Selfs, Shaded, Agouti, Tan Pattern and AOV (any other variety)	Bucks & Does: Not over 2 1/2	yes; not 2 lbs	yes
NEW ZEALAND Black, Red, and White	Bucks: 9-11 lbs Does: 10-12 lbs	yes; not over 9 lbs	yes
PALOMINO Golden and Lynx	Bucks: 8-10 lbs Does: 9-11 lbs.	yes; bucks not over 8 Does not over 8 1/2 lbs	yes
POLISH Black, Blue, Chocolate, Blue-eyed White, Red-eyed White	Bucks & Does Not over 3 1/2	yes; not over 2 1/2	yes
REX Black, Black Otter, Blue Californian, Castor, Chinchilla, Chocolate, Lilac, Lynx, Opal, Red, Sable, Seal, White, Broken Group	Bucks: 7 1/2-9 1/2 Does: 8-10 1/2	yes; bucks not over 8 Does not over 8 1/2 lbs	yes
RHINELANDER	Bucks: 6 1/2-9 1/2 Does: 7-9 lbs	yes; bucks not over 7 Does not over 7 1/2	yes

SATIN Black, Blue, Californian, Chinchilla, Chocolate, Copper, Red, Siamese, White, Broken Group	Bucks: 8 1/2-10 1/2 Does: 9-11 lbs	yes; bucks not over 8 Does not over 8 1/2	yes
SILVER Black, Brown, and Fawn	Bucks & Does: 4-7 lbs	no	yes
SILVER FOX Black & Blue	Bucks: 9-11 lbs. Does: 10-12 lbs	yes; not over 9 lbs	yes
SILVER MARTEN Black, Blue, Chocolate Sable	Bucks: 6-8 1/2 Does: 7-9 1/2	yes; bucks not over 6 1/2 does: not over 7 1/2 lbs	yes
TAN Black, Blue Chocolate and Lilac	Bucks: 4-5 1/2 Does: 4-6 lbs	no	yes

SUMMARY

WEIGHTS, JUNIOR WEIGHT LIMITATIONS, MAXIMUM WEIGHTS

BREEDS **WITHOUT** MAXIMUM JUNIOR WEIGHT LIMITATIONS

1. American Fuzzy Lop
2. French Angora
3. Belgian Hare
4. Standard Chinchilla
5. Dwarf Hotot
6. Flemish Giant
7. Himalayan
8. Holland Lop
9. Tan
10. American Sable
11. Satin Angora
12. Britannia Petite
13. Dutch
14. English Spot
15. Harlequin
16. Jersey Wooly
17. Silver

BREED **WITH** A MINIMUM WEIGHT ON JUNIORS

Checkered Giant

BREEDS **WITHOUT** A MAXIMUM WEIGHT LIMIT

1. Giant Angora
2. Checkered Giant
3. English Lop
4. Giant Chinchilla
5. Satin Angora
6. Flemish Giant
7. French Lop

BREEDS **WITH** PRE-JUNIOR CLASSES (ALL HAVE 3 MONTH AGE LIMIT)

1. Beveren-5 lb. maximum
2. Californian-5 1/2 lb. maximum
3. Champagne d'Argent-6 lb. maximum
**4. Checkered Giant-4 lb. minimum & 7 lb. maximum
5. Chinchilla-American-6 lb. maximum
6. Chinchilla-Giant-8 lb. maximum
7. Cinnamon-5 1/2 lb. maximum
8. Hotot-5 lb. maximum
9. New Zealand-6 lb. maximum. (shown in individual varieties
10. Palomino-5 lb. maximum
11. Satin-6 lb. maximum

**only breed with minimum on pre-junior

BREEDS THAT HAVE A MAXIMUM WEIGHT LIMIT UNDER 4 1/2 POUNDS

1. American Fuzzy Lop (4 lbs)
2. Himalayan (4 1/2 lbs)
3. Holland Lop (4 lbs)
4. Netherland Dwarf (2 1/2 lbs)
5. Britannia Petite (2 1/2 lbs)
6. Jersey Wooly (3 1/2 lbs)
7. Mini Rex (4 1/2 lbs)
8. Polish (3 1/2 lbs)

BREEDS THAT ARE ARBITRARILY CLASSED AS "SMALL" BREEDS AS COMPARED TO THE "DWARF" (UNDER 4 1/2 LBS), LARGE AND GIANT BREEDS

1. English Angora
2. Standard Chinchilla
3. English Spot
4. Harlequin
5. Lilac
6. Silver
7. Tan
8. Satin Angora (no max. weight limit)
9. Dutch
10. Florida White
11. Havana
12. Mini Lop
13. Silver Marten

BREEDS THAT ARE ARBITRARILY CLASSED AS "MEDIUM-SIZED" BREEDS

1. American
2. French Angora
3. Beveren
4. Champagne D'Argent
5. Cinnamon
6. Hotot
7. Palomino
8. Rhinelander
9. Silver Fox
10. American Sable
11. Belgian Hare
12. Californian
13. American Chinchilla
14. Creme D'Argent
15. New Zealand
16. Rex
17. Satin

BREEDS THAT ARE ARBITRARILY CLASSED AS LARGE BREEDS

1. French Lop
2. English Lop

BREEDS ARBITRARILY CLASSED AS GIANT BREEDS

1. Giant Angora
2. Checkered Giant
3. Flemish Giant
4. Giant Chinchilla

SUMMARY-COLOR CLASSIFICATION

BREEDS CATEGORIZED INTO COLOR **GROUPS**

```
                    ***
English Angora       *   Exhibited in 2 classifications
French Angora       *** WHITE & COLORED
Satin Angora         *   (not in specific groups or *
                     varieties
                    ***

                    ***
Harlequin            *   Exhibited in varieties, or
Netherland Dwarf     *   combination of varieties,
                     *   within Group.  Best of Variety,
                    *** Best Opposite Sex of Variety;
                     *   as well as Best of Group and
                     *   Best of Group and Best Opposite
                     *   Sex of Group must be selected.
                    ***


                    *****
American Fuzzy Lop *  Exhibited in BROKEN and COLORED
English Lop        *  classification.  NOT in specific
French Lop        **** varieties and/or groups.
Holland Lop        *  Colors described in groups
Mini Lop           *
                    *****
```

Jersey Wooly --- Exhibited in specific GROUPS. NOT in individual varieties.

