

Rabbits

The Feeding and Care of a Successful Rabbitry



Rabbits

Table of Contents

Getting Stared	2
Common Breeds and Uses	
Nutrition and Feeding	3
Basic Digestion	
Nutritional Requirements	
Changing Feed Programs	
Feeding Recommendations	
Feeding Methods	
Management	7
Hutchkeeping Rules	
Running it Right	
Tracking Physiological Data	
Reproduction, Mating, Gestation and Weaning	8
Reproduction	
Mating Age	
Gestation	
Kindling	
Weaning-Rebreeding	
Shelter	9
Outdoor Shelters	
Cages	
Watering Systems	
Nest Boxes	
Feeders	
Sanitation	
Record Keeping	
Diseases of Rabbits	11
Infectious Diseases	
Other Diseases	
Marketing	13
Rabbit Husbandry References	13

Whether you're a rabbit fancier or commercial breeder, your rabbits' nutrition is important to you. Overall health, of course, is determined in large part by meeting any animal's nutritional needs. However, the rabbit's ability to achieve high productivity is strongly influenced by nutrition. A successful rabbit operation, whether for pleasure or profit, relies on advanced formulas to keep rabbits in good health.



It's working—rabbits are on the rise. The bred-rabbit population is increasing each year.

To be successful in the rabbit business, you have to remain updated on changes in nutrition and management. To help in these areas, your feed supplier has joined with others in establishing Cooperative Research Farms (CRF). For many years, CRF was actively engaged in rabbit research. CRF rabbit research has been conducted in the states of Ohio, New York and Virginia.

Our ingredient and feed evaluations have progressed simultaneously with management and feeding programs. The result is a wealth of information that has been incorporated into this manual, designed to provide practical answers on nutrition, housing and modern rabbit management.

CRF members have invested in the scientific research behind the feeds they sell. Behind every feed tag, you'll find solid science—technological and operational breakthroughs you'll get nowhere else.



Getting Started

The Feeding and Care of a Successful Rabbitry

The selection of a breed is a very important step in starting a rabbit operation. Base your decision on whether the rabbits are to be used for meat, fur, show or companion animal purposes. Mature rabbits of the large breeds weight 14 to 16 pounds, medium breeds nine to 12 pounds, and the small breeds three to four pounds. The medium-sized breed is considered to have the widest variety of uses.

The following is a brief description of the common breeds of domestic rabbits and their use:

New Zealand: Meat, laboratory and show; 9 to 12 pounds; fur white, red or black.

English Spot: Show, meat and laboratory; 5 to 8 pounds; white body with black, blue, chocolate, tortoise, lilac, grey or gold spots. Heat spots appear on nose, ears, cheeks and as circles around eyes; spine spots extend from base of ears to end of tail; side spots extend from base of ears to middle of hindquarters.

Flemish Giant: Show and meat; 12 pounds or over, fur steel grey, light grey, sandy, black, blue, white or fawn.

Checkered Giant: Show and fur; 11 pounds or over; body white with black or blue spots on cheeks, sides of body and hind-quarters and a wide spine strip. Black or blue ears and nose, and black or blue circles around the eyes.

Champagne d'Argent: Show and meat; 9 to 12 pounds; young are born solid black and at four months start to attain silver colour over entire body.

American Chinchilla: Show and fur; 9 to 12 pounds; surface fur grey, under-fur deep blue-grey, belly white.

Californian: Meat and show; 8 to 10 1/2 pounds, white fur with black nose, ears, feet and tail.

Satins: Show and fur; 8 1/2 to 11 pounds; fur black, blue, Californian, Chinchilla, chocolate, copper, red, Siamese, white.

Silver Martens: Show and fur; 6 1/2 to 9 1/2 pounds; fur black, blue, chocolate or sable with silver-tipped guard hairs.

Rex: Show and fur; 7 pounds or over; fur black, blue, Californian, Castor, Chinchilla, chocolate, lilac, Lynx, opal, red, sable, seal, white, broken.

Himalayan: Show and laboratory, 2 1/2 pounds to 5 pounds; white fur with black nose, ears, feet and tail.

Polish: Show and laboratory; not over 3 1/2 pounds; fur black, blue, chocolate, blue-eyed white, ruby-eyed white.

Dutch: Show and laboratory; 3 1/2 to 5 1/2 pounds at maturity; fur black, blue, chocolate, tortoise, grey or steel grey, having pure white band over the shoulder, under the neck and over the front legs and hind feet.

Your foundation stock should be purchased from reputable breeders and be certified Pasteurella-free. Pasteurella bacteria are present in all non-SPF rabbits, and its introduction to your herd can cause a broad range of health problems, as well as severely limiting production. Records should show the stock to have minimal disease problems and the young to be relatively free from birth defects.

A reputable breeder will discuss management and provide records of his rabbitry. It is not advisable to obtain animals without records. The records will reveal points that must be considered in establishing a successful rabbit operation. These are:

- **Regular Breeding:** The doe should produce at least six to eight litters per year.
- **Litter Size:** The doe should kindle between eight and 10 young, weaning seven or eight per breeding cycle.
- **High Levels of Milk Production:** Look for a weight of about 385 grams per bunny at 21 days. This will show the doe has a high rate of milk production and indicates the offspring's growth potential.
- **Rapid Growth:** Fryers should weigh at least four pounds at eight weeks of age.
- **Breeding Longevity:** The breeding life of both does and bucks should span between one to three years. Typical annual turn-over can consist of 120 percent of females and 40 – 50 percent of bucks.
- **Disease Resistance:** Select breeding stock from families that have shown a high degree of resistance to disease.
- **Excellent Type:** Select animals showing the established conformation for the breed and that are free from undesirable characteristics such as buck teeth, yellow fat, wooliness or off-colored pelts.
- **Vitality:** Obtain animals that are strong and vigorous.
- **Genetic Diversity:** Avoid excessive in-breeding by purchasing breeding stock from more than one source. If you buy from more than one source, however, the new rabbits should remain isolated for three to four weeks prior to introduction to minimize the potential for spreading disease. Visit all new or isolated animals last to avoid cross-contamination. Disinfect all cages and equipment before adding any new stock.



