



FEED^{THE}FUTURE

The U.S. Government's Global Hunger & Food Security Initiative



A COMPLETE HANDBOOK ON BACKYARD AND COMMERCIAL RABBIT PRODUCTION

PEACE CORPS PUBLICATION NO. R0041



USAID
FROM THE AMERICAN PEOPLE



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A Complete Handbook on Backyard and Commercial Rabbit Production

The Peace Corps

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Acknowledgements

A Complete Handbook on Backyard and Commercial Rabbit Production replaces an earlier publication of the same name that was produced by the Peace Corps in 1982. The majority of information found in that handbook was an adaptation and revision of *Commercial Rabbit Raising Agriculture Handbook No. 309*, by the U.S. Department of Agriculture.

This revision was done in 2014 under contract with EnCompass, LLC, through Feed the Future funding from USAID. The Peace Corps review team included Nutrition Specialist Eric Anderson and Expert Consultant Lee Lacy. Illustrations were produced by Kirsten Harper. The original manual was developed from material produced by Volunteers and staff members in Washington, D.C., and at Peace Corps posts throughout the world.

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As part of the United States “whole of government” effort to address food security in the developing world, the Peace Corps has edited and revised several existing technical manuals designed for use by Volunteers. Most of these materials were created in the late 1970s and early 1980s and were written by subject matter experts employed or contracted by the Peace Corps. They have been revised with funding provided to the Peace Corps by the U.S. Agency for International Development’s (USAID) Bureau of Food Security under a food security agreement, known as “Feed the Future.”

Given Volunteer and staff needs to access information on a wide range of topics related to food security, these manuals and their accompanying references were selected, reviewed, and updated, again, by subject matter experts. While years have passed since first written, the content covered in these manuals, particularly the basic concepts, has changed very little, if at all. Importantly, references in each of the manuals have been reviewed and updated, where necessary, and websites have been added to allow the reader to locate additional and more recent support content.

This manual is written as a guide for those Volunteers getting started with rabbit production projects. The intention is to provide Volunteers, staff, and counterparts with an overview of rabbit production practices. The focus is on raising rabbits to add needed protein to family diets and as an income-generating project for small farmers.

Much of the original content of this manual comes from the work of Volunteers and staff in the Philippines and from information developed by the U.S. Department of Agriculture. Volunteers may want to check with local extension agents and successful farmers to identify promising practices in rabbit production in their countries of service.

Glossary

Breeder: One who breeds or rears a special variety of rabbits in conformity with accepted standards of perfection or for the purpose of improving their commercial value.

Breeding: Mating the doe with the buck.

Buck: A male rabbit.

Buffing or kneading: The last stage in tanning when the skins are stretched by hand to soften the pelt.

Bunny: A baby rabbit.

Cage: A compartment generally 2-by-4-by-2 feet used for housing one adult rabbit.

Concentrates: Commercial or home-mixed feeds which provide 16–18 percent protein necessary in the rabbit's diet.

Conformation: Structural features, such as size, shape, etc.

Coprophagy: Reingesting of soft night droppings by the rabbit. It is usually a sign of nutritional deficiency.

Cross Breeding: Mating two different breeds of rabbits, such as a California and Chinchilla.

Cull: To remove all undesirable rabbits from the herd.

Doe: A female rabbit.

Droppings: Rabbit manure.

Dry Doe: The period of time from weaning the young, to the next breeding period, to the doe.

Forage: Any green roughage fed to cows, horses, pigs, and rabbits.

Foster Mother: A doe that nurses the bunnies of another mother in addition to her own bunnies. Fostering is usually done to even the number of bunnies from other does that have more than they can physically nurse.

Fryer: A bunny aged from 2 to 4 months old when its meat is prime, weighing about 9 to 1.5 kilos.

Fur Block: The stomach is filled with undigested fur, blocking the passage to the intestinal tract.

Gestation: Duration of doe's pregnancy from mating to kindling. Can be anywhere from 28 to 32 days, or an average of 30 days.

Hock: The middle joint or section of the hind leg, between the foot and the hip.

Hutch: A string or line of cages. They can be any length.

Hutch Card: Recording system where breeding and production are recorded for managerial evaluation. Usually a card is attached to each cage.

In-Breeding: Mating closely related rabbits of any breed.

Kindling: Giving birth to young rabbits.

Lactation: Nursing period from kindling to eight weeks.