COMPARISON FIBER BREEDS WITH GROUP CLASSIFICATION
(American Fuzzy Lop, English, French, Satin, & Giant Angora and Jersey Wooly)

GROUPS	AFL	E. ANG	FR. ANG	GT ANG	SAT ANG	JW
AGOUTI	X	X	X		X	X
BROKEN	X	NO	NO		NO	NO
POINTED WHITE	X	X	X	W	X	X
SELF	X	X	X	H O	X	X
SHADED	X	X	X	I N	X	X
SOLID	X	X	X	T L	X	NO
TICKED		X	X	E Y	X	NO
TAN PATTERN	NO	NO	NO		NO	X

EXHIBITION CLASSIFICATION

AMERICAN FUZZY LOP
Broken and Colored

ENGLISH ANGORA
White, Pointed White and Colored

FRENCH ANGORA
White, Pointed White and Colored

GIANT ANGORA
White only

SATIN ANGORA
White, Pointed White and Colored

JERSEY WOOLY
Specific Groups

--All fiber producing breeds have Agouti Groups
--American Fuzzy Lop only fiber producing breed to have Broken Group
--All fiber producing breeds have Pointed Whites except the Giant Angora
--All fiber producing breeds have a Self Group except the Giant Angora
--All fiber producing breeds have a Shaded Group except the Giant Angora
--All fiber producing breeds have a Solid Group except the Giant Angora and the Jersey Wooly
--All fiber producing breeds have a Ticked Group with the exception of the Giant Angora and Jersey Wooly
--The Jersey Wooly is the only fiber producing breed that recognizes the Tan Pattern Group

COMPARISON OF THE LOP BREED COLOR GROUP CLASSIFICATION

GROUP	AFL	E. LOP	FR. LOP	HOL. LOP	M. LOP
AGOUTI	X	X	X	X	X
BROKEN	X	X	X	X	X
POINTED WHITE	X	NO	NO	X	X
SELF	X	X	X	X	X
SHADED	X	X	X	X	X
SOLID	X	X	X	X	X
BRINDLED	NO	X	X	NO	NO
TICKED	NO	X	X	X	X
TAN PAT.	NO	NO	NO	NO	NO
CLASSES	BROKEN COLORED	BROKEN COLORED	BROKEN COLORED	BROKEN COLORED	BROKEN COLORED

--All lop-eared breeds have Agouti, Broken, Self and Shaded color Groups.
--All lop-eared breeds have the Pointed White Group except English and French Lop
--English and French Lops are the only lop-eared breeds that have a Brindled Group
--American Fuzzy Lop is the only lop-eared breed that does not have a Ticked Group.
--All lop-eared breeds exhibit in Broken and Colored categories

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BREED TUTORIAL - TYPE, BONE, BODY LENGTH

BREED	GENERAL TYPE (POINTS)	BODY TYPE (POINTS)	BONE/BODY LENGTH
AMERICAN	55	40 Mandolin, high point slightly forward of hip	Med/compact
AMERICAN FUZZY LOP	75	30 short & cobby, deep shoulders straight line to rounded hindqts.	Short, thick
AMERICAN SABLE	50	40 commercial, high point over midway area of hips	medium
ANGORA-ENGLISH	33	15 short-coupled and compact, round ball of fluff	med./fine compact
ANGORA-FRENCH	35	20 oval from side & oblong from above	medium
ANGORA-GIANT	20	10 commercial well-nourished	medium/comm
ANGORA-SATIN	29	15 medium length, firm, good depth, well-nourished	medium

BELGIAN HARE	50	25 long & narrow arched, continous sweep from shoulder to tail; round hindquarters; tucked up, well-ribbed up	forelegs; long, slender hindlegs; long & fine-body long & narrow
BEVEREN	60	40 Mandolin	medium
BRITANNIA PETITE	65	25 Neat, compact tucked up; sprightly	fine/compact slender
CALIFORNIAN	65	58 Depth to equal width; commercial type	medium
CHAMPAGNE D'ARGENT	55	*(50) commercial; well filled, rounded	med/fine moderate
CHECKERED GIANT	41	25 Long, well-arched; med-broad, well-rounded hindquarters; tapering	med-heavy/ long
CHINCHILLA-AMERICAN	45	30 commercial	med/med
CHINCHILLA-GIANT	60	40 moderately long massive & powerful; deep and well-rounded	heavy/ moderately long
CHINCHILLA-STANDARD	30	- short, compact well-rounded hindquarter	Med-fine/ short
CINNAMON	58	50 commercial	med/medium
CREME D'ARGENT	60	50 commercial; high point over center of hip	med-fine/ medium

DUTCH	25	17 close-coupled well-rounded	close coupled
DWARF HOTOT	65	35 Short, compact uniform shoulder width; rounded	short/short &
ENGLISH SPOT	23	-- racy, well- arched, gd. depth well-rounded	moderately long/racy
FLEMISH GIANT	55	35 long, powerful, fully arched and massive	large/long
FLORIDA WHITE	65	55 close-coupled, depth equal to width	---/short
HARLEQUIN	10	-- commercial; high point over middle of loin	medium
HAVANA	45	25 close-coupled; well-rounded shoulders and hind- quarters	med/fine/ short
HIMALAYAN	37	15 cylindrical, long & narrow, straight lines	fine/long
HOTOT	60	45 commercial	med/med
JERSEY WOOLY	51	20 short-coupled, compact gd. depth & round hips	sturdy/short
LILAC	45	30 compact, well- rounded with gd. depth	moderately fine/compact