Nutrition and Feeding

The Feeding and Care of a Successful Rabbitry

Basic Digestion

Rabbits are primarily herbivores, and are simple-stomached animals, as opposed to ruminants. As with the horse, there is microbial digestion in the large intestine and cecum. Feeds are broken down in the small intestine. It is the major area for the absorption of protein, fat, carbohydrates, energy, minerals and vitamins.

The cecum is capable of holding up to one-third of the digestive tract's volume and contains bacteria that help the rabbit utilize undigested food sources. The cecum and both the large and small intestines contain bacteria and protozoa that break down feed material by fermentation. During fermentation, microbial protein is synthesized and carbohydrates are broken down to volatile fatty acids that provide energy.

This fermentation in the lower digestive tract makes coprophagy, or the reingestion of soft feces, an important aspect of rabbit nutrition. Rabbits produce two types of feces. One is a hard, dry pellet, which is found under the cage. The other, a soft, high-moisture form, is not usually seen because it is consumed by the rabbit during the night.

Coprophagy is vital in providing B-complex vitamins, bacteria-synthesized protein and further digestion of some nutrients by passage through the digestive tract. B vitamins are synthesized in the lower digestive tract and the rabbit nearly or completely satisfies its requirement for these vitamins by consuming its soft feces.

While the unique digestive process makes the rabbit efficient at utilizing roughages, it also makes it sensitive to carbohydrate overload in the large intestine. With high level of grain and low levels of quality fiber, carbohydrates will be "food" for undesirable bacteria. The result is enteritis (diarrhea) caused by bacterial toxins. Loose feces under the cages are rare and should alert you that there is a digestive problem.

Nutritional Requirements

Rabbits require protein, carbohydrates, fat, minerals, vitamins and—just as important as the feed itself—water. The amount of nutrients (feed) that has to be consumed varies with the needs of the rabbit. High-producing breeder does and growing rabbits need more nutrients and energy than rabbits which are being maintained, such as bucks and early gestation does.

It is necessary for breeding and growing rabbits to have a balanced diet which is palatable and digestible. If the energy content of a feed is too low, a rabbit may not be able to consume enough to grow or lactate. And it won't eat enough to meet its needs if the feed is not palatable.

Water

The largest single constituent of the rabbit's body, water comprises approximately two-thirds of the body mass. No other substance has as many functions:

- Provides a solvent for digestions
- Transports nutrients and waste
- Regulates body temperature
- Lubricates joints

Water deficiency will cause poor growth and lactation, so be sure to always provide plenty of clean, fresh water. Evaluate water system to ensure an appropriate flow rate, as both low and excessive flow rates will decrease water intake. Rabbits eating dry food in warm weather will drink 10-20 oz. of water per day.

Energy

Energy is not a nutrient, but is supplied by protein, fat and carbohydrates. The energy requirement (feed intake) varies with maintenance, growth, gestation, lactation, environmental temperature and body size.

The amount of feed necessary also depends on the digestible energy content of the feed. As the digestible energy content of the feed decreases, the rabbit will eat more feed to meet its energy requirement. If the digestible energy is low in the feed, the rabbit may not be capable of consuming adequate feed for maximum growth and lactation. CRF formulations offer a variety of energy levels so that you may select the proper formula(s) for your rabbits.

The approximate feed intake with a feed containing 1,000 calories per pound is 3.8 percent of body weight for mature does and bucks, 5 percent for lactating does and 6 percent for growing bunnies.

Protein

Protein is made up of amino acids, which are the building blocks for blood, muscle, tissue, fur and are also vital to bone growth. Factors directly affected by protein/amino acid quantity or quality are milk production, litter size, weight gain and coat quality. For these reasons a higher protein diet is recommended when more litters per year are produced and when conditioning rabbits for show.

Coprophagy provides rabbits the opportunity to better utilize protein. The microbial contents of the rabbit's cecum produce proteins, which have a high nutritional value. However, the protein in the feed must be of high quality, defined in this case as having all the essential amino acids needed by the rabbit. It is these essential amino acids—those the rabbit cannot synthesize—which are necessary for rapid growth, proper development and lactation.

Nutrition and Feeding

The Feeding and Care of a Successful Rabbitry

The level of protein in the diet necessary to meet the needs of the rabbit for growth, gestation, lactation, body tissue repair and fur depends on the quality of that protein. The quality of protein is in turn related to the amino acid make-up, which influences the level of protein required.

In terms of amino acids, a well-balanced diet may contain as little as 15 percent protein, whereas most practical and economical diets contain 15 to 20 percent protein.



Fiber

Rabbits are not the most efficient utilizers of dietary fiber. Therefore, as the fiber content increases in the feed, there is a decrease in the digestible energy; consequently, rabbits have to consume more feed to provide for body functions.

There is no dietary recommended fiber level, but most feeds contain from 14 to 20 percent fiber.

It has been suggested that the dietary fiber level is related to diarrhea problems, but no conclusive evidence is available. It is typically recommended that fiber levels be increased with health challenges and/or poor management. With good management, fiber levels can be reduced, which has the effect of increasing the energy level.

Fat

Dietary fat provides a source of concentrated energy and essential fatty acids. Rabbits can utilize high levels of dietary fat (10 to 20 percent), however most commercial feeds contain only two to three percent. If high levels of fat are added, feed consumption will decrease. Therefore, other nutrient levels will need to be increased to compensate for the resultingly lower intake. Be aware that additional weight gain from higher fat levels in the diet may not offset the added cost of the fat.