Legume: Any plant of the pea family with seeds growing in pods, for instance peas, beans, and other leafy plants such as centrocema, Ipil-ipil (Peruvian type), Townsville stillo, leucerne (alfalfa), and a green leafy desmodium.

Litter: A set of bunnies per one birth.

Molting: The act or process of shedding or changing the fur, usually three times a year. The baby or nest fur is molted at 2 months old, and the first natural coat of fur is fully developed at 4–6 months. For a doe, it is nature's way of resting her from motherhood and she is in no condition to be bred.

Nest Box: A box measuring 22 inches long, 11 inches wide, 9 inches tall at the rear, 6 inches tall at the front, with a 6-by-11-inch top cover. Used for the doe to kindle her bunnies.

Nursing: Period when the young draw milk from the teats of the doe. Lasts from one to six days.

Oiling: The second to the last process of tanning to soften and prolong the life of the pelt.

Out-Breeding: Mating unrelated rabbits of any breed to improve the stock.

Palpating: A method of determining the accuracy of the doe's pregnancy on the 12th to 14th day after mating.

Glossary

Pedigree: A correctly written chart recording the male and female ancestors of a rabbit, also showing the date of birth. In short, the history of the animal.

Rabbit: A domesticated rodent of the genus *Oryctolagus Cuniculus*. An animal with four legs, about the size of a large cat, with medium or long ears.

Reproduction: The art of reproducing or multiplying of one's own kind.

Rump: The hind portion of the hack and backbone.

Sanitation: The art of maintaining cleanliness in the rabbitry, which is the most important part of management.

Tanning: A process of curing or preserving the skin or pelt of the rabbit by use of chemicals.

Weaning: Time when bunnies are separated from their mother, usually at 2 months of age.

Overview

Whether you raise rabbits for meat and fur, wool, or laboratory uses, select the breeds best adapted to the purpose. Table 1-1 lists common rabbit breeds and their predominant color, weight, and uses.

Medium and large breeds, such as the New Zealand, California, Dutch Gray, English Spot, Chinchilla, and Flemish Giant, have the most suitable size and conformation for producing meat and fur. White breeds of rabbits (e.g., New Zealand White and Californian) are the most prolific and the most desirable for commercial and fur production because white skins usually bring higher prices.

Table 1-1: Some Common Breeds of Rabbits

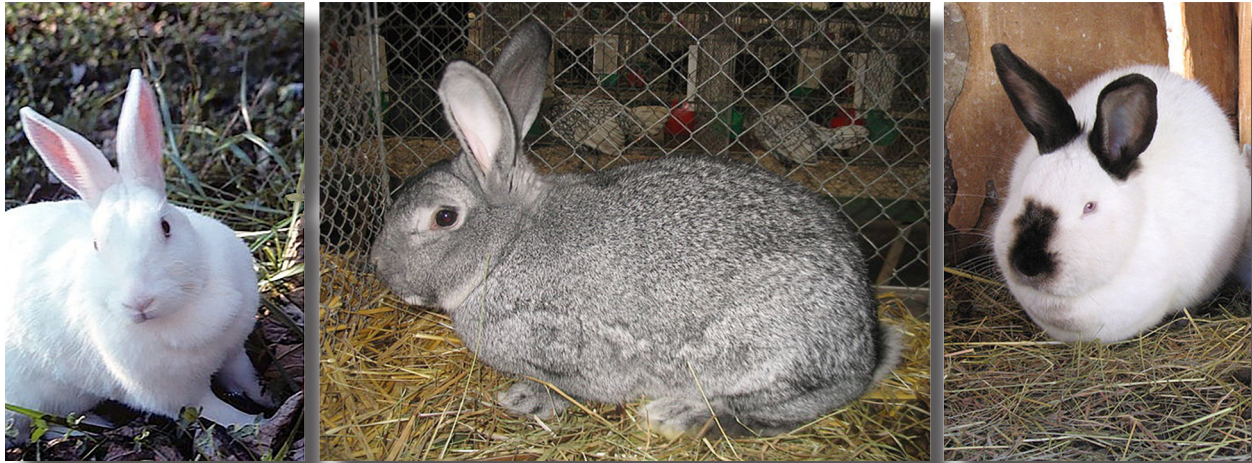
Breed	Color	Approximate Mature Weight (Kilos)	Principal Uses
American Chinchilla	Resembles the true Chinchilla	5–6	Meat and fur
Californian	White body; colored nose, ears, feet, and tail	3–5	Meat and fur
Dutch	Black, blue, chocolate, tortoise, steel gray, and gray; white saddle, or band over the shoulder carrying down under the neck and over the front legs and hind feet	1–2	Laboratory
English Spot	Basic body color white; colors of spots: black, blue chocolate, tortoise, steel gray, lilac, and gray; nose, ears, and eye circles and cheek spots; spine stripe from base of ears to end of tail; side spots from base of ears to middle of hind quarter	2–3	Laboratory and meat
Flemish Giant	Steel gray, light gray, sandy, black, blue, white, and fawn. No two colors allowed on solids	6	Meat
New Zealand	White, red, or black	4–5	Meat, fur, and laboratory