LOP-ENGLISH	81	28 mandolin	med-heavy
LOP-FRENCH	83	40 massive & thick set	heavy 10 pts. compact
LOP-HOLLAND	88	35 massive thick set shoulders; deep & round-off hindquarters of approx. equal depth	heavy/short
LOP-MINI	80	43 massive, thick set with good depth & well-filled	thick/compact
NETHERLAND DWARF	70	35 compact, well-rounded straight line from shoulder to hip	---/short
NEW ZEALAND	60	*(55) commercial; high pt. center of hips	med. heavy/ medium
PALOMINO	55	-- commercial; depth to equal width	med/moderate
POLISH	75	25 close-coupled; well-rounded and tapering	fine/compact
REX	45	35 commercial	med/medium
RHINELANDER	30	-- rounded cylindrical, with arch	moderately long/ suff. to give graceful appearance
SATIN	45	*(32) commercial; high pt. over center of hips	med/medium

SILVER	30	15 compact and well-arched	med/compact
SILVER FOX	52	40 commercial; high pt. over center of hip	medium/medium
SILVER MARTEN	40	-- well-developed hindquarter and shoulders	med/medium
TAN	25	-- type of own; tapered and graceful	---/----

SUMMARY - BODY TYPE, BONE AND BODY LENGTH

BREEDS WITH 50 POINTS, OR MORE, ON GENERAL TYPE

1. Holland Lop (88)
2. English Lop (81)
3. American Fuzzy Lop (75)
4. Netherland Dwarf (70)
5. Californian (65)
6. Florida White (65)
7. Creme D'Argent (60)
8. Giant Chinchilla (60)
9. French Lop (83)
10. Mini Lop (80)
11. Polish (75)
12. Britannia Petite (65)
13. Dwarf Hotot (65)
14. Beveren (60)
15. Hotot (60)
16. New Zealand (60)

BREEDS WITH LESS THAN 35 POINTS ON GENERAL TYPE

1. Harlequin (10)
2. English Spot (23)
3. Tan (25)
4. Standard Chinchilla (30)
5. Silver (30)
6. French Angora (35)
7. Giant Angora (20)
8. Dutch (25)
9. Satin Angora (29)
10. Rhinelander (30)
11. English Angora (33)

BREED(S) WITH POINTS ON BONE

1. French Lop (10)

BREEDS WITH 40 POINTS OR MORE ON BODY TYPE

1. Californian (58)
2. New Zealand (55)
3. Creme D'Argent (50)
4. Mini Lop (43)
5. American Sable (40)
6. Giant Chinchilla (40)
7. Silver Fox (40)
8. Florida White (55)
9. Cinnamon (50)
10. Hotot (45)
11. American (40)
12. Beveren (40)
13. French Lop (40)

BREEDS WITH LESS THAN 20 POINTS ON BODY TYPE

1. Giant Angora (10)
2. English Angora (15)
3. Dutch (17)
4. Satin Angora (15)
5. Himalayan (15)
6. Jersey Wooly (20)

BREEDS THAT SPECIFICALLY REQUEST, OR DESCRIBE, "COMMERCIAL" TYPE

1. American Sable
2. Californian
3. Cinnamon
4. Harlequin
5. New Zealand
6. Rex
7. Silver Fox
8. Giant Angora
9. American Chinchilla
10. Creme D'Argent
11. Hotot
12. Palomino
13. Satin
14. Silver Marten

BREEDS THAT SPECIFICALLY REQUEST, OR DESCRIBE, MANDOLIN TYPE

1. American
2. English Lop
3. Giant Chinchilla
4. Beveren
5. Flemish Giant

BREED STANDARDS THAT REQUEST "OVAL" SHAPE TO THE BODY

1. French Angora
2. Satin Angora

BREED STANDARDS THAT REQUEST A CYLINDRICAL BODY

1. Himalayan
2. Rhinelander

BREED STANDARDS THAT REQUEST A MASSIVE, OR MASSIVE APPEARING, AND/OR POWERFUL BODY

1. Giant Chinchilla
2. French Lop
3. Mini Lop
4. Flemish Giant
5. Holland Lop

BREED STANDARDS THAT REQUEST A "SHORT, OR CLOSE, COUPLED" BODY

1. English Angora
2. Florida White
3. Mini Rex
4. Dutch
5. Havana
6. Polish

BREEDS THAT REQUEST A "COMPACT" BODY

1. Britannia Petite (arched)
2. Dwarf Hotot
3. Netherland Dwarf
4. Standard Chinchilla
5. Lilac
6. Silver

BREEDS THAT REQUEST A "SHORT/COBBY" BODY

1. American Fuzzy Lop

BREEDS THAT REQUEST AN "ARCHED" BODY IN BODY DESCRIPTION

1. Belgian Hare
2. English Spot
3. Silver
4. Britannia Petite (arched)
5. Checkered Giant
6. Rhinelander
7. Tan (not completely arched)