Minerals

Calcium and Phosphorus - Calcium and phosphorus are major constituents of bone and teeth. Calcium has a role in blood clotting and muscle contractions. Phosphorus is a component of protein, lipids and carbohydrates and functions in their metabolism. Dietary levels of calcium at 0.8 to 1.0 percent and phosphorus at 0.5 to 0.8 percent are satisfactory for growth and reproduction.

Rabbits should not be fed more phosphorus than calcium because it can induce bone abnormalities, as do deficiencies of calcium and phosphorus.

Salt - Salt is a source of sodium, an essential component of body fluids. Salt can be provided at 0.5 percent of the diet or given as a salt spool. Sodium levels in the water may need to be taken into account.

Potassium - Potassium serves in performing muscle contractions, nerve function and transportation of body fluids. A well-balanced commercial diet contains 0.6 to 0.9 percent potassium and meets the needs of the rabbit.

Magnesium - Magnesium is an essential constituent of bone and teeth and is present in all body cells and soft tissues. The magnesium requirement is low (0.06 percent) and can be supplied by forages in the diet. More complete feeds contain 0.2 percent magnesium. Magnesium deficiency can cause retarded growth as well as fur and weight loss.

Nutrition and Feeding

The Feeding and Care of a Successful Rabbitry

Iron and Copper - Iron and copper are essential for blood formation. A deficiency of either can cause anemia and the loss of fur pigmentation. Dietary levels of six parts per million (ppm) copper and 40 ppm of iron are adequate for growth and hemoglobin formation.

Manganese - Manganese is necessary for proper bone formation, growth and reproduction. The manganese requirement is listed at nine ppm, although most diets contain much higher levels. It is doubtful that a deficiency would ever be observed using natural ingredients. A deficiency is associated with malformed skeleton, short, bowed legs and bones that break easily.

Selenium - It is recommended that 0.1 mg/kg (0.05 mg/lb) be added to rabbit diets.

Zinc - Zinc is involved with many body enzyme systems that are responsible for growth and maintenance of tissue. A requirement has not been determined but it is required and a diet that contains 20 to 50 ppm appears adequate. A deficiency in this important mineral may result in poor growth, loss of fur and dermatitis.

Vitamins

Vitamin A - Vitamin A is necessary for the development and maintenance of bone and epithelial tissues, as well as supporting visual processes. (There is some truth to the time-honored canard that carrots help you see better.) Rabbits can obtain their vitamin A from carotene found in forages. Diets containing 1,000 International Units (IU) per pound appear satisfactory; however, commercial feeds usually have much more. Because vitamin A is heat sensitive, make sure your feed contains a high-quality source of this vitamin to prevent breakdown during warm weather.

A lack of vitamin A results in muscle weakness, blindness, leg paralysis, convulsions and reproductive failures. Excess vitamin A causes slow growth, skin lesions and fur loss.

Vitamin D - Vitamin D promotes absorption of calcium and phosphorus from the small intestine and their utilization by bones. A deficiency of vitamin D causes rickets in young animals and osteomalacia in mature animals. Complete diets containing as little as 200 milligrams per pound meet the rabbit's vitamin D requirement. CRF research has shown that excessive levels of vitamin D can cause an increased incidence of soft tissue calcification of the heart, kidneys and muscles.

Vitamin E - Vitamin E is important in maintaining hemoglobin stability and also works as a stabilizer of fat structures. It is recommended that feeds contain a total of 20 IU per pound for growth and reproduction.

Vitamin K - Vitamin K is important for blood clotting. A vitamin K deficiency has never been reported since the rabbit's microflora synthesis is adequate.

B-Complex (Water Soluble) Vitamins - There are eight B-complex vitamins necessary for growth, reproduction and maintenance of rabbits. These are thiamine, riboflavin, pantothenic acid, niacin, folic acid, vitamin B12, biotin and choline. There is evidence that rabbits receive adequate amounts of B-complex vitamins from those synthesized by intestinal microflora and the ingestion of their soft feces.

Vitamin C - Rabbits are capable of synthesizing vitamin C in the liver, and therefore do not require a dietary source.

Other Ingredients

CRF research-based feeds have proven the effectiveness of providing live, beneficial organisms, which enable several responses:

- Competitive exclusion where salmonella, E. coli and other harmful organisms are excluded from establishing populations in the digestive tract because of the presence of live lactobacillus and other beneficial organism.
- Rabbits are healthier, and in all studies, survivability of the young was greater with the proper mix of live organisms in the feed.
- Nutrients produced by these live organisms are highly digestible.
- Rabbits stay on feed so that enteritis is virtually eliminated. This does not mean these organisms can offset the negative effects of a high carbohydrate diet; however, the rabbits can withstand much more stress.

Changing Feed Programs

It is always a good idea to change feed slowly from one feeding program to another. Mixing the old feed with the new feed allows the rabbit to adjust. You should have a specific goal in mind when supplementing feed. Use caution when supplementing feed pellets with greens, grains, bread or other carbohydrates. Do not add barley, corn, oats, hay or other foodstuffs to your rabbit-feeding program without proper advice from a nutritionist. Sorting of whole grains or hay may occur, reducing proper nutrient intake. Dilution of feed intake will decrease intake of nutrients, which in turn can suppress rabbit performance.

Feeding Rates

A rule of thumb is two to three ounces per day for small breeds, 3.5 to four ounces per day for medium breeds, and four to eight ounces per day for large breeds. Beginning on the second day after kindling, nursing does should have their feed increased daily, until they are on a full-feed regimen, where they should be kept until the litter is weaned.