Ch 1: Selecting a Breed

With sufficient feeding, mature animals (4–5 months old) of the smaller breeds should weigh 1 1/3–3 kilos each; those of the medium breeds, 4–5 kilos; and those of the larger breeds, 6 1/3–7 1/3 kilos. There are 28 different breeds and approximately 77 varieties that vary in type, color, and size.

Figure 1-1: Pictured are representative breeds of meat rabbits: New Zealand White (left), Chinchilla (center), and Californian (right).

Photos c/o creativecommons.org



Selecting Foundations

Selection of prime stock is the initial and most basic step toward the success or failure of a rabbit operation. Naturally, an animal's appearance will play a major factor in the process of selection. Other essential requirements are health, vigor, longevity, ability to reproduce, and desirable type and conformation. However, overall, the primary criterion remains the rabbit's records. It is vitally important to study records on family production, hereditary factors, size of animals, growth potential, etc. Therefore, purchase your foundation stock from a reliable and established rabbitry that keeps such records.

Signs of Receptiveness

Female rabbits do not have a "heat" period. They ovulate in response to having been mounted by the male.

When ready for breeding, females will show reddening of the vulva. Deep red and even purple indicates the female will usually accept the male and conception should occur about 75 percent of the time. Other signs include:

- Sudden decrease in feed consumption
- Rubbing of chin on side of hutch

- Riding on one another if in a colony-type cage
- Restlessness; trying to gain entrance to neighboring cages and violently spilling water howl or cup
- Occasionally the doe will ride the buck when service is attempted

How to Breed

When does are 4 months or older, regularly check them for receptiveness (the vulva turning purple or reddening).

Following are guidelines for breeding:

1. Breed does initially at 5 months of age for small breeds and 6 months of age for medium size.
2. Use mature bucks at 6 months of age.
3. Breed in the early morning or late afternoon.
4. Take the doe to the buck's cage for service, leave for repeated service up to 10 minutes; return the doe to her cage. If the doe fights the buck, restrain her for service.
5. If the buck fails to serve the doe in minimum time, switch the doe to another buck.
6. Palpate the doe 10–14 days after breeding to see if the doe is pregnant. A doe that is not pregnant at 14 days should be regularly checked for receptiveness (vulva reddening) in order to return her for service with the buck.
7. The number of bucks needed depends on the size of the herd. Generally, a buck should only be bred as often as once every other day. Overweight rabbits, both bucks and does, become poor breeders. In general, keep one buck to every 10 does.
8. The average gestation period is 31 days. A day or two on either side is possible.
9. Replace a buck when his record reveals low production, or his offspring show poor feed conversion or poor rate of weight gain.
10. Save replacement stock for expansion as needed to keep cages filled with working does and active bucks. Constantly improve the herd by strict culling of low producers.

Ch 1: Selecting a Breed

11. The average production life of a good does is about 2–3 years, but save good-producing does as long as production warrants them.
12. The average production life of a good buck is from one to five years.
13. Save at least one young replacement doe and buck per month for each 12 working does at the end of the second or third year, when replacement is needed. This replacement rate generally will not cover both culling and mortality. Replenish stock as needed.
14. Occasionally purchase good bucks from established and reliable farms to prevent extreme in-breeding.

The following figures summarize the information a good manager needs for breeding operations.