BREED STANDARD THAT REQUIRED "RACY" TYPE

English Spot

BREED STANDARDS THAT REQUEST A "LONG" BODY

1. Belgian Hare
2. Giant Chinchilla
3. Himalayan
4. Checkered Giant
5. Flemish Giant

BREEDS WITH A "TUCKED UP" REQUEST IN THE BREED STANDARD

1. Belgian Hare
2. Britannia Petite

BREEDS THAT SPECIFICALLY REQUEST A "LARGE" BONE

1. Flemish Giant
2. Giant Chinchilla

BREEDS THAT SPECIFICALLY REQUEST A "HEAVY" BONE

1. French Lop
2. Holland Lop

BREED STANDARDS THAT REQUEST A MODERATELY HEAVY BONE

1. ENGLISH LOP
2. New Zealand

BREED THAT REQUEST A "THICK" BONE

Mini Lop

BREED STANDARDS THAT REQUEST "LONG" BONE

1. Belgian Hare
2. Rhinelander
3. English Spot

BREED STANDARD THAT REQUESTS "SHORT" BONE

1. American Fuzzy Lop
2. Dwarf Hotot

BREED STANDARD THAT REQUESTS "STURDY" BONE

Jersey Wooly

BREED STANDARDS THAT REQUIRE "FINE" BONE

1. Britannia Petite
2. Polish
3. Himalayan

BREED STANDARDS THAT REQUIRE "MEDIUM FINE" BONE

1. English Angora
2. Standard Chinchilla
3. Champagne D'Argent
4. Havana
5. Lilac
6. Mini Rex

TUTORIAL - HEAD, EARS AND EYES

BREED	**HEAD POINTS**	**EARS POINTS**	**EYES POINTS**
AMERICAN (10)	5 rather narrow	4 erect, proportional to body, slightly pointed	1 bright & bold
AMERICAN FUZZY LOP (40)	30 massive, face flattened, good width.	10 lopped vertically from flattened ear base. 1/2" - 1" below jaw line	X
AMERICAN SABLE (10)	combined 8 points med. full, more masculine in bucks	carried in "V" proportional to head & body	2
ANGORA-ENGLISH (12)	5 short & broad dense bangs & side trimmings	5 carried in "V" rather short, fringed, & tasseled 3"-4" long	2 bright & bold
ANGORA-FRENCH (9)	3 oval; clean except for some side trimmings	4 carried erect, plain or tufted @ tips; proportional to head and body	2 bright & bold
ANGORA-GIANT (7)	3 oval, noticeable furnishings, heavier in males	2 carried erect, well-haired, fringed, tasseled & length proportional to head	2 bright & bold

ANGORA-GIANT (CON'T)		and body. Ideal length 4"	
ANGORA-SATIN (9)	5 oval, to balance w/body, some side trimmings	4 carried erect	x
BELGIAN HARE	5 long & narrow set on slender neck	5 carried sloping back, parallel w/head, thin and fine, proportional	3 large & wild
BEVEREN (15)	10 full, size to conform w/body larger in males	5 carried in "V" proportional	X
BRITANNIA PETITE (35)	10 wedge-shaped narrow	10 erect, rounded, furred, touching & proportional to head, body & bone	15 bright &
CALIFORNIAN (5)	3 well-shaped, bucks a little fuller	2 carried upright proportional	X
CHAMPAGNE D'ARGENT (5)	combined 5 well-shaped, medium full	erect, proportional to body	
CHECKERED GIANT (8) (total-24 pts.) (including head (markings)	4 large, proportional to body. broader	4 carried erect & close, heavy set, proportional. DISQ. under 5 2/4" on seniors	X
CHINCHILLA-AMERICAN (10)	combined 8 points med. full & well-filled	erect, proportional	2 large, bold & bright
CHINCHILLA-GIANT (12)	7 large, shapely broader in bucks	3 erect, strong, thick, proportional	2 reposeful

CHINCHILLA-STANDARD (0) no allotted points-included in general type

	med/full	erect & proportional	bright
CINNAMON (6)	3 well-shaped proportional	2 erect, proportional	1 bright
CREME D'ARGENT (7)	3 med. length proportional broader in bucks	3 well-set, strong base, proportional	1 bright & bold
DUTCH (8) (30 pts. including head markings)	5 rounded	2 erect, stocky & proportional	1 bright & bold
DWARF HOTOT (30) (45 pts including head markings)	15 relatively large	15 erect & short 2 1/4" DISQ. over 3"	X
ENGLISH SPOT (0) (28 pts. on head markings)	no specific allotted points proportional and balanced	erect, proportional	bright & bold
FLEMISH GIANT (13)	7 large, proportional to body, larger in bucks	4 erect, heavy base & proportional, Ideal length-6" DISQ. under 5 3/4 inches in seniors	2 reposeful
FLORIDA WHITE (10)	combined 10 points round, full. more developed in bucks	erect, stocky and balanced	X
HARLEQUIN (0) (20 pts. on head and ear markings)	no specific allotted points well proportioned	carried in "V"	
HAVANA (14)	5 med. short & broad, broader in bucks	5 erect, rather short	4 medium
HIMALAYAN (12) (32 pts. including head and markings)	5 long and neat	5 erect, thin proportional	2 bright, bold alert

HOTOT (10) (25 pts. including markings)	5 strong, more refined in does	5 carried in "V" drawn in at base & narrows to slight point 4 3/4-5 1/8"	0 bold
JERSEY WOOLY (29)	15 well-rounded, bold with some side trimmings	12 erect, short substantial, ideal len. 2 1/2" may have small tufts. DISQ. over 3 inches	2 bright, bold
LILAC (10)	3 short & well-filled. broader in bucks	3 straight, rather short & proportional	4 large, clear, bright
LOP-ENGLISH (46)	13 well-shaped, wide, full cheeked & curved skull	33 long as possible width 1/4 length, well-rounded tip, thick but pliable w/out blemishes DISQ. less than 21"	X
LOP-FRENCH (30)	15 strongly developed and sturdy	15 lopped vert. from crown, horseshoe shaped 1 1/2" or more below jaw	X
LOP-HOLLAND (35) (43 pts. total including crown)	25 wide, short, round, well-filled muzzle	10 lopped vert. from CROWN (8 pts) horseshoe shaped 1/2"-1" below jaw	X
LOP-MINI (32)	16 strongly developed bold & balanced, wider in bucks	16 lopped vertically from boldly arched crown; horseshoe shaped	X
MINI REX (12)	5 proportional-small narrower in does	5 erect, relatively short & w/out flanges	2 bold, bright