Nutrition and Feeding

The Feeding and Care of a Successful Rabbitry

Feeding Recommendations

Bucks & Dry Does:

- Feed to maintain proper weight and condition
- Four to six ounces daily

Gestating Does:

- Depending upon condition, feed four to six ounces daily
- Overfeeding increases body weight and results in fertility drops and kindling problems

Lactating Does:**

- Limit to two to three ounces of feed the first day to prevent caked udders
- Increase daily to reach free choice in about four to five days

Bunnies:**

Feed free choice prior to and following weaning

Young Rabbits:**

Free choice until they reach their genetic potential

** Self-feed on a free choice basis

Feeding Methods

Self-feeding – Place feed in hoppers from which the rabbits may eat until they are full. Feeding once a day—usually in the evening—is plenty, but it's important to feed at the same time each day. Remember, very little digestion of feed takes place in the stomach, which is primarily a holding vat for ingested food. Feed passes rapidly through the stomach; therefore, it is beneficial to provide feed free-choice to growing rabbits.

Full-feeding – Hand-feed once or twice daily. Increase the feed allowance until the rabbit either eats all the feed or has just a few pellets left at the next feeding. This way, the stock always has fresh feed.

Restricted-feeding – A lower-than-normal feed allowance is hand-fed once or twice daily to herd bucks, dry does and young breeding stock to prevent them from becoming too fat. A fat rabbit has a lower reproductive rate.

The following table provides non-proprietary formulation guidelines for our CRF rabbit feeds:

Feed Tag Information

Nutrient.		16 percent Rabbit		18 percent Rabbit		Show Rabbit	
		Min.	Max.	Min.	Max.	Min.	Max.
Crude Protein	percent	16.0		18.0		19.0	
Crude Fat	percent	2.00		2.5		3.50	
Crude Fiber	percent	14.0	16.5	14.0	16.0	13.0	16.0

What else should you look for when choosing your feeds? An additional key to the success of CRF-member manufactured rabbit diets is our intolerance for fines. This means your feed supplier is committed to using the highest-grade ingredients, incorporating pellet binders and keeping careful attention on grind and pellet size.

Another factor to consider in selecting diets is the color of the feed. Green alfalfa meal, for instance, is highly favored over brown alfalfa meal. In addition to a DFM (Direct Fed Microbial), another ingredient of value is yucca extract. This will markedly reduce odor in the rabbit buildings.



Management

The Feeding and Care of a Successful Rabbitry

Hutchkeeping Rules

You have selected the breed(s) best suited to your purposes. You provide high-quality feed and plenty of fresh water. However, there are still a few more factors to consider on your way to successful rabbit management, among them housing, equipment and record keeping.

Construct housing to protect the rabbits from predatory animals, excessive heat and the elements. Good ventilation is essential. Buildings should be designed to allow convenient feeding, cleaning and removal of manure. Building plans should also allow for future expansion.

The style of the equipment you will need for feeding and caring for rabbits will depend upon the size of the rabbitry and the purpose for which the rabbits are grown. In general, however:

- Wire cages and metal feeders are preferred
- Use automatic watering where feasible
- Build nest boxes to protect young
- When selecting equipment, always consider ease of cleaning

High-quality feed should be made available in clean feeders or crocks and in adequate quantities as outlined in the section on feeding. Clean, fresh water should be available at all times, making automatic watering systems advisable.

Record keeping is essential for selecting replacement breeding stock and, for rabbit producers, providing the data that will help make informed economic decisions to keep your operation strong. Good records also help to reveal problems with breeding, feeding, health and marketing.

Running it Right

A few simple rules will make your rabbitry a successful enterprise:

- Never loan bucks to others.
- Isolate new rabbits or those returning from shows for three to four weeks, keeping them far away from other rabbits.
- Quickly dispose of dead rabbits. If disease is suspected, disinfect equipment and burn droppings and bedding.
- Clean and disinfect cages regularly. Don't allow droppings, hair or moisture to collect on cages.
- Clean and disinfect the doe's cage before inserting a new nest box. Clean the cage again before the litter comes out of the nest.
- Wash and disinfect nest boxes. Never re-use litter (wood shavings).
- Vacuum or burn fur that accumulates on cages.
- Keep water clean. Flush and disinfect water lines weekly.
- Control flies with insecticide. If you use sprays, spray the rabbitry, especially the manure area.
- Keep the dropping pits under the cages as dry as possible.
- Keep vermin out.
- Have visitors disinfect their shoes or wear disposable plastic boots before entering or enforce a "no visitors" rule.

Tracking Physiological Data

Life Span

Average of all breeds about six years, maximum
15 years for large hybrids

Minimum Breeding

Age
Four months for small breeds (Polish), five to six months for medium breeds (New Zealand), nine-12 months for large breeds (Flemish)

Weight

Minimum breeding weight is 2/3 of adult weight

Estrus Cycle

About 15-16 days. Ovulation occurs past coitus

Gestation time

Average 31 days, variation 29-35 days

Weaning age

Four to eight weeks (35 days is the recommendation in Quebec)

Rectal Temperature

Range of average 102.2 - 103.2 F, minimum 101.9 F, maximum 103.7F

Respiratory Rate

Average 53 breaths per minutes, variation 38-60

Heart Rate

Average 205 beats per minute, range 200-250

Daily Food Consumption

0.4 - 1.2 oz. of food per lb of body weight, depending on production phase

Daily Water Consumption

Three ounces during growth; 12 ounces for adults; one to two quarts during lactation. This will also depend on environmental conditions.

Reproduction

The Feeding and Care of a Successful Rabbitry

Reproduction, Mating, Gestation and Weaning

Reproduction

The rabbit doe is polyestrous—having no regular estrus cycle—and ovulation is stimulated by mating. Eggs develop in the ovaries of mature females every 15 to 16 days. These eggs may be fertilized from the second to the 14th day of this 16-day period, meaning the doe is generally receptive 13 days out of 16.

Bucks usually mature about one month later than does.

Breeding can be natural, forced or accomplished by artificial insemination. Natural matings provide the highest conception rate.

The doe should be taken to the buck and observed for mating. (Never bring the buck to the doe, as it may spend too much time examining the new cage, or worse, make the doe feel so threatened she attacks. If mating does not occur within two to three minutes, the doe should be removed and either placed with another buck or brought back to the buck the following day. The mating is complete when the buck falls over on his back or side after mounting.