NETHERLAND DWARF (35)	15 big, round in all directions. larger in bucks	15 erect, short, good substance Ideal len. 2" rounded tips balanced DISQ. over 2 1/2"	5 round, bold & bright
NEW ZEALAND (5)	combined for 5 points med. well-filled more massive in bucks	erect, med-thick proportional	
PALOMINO (0)	no allocated points med. proportional more developed in bucks	carried together, well-furred and proportional	
POLISH (45)	15 short, full cheeks & muzzle; convex skull. broader in bucks	15 short, close touching. no flanges. DISQ. over 3"	15 large, bold, expressive bright
REX (7)	3 broad, proportional harmonizing w/body	3 erect, med. thick. proportional	1 bright bold
RHINELANDER (0) (12 pts on head marking)	no specific point allocation full, well-shaped balanced	erect in "V" balanced	bright, bold
SATIN (3)	combined for 3 points proportional balanced	erect, well-furred	X bright bold
SILVER (9)	6 med. in size and proportional	3 upright and proportional	X
SILVER FOX (7)	4 well formed, shaped balanced	2 upright, heavy base, proportional in length	1 clear, bold, bright
SILVER MARTEN (0) (4 pts on head markings)	no specific point allocation medium, broader in bucks	erect proportional	large, bold, bright
TAN (0) (4 pts on head markings)	no specific point allocation NOTE: no specific description; but, faulted for long ears and narrow head		

TOTAL HEAD, HEAD ONLY EARS AND EYES

BREED	TOTAL	HEAD INCLUDING MARKINGS	HEAD	EARS	EYES
AMERICAN	10	X	5	4	1
AMERICAN FUZZY LOP	40	X	30	10	X
AMERICAN SABLE	10	X	combined	8	x
ANGORA-ENGLISH	12	X	5	5	2
ANGORA-FRENCH	9	X	3	4	2
ANGORA-GIANT	7	X	3	2	2
ANGORA-SATIN	9	X	5	4	X
BELGIAN HARE	13	X	5	5	3
BEVEREN	15	X	10	5	X
BRITANNIA PETITE	35	X	10	10	15
CALIFORNIAN	5	X	3	2	X
CHAMPAGNE D'ARGENT	5	X	combined	5	X
CHECKERED GIANT	8	24	4	4	X
CHINCHILLA-AMERICAN	10	X	combined	8	2
CHINCHILLA-GIANT	12	X	7	3	2
CHINCHILLA-STANDARD	0	X	X	X	X
CINNAMON	6	(all markings 11)	3	2	1
CREME D'ARGENT	7	X	3	3	1
DUTCH	8	30	5	2	1
DWARF HOTOT	30	45	15	15	X
ENGLISH SPOT	0	28	X	X	X
FLEMISH GIANT	13	X	7	4	2
FLORIDA WHITE	10	X	combined	10	X
HARLEQUIN	0	20	X	X	X
HAVANA	14	X	5	5	4
HIMALAYAN	12	32	5	5	2
HOTOT	10	25	5	5	0
JERSEY WOOLY	29	X	15	12	2
LILAC	10	X	3	3	4
LOP-ENGLISH	46	X	13	33	X
LOP-FRENCH	30	X	15	15	X
LOP-HOLLAND	35	X	25	10	X
LOP-MINI	32	X	16	16	X
NETHERLAND DWARF	35	X	15	15	5
NEW ZEALAND	5	X	combined	5	X
PALOMINO	0	X	X	X	X
POLISH	45	X	15	15	15
REX	7	X	3	3	1
RHINELANDER	0	X	X	X	X
SATIN	3	X	combined	3	X
SILVER	9	X	6	3	X
SILVER FOX	7	X	4	2	1
SILVER MARTEN	0	X	X	X	X
TAN	0	X	X	X	X

SUMMARY FOR HEAD, EARS, EYES AND TOTAL HEAD POINTS

BREEDS WITH 5 OR MORE POINTS ON THE EYES

1. Britannia Petite (15)
2. Polish (15)
3. Netherland Dwarf (5)

BREEDS WITH THE MOST POINTS ALLOCATED TO THE EYES

1. Britannia Petite (15)
2. Polish (15)

BREED WITH THE MOST EMPHASIS ON EARS

English Lop (33)

BREEDS WITH 15 OR MORE POINTS ON EARS

1. Dwarf Hotot (15)
2. French Lop (15)
3. Netherland Dwarf (15)
4. English Lop (33)
5. Mini Lop (16)
6. Polish (15)

BREEDS THAT COMBINE HEAD AND EAR POINTS

1. American Sable (8)
2. New Zealand (5)
3. Satin (3)
4. Champagne d'Argent (5)
5. Florida White (10)
6. American Chinchilla (8)

BREEDS WITH MORE THAN 10 POINTS ON HEAD

1. French Lop (15)
2. Dwarf Hotot (15)
3. Holland Lop (25)
4. Polish (15)
5. Jersey Wooly (15)
6. Mini Lop (16)
7. English Lop (13)
8. Netherland Dwarf (15)
9. American Fuzzy Lop (30)

BREEDS WITH MORE THAN 20 POINTS ON HEAD

1. American Fuzzy Lop (30)
2. Holland Lop (25)

BREEDS WITH TOTAL HEAD, EAR AND EYE POINTS THAT EXCEED 40 POINTS

1. English Lop (46)
2. Polish (45)
3. American Fuzzy Lop (40)

BREEDS WITH MORE THAN 30 TOTAL HEAD, EAR AND EYE POINTS

1. English Lop (46)
2. Holland Lop (35)
3. Mini Lop (32)
4. Dwarf Hotot (30)
5. French Lop (30)
10. Polish (45)
11. American Fuzzy Lop (40)
12. Britannia Petite (35)
13. Netherland Dwarf (35)
14. Jersey Wooly (29)