If double matings are used, they should be done immediately. Generally if the same pair is mated, they should be bred back within five hours after the first mating. These methods will take advantage of improving breeding efficiency.

Mating Age

The age for first matings depends on the breed, but a general rule is that the large breeds may be mated at nine to 12 months of age. Smaller breeds mature earlier than larger ones, with six months as the average first mating age for does. Restlessness and nervousness will often indicate a doe is ready to mate; however, it is not necessary to watch for these signs. Set up a breeding schedule and follow it. Does can reproduce for three years, although some hardy breeders have remained productive for up to four.

Bucks of the same breed can be used for breeding at about the same age as the does. One buck can be used several times per day, but generally they should not be used more than two to three times per week. Body condition should be monitored to avoid over-use.

Gestation

The average gestation period for rabbits is 31 days, varying anywhere from 29 to 35 days. If a doe exhibits kindling tendency 18 to 22 days after mating, it is a good sign of false pregnancy (pseudo-pregnancy).

Does should be checked for pregnancy 14 days after mating. If not found pregnant, they should be bred back immediately. A pregnancy check can be made by holding the doe by the ears and skin over the shoulders with the right hand, using the left hand to palpate for the fetuses. The embryos will be marble-shaped and the size of an olive. Care should be taken when palpating the doe to prevent injury to the fetuses, particularly after 16 days of gestation.

Kindling

Does should be watched closely for signs of kindling. Nest boxes should be placed in with the doe three days before she is due to kindle or when fur pulling is observed. Remove nest boxes when the young rabbits are two weeks of age.

The doe should not be disturbed until after the young are a day old. At that time, the litter can be examined. Any deformed, dead or excess rabbits should be removed. Excess young (the strongest) can be transferred to a foster mother that is a good milker.

Weaning-Rebreeding

The young can be weaned at four weeks of age, but they are normally separated from the doe at eight weeks. (A typical weaning age in Quebec is 35 days.) An ambitious, but good rule of thumb is that meat rabbits should weigh five pounds at eight weeks.

Most commercial breeders rebreed at 31 days after kindling, which produces six litters per year. This requires greater attention to feeding and management than when the does are rebred six to eight weeks after kindling.



Outdoor Shelters

Outdoor hutches should provide adequate shelter from sunlight, rain and snow, as well as protection from predators. A hutch with woven wire floors and sides provides air circulation and is more sanitary than a solid hutch. Single-deck hutch doors should be about 34" from the ground and should be of 14 or 16 gauge 1" x 1/2" welded galvanized wire. Sixteen gauge 1" x 2" wire may be used for the sides. Chicken wire does not provide adequate protection from dogs. Sheet aluminum, galvanized steel, tempered Masonite or exterior plywood all are satisfactory for the roof. The door should be large enough to allow easy access to the entire hutch and to facilitate cleaning and placement of nest box placement, feeders and waterers.

Commercial Rabbit Housing

Weather extremes should be considered in site selection. A site providing natural protection from winter winds and summer sun is preferred. If the building must be in the open in northern climates, a house that runs east and west takes advantage of the heat from the winter sun and the summer cooling westerly breezes. A well-drained site will help keep moisture down. It is also a good idea to check zoning laws and to anticipate possible zoning changes.

If rabbits are to be raised for laboratory use in the United States or to be sold to pet dealers, they must be housed and handled according to Animal Welfare Act Regulations set forth by the U.S. Department of Agriculture. A rabbitry that is in this business is also required to be licensed by the U.S. Department of Agriculture. Some occasional sales of such animals are exempt.

Details are available from:

www.aphis.usda.gov/ac/publications.html

Canadian producers should contact their federal or provincial authorities to determine the requirements in their area.

www.ccac.ca/en/CCAC_Main.htm

Farm buildings designed for poultry are usually satisfactory for rabbits. Former poultry houses should be thoroughly steam-cleaned, sanitized and allowed to dry at least three weeks before housing rabbits. This practice is suggested to avoid possible contamination of organisms from poultry to rabbits.

A 30' x 96' house designed for caged laying hens is large enough for a 100-doe rabbitry. Windowless houses, open-sided houses with outside curtains and windowless, insulated houses can be used. Housing design depends upon the climate and whether complete environmental control is desired. Divide rabbits by stage of growth or production into separate rooms for best results.

In a windowless house, electric lights are essential. They may be controlled by a timer, running at least 12 hours on and 12 hours

off. In the maternity area, lighting should be on 15 to 16 hours, while those in the growing section can be reduced to eight hours per day.

Ventilation fans controlled automatically by a timer and thermostat will help provide a comfortable environment – between 40 and 80 F. In hot climates evaporation or mist cooling may be necessary. Insulation of the rabbitry may be feasible to help control temperature.

Most modern rabbit buildings have concrete floors. Some may have dirt floors with concrete walks wide enough for feed carts and manure-handling equipment.

Cages

Wire cages for medium-sized breeds are usually 30" deep by 36" wide and 18" high. They are hung from the ceiling three or four feet above ground level. Especially designed for rabbits, these cages are available commercially or can be built by the rabbit producer. Welded wire half-inch by one-inch, 14-gauge is used for floors, while top and sides are made of one-inch by two-inch, 14- or 16-gauge wire. Twelve-gauge wire is used to hang the cages from the ceiling. Cages are usually hung back-to-back in single tiers. A few extra cages can be built for growing rabbits, housing bucks and isolation of new stock brought into the herd from the outside.

Watering Systems

Water is an essential nutrient and its importance is often overlooked. Fresh, clean water should be available to the rabbits at all times. Automatic watering saves time, is much more sanitary, and assures a constant supply of fresh water. Float tanks or pressure regulators, plastic pipe with electric heating cables inside the pipe in cold climates and dew-drop, monoflow or pivoting stem drinking valves make up the watering system. Pressure regulators are necessary if the water system is connected to a city water line or farm pressure system. Pressure should be reduced to about three pounds; check pressure at both the beginning and end of each line. In colder regions, regulating water temperature by using water that has been preheated to room temperature is recommended.