INCLUDING THE HEAD MARKINGS, THE 3 BREEDS WITH THE MOST POINTS ON HEAD, EAR AND EYES

1. English Lop (46)
2. American Fuzzy Lop (40)
3. Dwarf Hotot (45)

BREEDS WITH POINTS ON HEAD MARKINGS

1. Dwarf Hotot (45)
2. Dutch (30)
3. Hotot (25)
4. Harlequin (20)
5. Himalayan (32)
6. English Spot (28)
7. Checkered Giant (24)
8. Cinnamon (11 total)

BREEDS WITH MORE POINTS ON EARS THAN HEAD

1. English Lop (33-13)
2. French Angora (4-3)

BREEDS WITH EQUAL POINTS ON HEAD AND EARS

1. Mini Lop (16 ea)
2. Polish (15 ea)
3. Dwarf Hotot (15 ea)
4. American Sable (5 ea)
5. Havana (5 ea)
6. Hotot (5 ea)
7. Checkered Giant (4 ea)
8. Netherland Dwarf (15 ea)
9. French Lop (15 ea)
10. Britannia Petite (10 ea)
11. Belgian Hare (5 ea)
12. Himalayan (5 ea)
13. Mini Rex (5 ea)
14. Creme d'Argent (3 ea)

BREEDS WITH MORE POINTS ON HEAD THAN EARS

1. Satin Angora (5-4)
2. Californian (3-2)
3. Cinnamon (3-2)
4. Flemish Giant (7-4)
5. Holland Lop (25-10)
6. Silver Fox (4-2)
7. Giant Angora (3-2)
8. Beveren (10-5)
9. Giant Chinchilla (7-3)
10. Dutch (5-2)
11. Jersey Wooly (15-2)
12. Silver (6-30)
13. American Fuzzy Lop (30-10)

BREEDS WITH MORE POINTS ON EYE THAN EITHER HEAD OR EARS

1. Britannia Petite (15-10-10)
2. Lilac (4-3-3)

BREEDS WITH MORE TOTAL HEAD POINTS THAN BODY TYPE POINTS

1. American Fuzzy Lop (40-30)
2. Dwarf Hotot (45-35) (includes head mark)
3. English Lop (46-28)
4. Netherland Dwarf (35-35)
5. Himalayan (32-15) (include head mark)
6. English Spot (28-0) (head marking only)
7. Britannia Petite (35-25)
8. Jersey Wooly (29-20)
9. Holland Lop (43-35)
10. Polish (45-25)
11. Harlequin (20-0) (head marking only)

BREEDS WITH A RESPOSEFUL EYE

1. Giant Chinchilla
2. Flemish Giant

BREEDS THAT CARRY EARS IN "V" SHAPE

1. English Angora
2. Harlequin
3. Beveren
4. Hotot
5. Rhinelander

BREEDS THAT CARRY EARS LOPPED VERTICALLY

1. American Fuzzy Lop (1/2-1" below jaw)
2. French Lop (1 1/2" or more below jaw)
3. Mini Lop (no measurement)
4. English Lop (minimum 21")
5. Holland Lop (1/2-1" below jaw)

BREEDS THAT CARRY EARS PARALLEL WITH THE HEAD

Belgian Hare

BREEDS WITH AN EAR LENGTH MAXIMUM

1. Dwarf Hotot (disq. for ears over 3 inches)
2. Jersey Wooly (disq. for ears over 3 inches. Ideal length 2 1/2 inches)
3. Netherland Dwarf (disq. for ears over 2 1/2 inches. Ideal length 2 inches)
4. Polish (disq. for ears over 3 inches)

BREEDS WITH A MINIMUM EAR LENGTH

1. Checkered Giant (5 3/4 " on seniors)
2. Flemish Giant (5 3/4" on seniors)
3. English Lop (21" on all classes

BREEDS WITH MEASUREMENT ON EARS - OTHER THAN MAXIMUM AND MINIMUM

1. English Angora 3-4"
2. Hotot 4 3/4"-5 1/8"

THE ONLY BREED WITH THIN TEXTURED EARS REQUIRED

Himalayan

BREEDS WITH A FLATTENED FACE

1. American Fuzzy Lop
2. Jersey Wooly

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TUTORIAL - FUR, COLOR AND CONDITION

BREED	FUR POINTS	COLOR POINTS	CONDITION POINTS
AMERICAN (35)	20 ARBA normal fur	15	10
AMERICAN FUZZY LOP (20)	15	5	5
AMERICAN SABLE (45)	20 roll-back; guard hairs 1/8" above undercoat	25 shadings included	5
ANGORA-ENGLISH (62)	57 den. 25; tex. 20; len. 12 ideal 2 1/2-3 1/2" min. 1 1/2"	5	5
ANGORA-FRENCH (60)	55 den. 25; tex. 20; len. 10 ideal 2 1/2-3 1/2" min. 1 1/2"	5	5
ANGORA-GIANT (70)	65 den. 25; tex. 20; len. 20 ideal 4"; min. 2" tex; underwool, awn fluff & awn (guard) hair	5	10
ANGORA-SATIN (66)	60 density, texture, length-15 points each; SHEEN 15 points	6	5
BELGIAN HARE (40)	10 rather harsh	20 ticking	10
BEVEREN (35)	15 roll back fur; ideal len. 1-1 1/2"	20	5
BRITANNIA PETITE (30)	25 fine, short, silky, fly-back	5	5
CALIFORNIAN (25)	20 ARBA normal fur includes markings	5	10
CHAMPAGNE D'ARGENT (35)	15 ARBA normal fur	20	10
CHECKERED GIANT (14) (markings-38 pts)	*7 short, fly-back	7	7