If there is sediment in the water, a filter is required to avoid plugging of the drinking valves. Hair that accumulates on the valves also must be removed regularly. Make sure that drinking valves are of the proper height so that all rabbits can drink.

Nest Boxes

Nest boxes are used to protect the young. There are many designs, and they can be made from a variety of materials: wood, Masonite, wire, galvanized steel or a combination of two or more of these items. Sunken nest boxes are said to help overcome losses

Shelter

due to very young rabbits getting out of the boxes. Nest boxes are available from equipment suppliers or can be home-made. A design in common use is a box eight inches high by 12 inches wide by 18 inches long, with one end cut down to about six inches. Wooden boxes cost less and may be warmer, but they are difficult to wash and disinfect.

In controlled environment buildings, wire nest boxes lined with wood shavings, hay, straw or paper can be used. In warm climates, wire bottom nest boxes without lining are satisfactory. The nest is made entirely from the hair that the doe pulls. Additional insulation is required during cool weather. The nest box should be placed in the doe's cage three days before she is due to kindle.

Feeders

A number of different kinds of metal feeders are available. There are self-feeders that hang on the wire cage where the feed hopper is on the outside and the feed trough is on the inside of the cage. There are feeders for the doe and growing rabbits, creep feeders for starting very young rabbits and combination doe-and-creep feeders. Creep feeders should be constructed or placed in such a way as to prevent the doe from getting to the creep feed. Feeders should have small holes or screens to allow feed fines to fall through. Keep feeders free of moisture.



Sanitation

Pasteurella and diarrhea are the major causes of rabbit losses. Studies have shown that management and environment are most important in preventing morbidity and mortality in a rabbit operation.

Floors, equipment, feeders and waterers need to be disinfected with Iodo-Phor compounds at least every four to five weeks. Clorox is an excellent disinfectant. Read all labels carefully.

Some type of bedding needs to be placed under the cages to absorb urine and reduce odors. Droppings and urine should be removed at least once a week to help eliminate bacterial build-up.

Sick rabbits should be removed immediately from other rabbits and treated, and the area cleaned and disinfected.

Record Keeping

All serious rabbit raisers should keep good records. They are necessary to identify any long-term productivity problems and to evaluate individual and overall performance. The following is information that should be recorded:

Buck:

- Identification number, origin, date of birth and breed
- For each mating: date, doe number, observations
- Kindling date: litter size (alive and stillborn)
- Weaning date: litter size and weight
- Selling date: litter size, live weight and carcass weight
- Special observations on health, behavior, etc.

Doe:

- Identification number, origin, date of birth and breed
- For each mating: date, buck number, observations
- Pregnancy diagnosis
- Kindling date: litter size (alive and stillborn)
- Weaning date: litter size and weight
- Selling date: litter size, live weight and carcass weight
- Special observations on maternal behaviour, health problems and treatment, etc.

Weaned Litter:

- Weaning date, weaning live weight and number
- Feed consumption
- Feed conversion
- Selling weight and carcass weight



Diseases of Rabbits

The Feeding and Care of a Successful Rabbitry

Infectious Diseases

Note: Consult your veterinarian for specific preventions and treatments or refer to *Domestic Rabbits: Disease and Parasites*, U. S. Department of Agriculture, Agriculture Research Services, Agriculture Handbook No. 490, 1976.

Pasteurellosis – Runny nose—nasal discharge may be thick or thin, sneezing, matted fur on inside front feet. May develop into pneumonia, and is usually a chronic type of infection.

Causes: Bacterial infection of the nasal sinuses (*Pasteurella multocida* or *Bordetella bronchiseptica*).

Treatment and Control: Isolate sick animals, clean and disinfect hutches thoroughly, euthanize and deeply bury rabbits that do not recover completely after treatment. Treat individual animals with penicillin: streptomycin injected intramuscularly. Use one ml. for fryer size, two ml. for mature rabbits. Repeat on day three or administer terramycin liquid for mastitis at five drops into mouth each day for five days.

Pneumonia – Labored breathing with nose held high, bluish colour to eyes and ears. Lungs show congestion and may be red, mottled, moist and possibly filled with pus. Often secondary to enteritis.

Causes: Bacterial infection of the lungs. Organisms involved may be *Pasteurella multocida*, *Bordetella bronchiseptica*, and *Staphylococcus* and *Streptococcus* sp.

Treatment and Control: Isolate sick animals, clean and disinfect hutches thoroughly, euthanize and deeply bury rabbits that do not recover completely after treatment. Treat individual animals with penicillin: streptomycin injected intramuscularly. Use one ml. for fryer size, two ml. for mature rabbits. Repeat on day three or administer terramycin liquid for mastitis at five drops into mouth each day for five days.

Enteritis, Bloat or Scours – Most common in young rabbits at five to eight weeks of age. Loss of appetite, lowered litter activity, dulled or squinted eyes, rough fur and bloated appearance. Diarrhea or mucus droppings. Animals may grind teeth. Stomach contents are fluid, gaseous or filled with mucus.

Causes: Causes unknown; may be due to an intestinal virus or stress with bacterial toxins resulting in secondary damages.

Treatment and Control: Terramycin or aureomycin may be used in the drinking water for treating individual cases. Keep hutches and nest boxes clean.

Tyzzler's Disease – Occurs in rabbits three to eight weeks of age. Primary sign is a persistent diarrhea, usually ending in death in one or two days.

Causes: Bacterial infection of large intestines and liver by *Bacillus piliformis*.

Treatment and Control: Aureomycin in drinking water may be helpful. It may be necessary to depopulate, clean and disinfect the premises to eliminate disease.

Ringworm or Favus – Circular patches of scaly skin with red, elevated crust. Usually starts on head. Fur may break off or fall out.

Causes: Fungal infection, typically by trichophyton and microsporum. A warm, moist environment and poor ventilation tends to encourage its development.

Treatment and Control: Isolate doe and litter, move affected litter to a clean, isolated cage, dip doe and litter in lime sulphur dip, if possible, or treat affected areas with tincture of iodine and then dust nesting boxes with industrial fungicidal sulphur.

Salmonellosis – Young rabbits are most susceptible. Affected rabbits portray dullness, high temperature, diarrhea, coma and, eventually, death.

Causes: Infection with salmonella-species bacteria.

Treatment and Control: Use good sanitary measures to reduce transmission to new animals. Treat individual animals with penicillin: streptomycin injected intramuscularly. Use one ml. for fryer size, two ml. for mature stock.

Staphylococcosis – Abscesses on feet.

Causes: A bacterial disease which usually invades broken areas of the skin caused by bruising or open wounds of the feet.

Treatment and Control: Prevent infection by maintaining dry, sanitized cage and a clean environment. Cull animals with advanced cases. Abscesses must be drained. Penicillin: streptomycin injections will usually help systemic infections.

Diseases of Rabbits

The Feeding and Care of a Successful Rabbitry

Coccidiosis, Intestinal – Mild cases, no symptoms; moderate cases, diarrhea and no weight gain. Severe cases have pot belly, diarrhea with mucus. Pneumonia is often secondary.

Causes: Parasitic infection of the intestinal tract caused by coccidia. (*Eimeria perforans*, *E. magna*, *E. media*, *E. irrisdua*.)

Treatment and Control: Keep floor clean and dry, removing droppings frequently. Prevent fecal contamination of feed and water.

Water soluble sulfaquinoxaline can be added to the drinking water. This treatment, combined with good sanitation, will greatly reduce numbers of parasites and, therefore, infected animals.

Coccidiosis, Hepatic (Liver) – Pure infections are usually not detectable in live animals and are usually not fatal. Liver infections, however, often are seen in combination with intestinal coccidiosis and may be fatal.

Causes: Parasitic infection of the liver and bile ducts caused by *Eimeria stiedae*.

Treatment and Control: Same as for intestinal coccidiosis.

Ear Mange or Canker – Shaking of head, scratching of ears. Brown scaly crusts at base of inner ear.

Causes: Ear Mites (*Psoroptes cuniculi* and *Chorioptes cuniculi*).

Treatment and Control: To treat the condition make a 0.5% suspension using 25 percent Malathion wettable powder suspended in glycerine. Apply this material in each ear liberally and spray rabbitry with 0.5% Malathion spray. Repeat at two week intervals until eradication is complete.

Tapeworm Larvae – White streaks in liver or small white cysts attached to membrane on stomach or intestines. Usually cannot detect in live animals.

Causes: Larval stage of the dog tapeworms (*Taenia pisiformis*) or of the cat tapeworm (*Titaeniaeformis*).

Treatment and Control: No treatment; keep dogs and cats away from feed, water and nest box material. Eggs of tapeworm occur in droppings of dogs and cats.

Other Diseases

Sore Hocks – Bruised, infected or abscessed areas on hocks. May be found on front feet in severe cases. Animal shifts weight to front feet to relieve hocks.

Causes: Bruised or chafed areas become infected. Caused by wet floors, irritation from wire or nervous “stomping.”

Treatment and Control: Small lesions may be helped by placing animal on lath platform or on ground. Advanced cases are best culled. Medication is temporarily effective.

Fur Plucking or Chewing – Rabbits chewing their own fur will show bare or uneven areas along their backs, sides and rumps. If they chew the fur of a hutchmate, the eyelashes, feelers and fur on the head disappear first.

Causes: Numerous causes have been suggested, including:

- A behaviour characteristic often the result of boredom and/or overcrowding
- Dietary deficiency in nutrients such as protein fiber or water
- Infectious or parasitic diseases are contributing causes

Treatment and Control: Ensure maintenance of a good environment with no overcrowding. Feed a balanced diet formulated to contain the necessary essential nutrients. Remove problem animals and isolate in a single cage.

Caked Udders – Breasts become firm and congested; later hard knots form at sides of nipples. Knots may break open, showing dried milk.

Causes: Milk not drawn from glands as fast as formed, because of too few young or young not nursing sufficiently. Usually a management problem with high milk producing does.

Treatment and Control: Do not wean young abruptly; if litter is lost, rebreed doe and protect doe from disturbance so young can nurse properly. Correct faulty nest boxes that injure breasts.

Conjunctivitis or Weepy Eye – Inflammation of the eyelids; discharge may be thin and watery or thick and purulent. Fur around the eye may become wet and matted.

Causes: Bacterial infection of the eyelids. May also be due to irritation from smoke, dust, sprays or fumes.

Treatment and Control: Early cases may be cleared up with eye ointments, argyrol, yellow oxide of mercury or antibiotic used as directed. Protect animals from airborne irritants.

Marketing

Marketing of rabbits continues to be one of the largest problems in the industry. This problem has been overcome in certain local areas by good cooperation between producer and processor to supply the public with an attractive, high-quality product on a consistent basis.

The importance of a sound marketing program cannot be over-emphasized. A person interested in producing rabbits should thoroughly investigate the sale of animals before becoming involved.

Marketing of rabbits can be listed under the following categories:

- Marketed as rabbit meat.
- Sale of animal for research and laboratory purposes.
- Sale of rabbit meat for human consumption and selected parts such as eyes, aorta, brains, pancreas, etc., sold to research groups.
- Breeding purposes

Normally most market animals are sold as fryers at eight weeks of age, weighing approximately four to five pounds.

The white furred animals such as the New Zealand and Californian are preferred by processors because of the better saleability of the white pelt.