CHINCHILLA-AMERICAN (50)	25 fly-back; 1 1/8"-1 3/8" ideal 1 1/4"	25 undercolor-5 pts ring color-8 pts surface color-12 pts	5
CHINCHILLA-GIANT (30)	15 ARBA normal fur 1 1/8"-1 3/8"	15 undercolor-3 pts ring color-5 pts surface color-7 pts	10
CHINCHILLA-STANDARD (65)	30 fine; 1 1/8"-1 3/8"; ideal 1 1/4"	35 undercolor-8 pts ring color-12 pts surface color-15 pts	5
CINNAMON (26) *markings 11 pts	*15 ARBA normal fur	11	5
CREME D'ARGENT (35)	15 resume natural position	20	5
DUTCH (20) *markings 50 pts	*10 short, dense & fly back	10	5
DWARF HOTOT (15) *markings 15 pts	*10 soft, fine, roll-back	5	5
ENGLISH SPOT (16) *markings 56 pts	8 short & fine	8	5
FLEMISH GIANT (35)	15 return to normal position	20	10
FLORIDA WHITE (25)	20 ARBA normal fur	5	10
HARLEQUIN (25) *markings 60 pts	*10 ARBA normal fur	15	5
HAVANA (45)	20 soft, medium length	25	10
HIMALAYAN (15) *markings 43 pts	*10 fine, silky & close lying	5 (body)	5
HOTOT (20) *markings 15 pts	*15 NBF; visible guard hairs frosty sheen	5	5

TUTORIAL - FUR, COLOR AND CONDITION

BREED	FUR POINTS	COLOR POINTS	CONDITION POINTS
AMERICAN (35)	20 ARBA normal fur	15	10
AMERICAN FUZZY LOP (20)	15	5	5
AMERICAN SABLE (45)	20 roll-back; guard hairs 1/8" above undercoat	25 shadings included	5
ANGORA-ENGLISH (62)	57 den. 25; tex. 20; len. 12 ideal 2 1/2-3 1/2" min. 1 1/2"	5	5
ANGORA-FRENCH (60)	55 den. 25; tex. 20; len. 10 ideal 2 1/2-3 1/2" min. 1 1/2"	5	5
ANGORA-GIANT (70)	65 den. 25; tex. 20; len. 20 ideal 4"; min. 2" tex; underwool, awn fluff & awn (guard) hair	5	10
ANGORA-SATIN (66)	60 density, texture, length-15 points each; SHEEN 15 points	6	5
BELGIAN HARE (40)	10 rather harsh	20 ticking	10
BEVEREN (35)	15 roll back fur; ideal len. 1-1 1/2"	20	5
BRITANNIA PETITE (30)	25 fine, short, silky, fly-back	5	5
CALIFORNIAN (25)	20 ARBA normal fur includes markings	5	10
CHAMPAGNE D'ARGENT (35)	15 ARBA normal fur	20	10
CHECKERED GIANT (14) (markings-38 pts)	*7 short, fly-back	7	7

CHINCHILLA-AMERICAN (50)	25 fly-back; 1 1/8"-1 3/8" ideal 1 1/4"	25 undercolor-5 pts ring color-8 pts surface color-12 pts	5
CHINCHILLA-GIANT (30)	15 ARBA normal fur 1 1/8"-1 3/8"	15 undercolor-3 pts ring color-5 pts surface color-7 pts	10
CHINCHILLA-STANDARD (65)	30 fine; 1 1/8"-1 3/8"; ideal 1 1/4"	35 undercolor-8 pts ring color-12 pts surface color-15 pts	5
CINNAMON (26) *markings 11 pts	*15 ARBA normal fur	11	5
CREME D'ARGENT (35)	15 resume natural position	20	5
DUTCH (20) *markings 50 pts	*10 short, dense & fly back	10	5
DWARF HOTOT (15) *markings 15 pts	*10 soft, fine, roll-back	5	5
ENGLISH SPOT (16) *markings 56 pts	8 short & fine	8	5
FLEMISH GIANT (35)	15 return to normal position	20	10
FLORIDA WHITE (25)	20 ARBA normal fur	5	10
HARLEQUIN (25) *markings 60 pts	*10 ARBA normal fur	15	5
HAVANA (45)	20 soft, medium length	25	10
HIMALAYAN (15) *markings 43 pts	*10 fine, silky & close lying	5 (body)	5
HOTOT (20) *markings 15 pts	*15 NBF; visible guard hairs frosty sheen	5	5

JERSEY WOOLY (44)	39 density 15; texture 12; length 12; ideal 2-3" min. 1"	5	5
LILAC (40)	20 RBFO; 1" in length not to fly-back	20	15
LOP-ENGLISH (9)	5 less than 1"	4 (includes markings)	10
LOP-FRENCH (12)	8 roll-back; ideal length 1 1/4"	4 (includes markings)	5
LOP-HOLLAND (7)	5 roll-back; approx. 1"	2 (includes markings)	5
LOP-MINI (15	10 roll-back; med. length	5 (includes markings)	5
MINI REX (45)	35 straight up; not exceed 5/8"	10 Brokens: disq. less than 10% more than 50%	5
NETHERLAND DWARF (25)	10 roll-back	15	5
NEW ZEALAND (30)	15 ARBA normal fur	15	10
PALOMINO (40)	15 ARBA normal fur	25	5
POLISH (20)	10 fly-back	10	5
REX (50)	40 upright; ideal len. 5/8"; disq. less than 1/2", more than 7/8"	10 Brokens: disq. less than 10% more than 50%	5
RHINELANDER (35) *markings 30	5 BFO; short, fly-back	30 body-5 distribution-25	5
SATIN (35+10 SHEEN)	20	15	10

	sheen 10; satin fur std. return to natural position	faulted: Broken for: less than 10%; more than 50%	
SILVER (65)	15 short 5/8"-7/8" snappy fly-back	50 surface & under color-15; evenness of silvering-20; brightness of silvering-15	5
SILVER FOX (28+15 silvering)	20 fairly long, 1-1 1/2"; remain upright	8 + 15 silvering	5
SILVER MARTEN (42) *markings 13 pts	20 ARBA normal fur	22	5
TAN (35) *markings 35 pts	10 snappy fly-back; guard hair 3/4-7/8"	25 body-10 pts. tan-15 pts	5