Dressing percent in fryers ranges between 50 to 60 percent, with an average of between 52 and 54 percent. It is extremely important to obtain a uniform lot with a high dressing percentage for best efficiency. This is influenced by genetics, feeding and management.

To really make rabbit meat an important part of the North American diet, producers and processors should work closely to supply an attractive product the consumer wants.

Listed below are items that should be remembered in marketing rabbits:

- Producers should select does for breeding that produce young which are high meat-yielding animals.
- Animals should be properly fed and managed to produce an attractive, finished carcass.
- Processor should package and display ready to cook product to attract new consumers and retain existing consumers.
- Rabbit should be realistically priced at a level fair to producer, processor, retailer and consumer.
- The packaged rabbit should be well display in the meat counter.
- Fresh suppliers should always be available at sale points.
- It is essential that more sales promotions for rabbit meat be undertaken.
- Sales of research animals, either as live animals or as individual parts or organs, are usually handled directly between rabbit raiser and the research group using the animals.

References

Rabbit Husbandry References

Nutrient Requirements of Rabbits

1977, Second Revised Edition
National Research Council
2101 Constitution Avenue, N.W.
Washington, D.C. 20418

Domestic Rabbits: Diseases and Parasites

U.S. Department of Agriculture
Agricultural Research Service, Agr. Handbook No, 490, 1976

American Rabbit Breeders Association, Inc.

P.O. Box 426
Bloomington, IL 61702
Phone (309) 664-7500
Fax (309) 664-0941
www.nmia.com/~arba/

Bass Equipment Company

www.bassequipment.com/

Evans Software Services

www.evans-software.com/index.shtml

Professional Rabbit Meat Association

www.prma.org/

World Rabbit Science Association

<http://world-rabbit-science.org/>



A Large Scale Partnership

Providing Innovative, Proven Animal Nutrition Research.

Research of the magnitude needed to be statistically valid is inherently expensive. So it's smart for feed manufacturers to join forces and share expenses.

It's also smart to buy from these cost-savvy feed producers. Because when we're watching out for our dollars, we're watching out for yours too.

By spreading the expense of research over the millions of tons of feed supplied by our members, CRF can keep the costs of reasearch to only pennies per ton of feed.

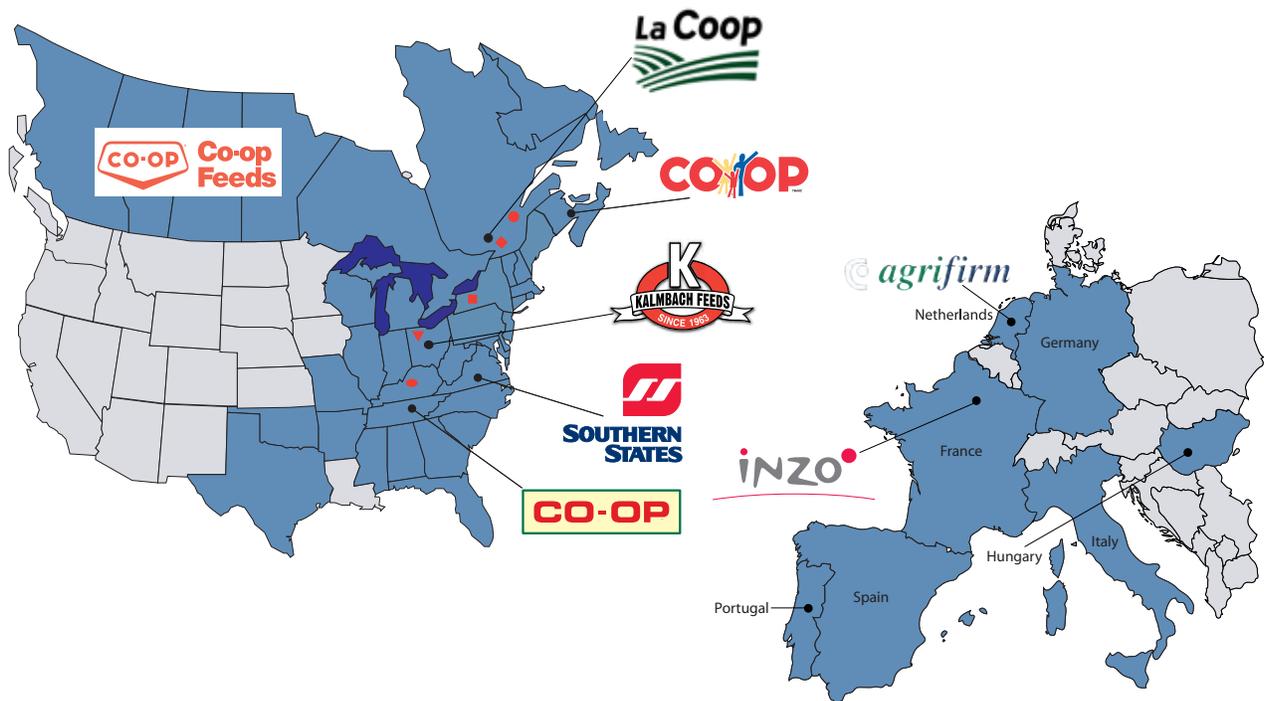
Through innovative partnerships and cost sharing. CRF is able to turn its collective knowledge into profits and increase productivity for its members for over 50 years.

This partnership enables CRF members to be the first with an array of patented techniques and products designed to make farming more profitable for you.



A Large Scale Partnership

Providing innovative, proven animal nutrition research.



- **Beef Research**
Various locations
- **Dairy Research**
New York, U.S.A.
- ◆ **Layer Research**
Quebec, Canada
- ▼ **Swine Nursery Research**
Ohio, U.S.A.
- ◆ **Broiler Research**
Quebec, Canada
- **Equine Research**
Kentucky, U.S.A.
- ▶ **Sow Research**
Quebec, Canada