RBFO, BFO & NFB - Recommended for breed fur only

SUMMARY FUR, COLOR AND CONDITION

BREED WITH MOST POINTS ON CONDITION
Lilac (15)

THE LEAST NUMBER OF POINTS FOR ANY BREED ON CONDITION
5 points

BREEDS WITH THE MOST POINTS ON FUR/WOOL

1. Giant Angora (65)
2. English Angora (57)
3. Rex (40)
4. Mini Rex (35)
5. Satin Angora (60)
6. French Angora (55)
7. Jersey Wooly (49)

BREEDS WITH MORE THAN 25 POINTS ON COLOR

1. Silver (50)
2. Rhinelander (30)
3. Palomino (25)
4. Belgian Hare (20+10)
5. Standard Chinchilla (35)
6. Tan (25)
7. American Sable (25)
8. American Chinchilla (25)
9. Havana (25)

JERSEY WOOLY (44)	39 density 15; texture 12; length 12; ideal 2-3" min. 1"	5	5
LILAC (40)	20 RBFO; 1" in length not to fly-back	20	15
LOP-ENGLISH (9)	5 less than 1"	4 (includes markings)	10
LOP-FRENCH (12)	8 roll-back; ideal length 1 1/4"	4 (includes markings)	5
LOP-HOLLAND (7)	5 roll-back; approx. 1"	2 (includes markings)	5
LOP-MINI (15	10 roll-back; med. length	5 (includes markings)	5
MINI REX (45)	35 straight up; not exceed 5/8"	10 Brokens: disq. less than 10% more than 50%	5
NETHERLAND DWARF (25)	10 roll-back	15	5
NEW ZEALAND (30)	15 ARBA normal fur	15	10
PALOMINO (40)	15 ARBA normal fur	25	5
POLISH (20)	10 fly-back	10	5
REX (50)	40 upright; ideal len. 5/8"; disq. less than 1/2", more than 7/8"	10 Brokens: disq. less than 10% more than 50%	5
RHINELANDER (35) *markings 30	5 BFO; short, fly-back	30 body-5 distribution-25	5
SATIN (35+10 SHEEN)	20	15	10

	sheen 10; satin fur std. return to natural position	faulted: Broken for: less than 10%; more than 50%	
SILVER (65)	15 short 5/8"-7/8" snappy fly-back	50 surface & under color-15; evenness of silvering-20; brightness of silvering-15	5
SILVER FOX (28+15 silvering)	20 fairly long, 1-1 1/2"; remain upright	8 + 15 silvering	5
SILVER MARTEN (42) *markings 13 pts	20 ARBA normal fur	22	5
TAN (35) *markings 35 pts	10 snappy fly-back; guard hair 3/4-7/8"	25 body-10 pts. tan-15 pts	5

RBFO, BFO & NFB - Recommended for breed fur only

SUMMARY FUR, COLOR AND CONDITION

BREED WITH MOST POINTS ON CONDITION
Lilac (15)

THE LEAST NUMBER OF POINTS FOR ANY BREED ON CONDITION
5 points

BREEDS WITH THE MOST POINTS ON FUR/WOOL

1. Giant Angora (65)
2. English Angora (57)
3. Rex (40)
4. Mini Rex (35)
5. Satin Angora (60)
6. French Angora (55)
7. Jersey Wooly (49)

BREEDS WITH MORE THAN 25 POINTS ON COLOR

1. Silver (50)
2. Rhinelander (30)
3. Palomino (25)
4. Belgian Hare (20+10)
5. Standard Chinchilla (35)
6. Tan (25)
7. American Sable (25)
8. American Chinchilla (25)
9. Havana (25)

BREEDS WITH MORE POINTS ON COLOR THAN FUR

1. American Sable (25-10)
2. Beveren (20-15)
3. Standard Chinchilla (20- (35-30)
4. Flemish Giant (20-15)
5. Havana (25-20)
6. Palomino (25-15)
9. Belgian Hare (20-10, ticking 10)
10. Champagne d'Argent 15)
11. Creme d'Argent (20-15)
12. Harlequin (15-10)
13. Netherland Dwarf (15-10)

BREEDS WITH MORE POINTS ON COLOR THAN FUR (CON'T)

7. Silver (50-15)
8. Tan (25-10)
14. Rhinelander (30-5)
15. Silver Marten (22-20)

BREEDS WITH 50 OR MORE POINTS ON FUR/WOOL AND COLOR

1. Giant Angora (76)
2. Silver (65)
3. English Angora (62)
4 Rex (50)
5. Satin Angora (66)
6. Standard Chinchilla (65)
7. French Angora (60)
8. American Chinchilla (50)

BREEDS WITH LESS THAN 5 POINTS ON COLOR (INCLUDING MARKINGS)

1. Holland Lop (2)
2. English Lop (4)
3. Californian (5)
4. French Lop (4)
5. Mini Lop (5)
6. American Fuzzy Lop (5)

BREEDS WITH 8 POINTS OR LESS ON FUR

1. English Spot (8)
2. English Lop (5)
3. Checkered Giant (7)
4. French Lop (5)
5. Rhinelander (5)

BREEDS WITH LESS THAN 15 POINTS ON TOTAL FUR/WOOL & COLOR

1. Holland Lop (7)
2. French Lop (12)
3. Himalayan (15)
4. English Lop (9)
5. Mini Lop (15)
6. Checkered Giant (14)
7. Dwarf Hotot (15)

BIOGRAPHY

Dr. T. E. "Doc" Reed was born March 19, 1940. He was a 1965 graduate of Purdue University School of Veterinary Medicine. Dr. Reed opened his large and small animal practice in Markle, Indiana upon graduation. He continued that practice until his death on June 18, 1994. The last ten years of his life was devoted to rabbit medicine.