Figure 1-2: Rabbit Lactation Calendar for Medium-sized Breeds

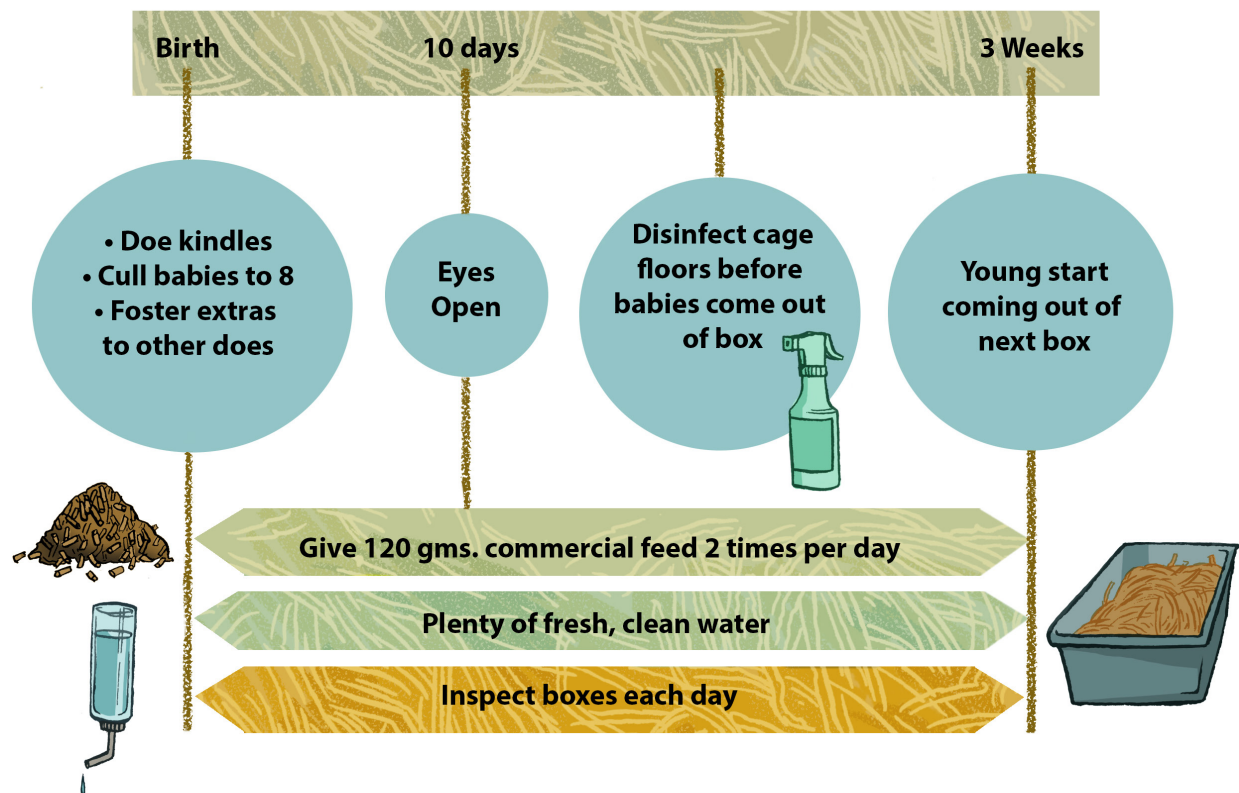
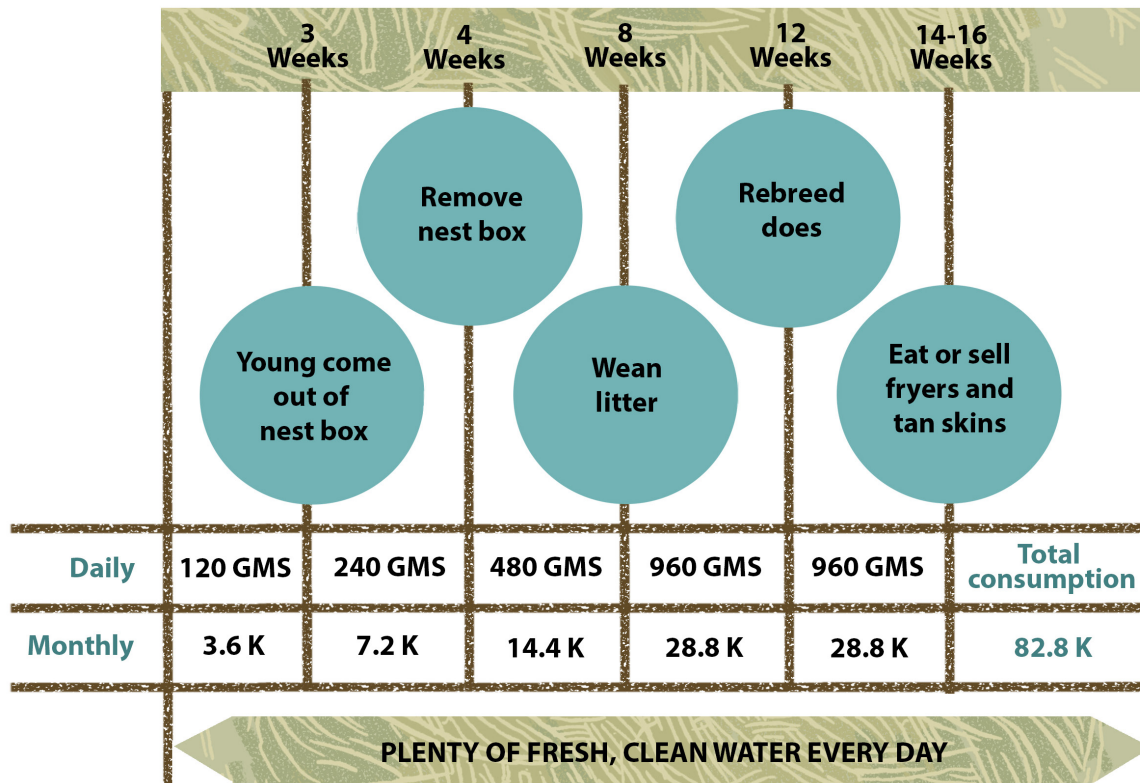
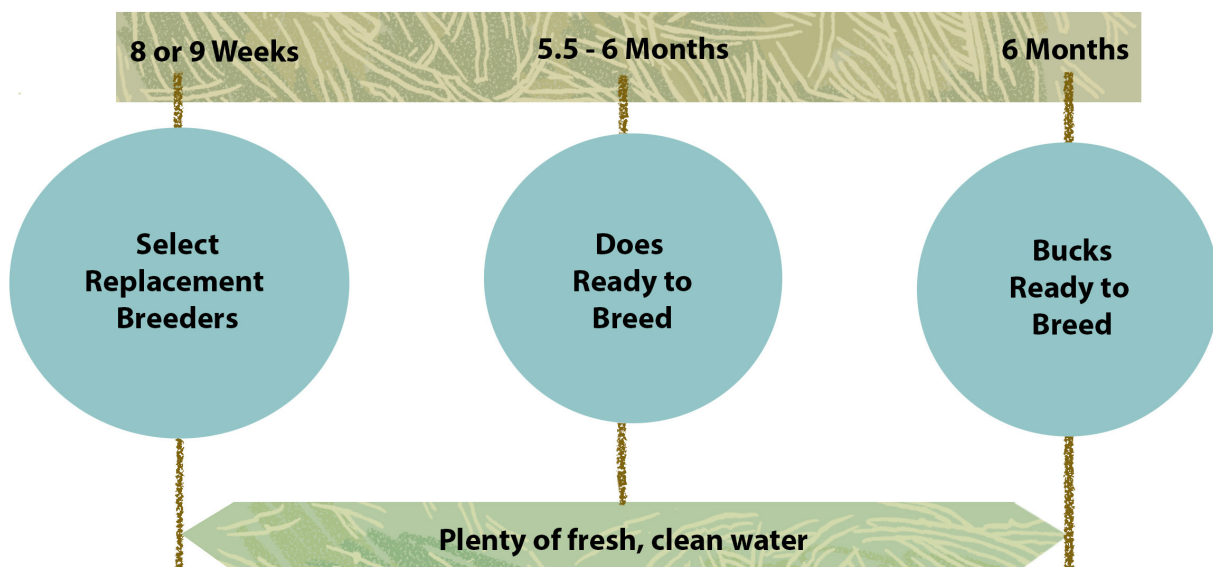


Figure 1-3: Rabbit Suckling Calendar*



*NOTE: This includes the doe's ration up to weaning or eight weeks. After weaning, she continues with 120 grams of daily feed ration.

Figure 1-4: Rabbit Breeder Replacement Calendar *



*NOTE: For second or third year of operation.

Ch 1: Selecting a Breed

Factors that Limit Conception

If a doe is indeed pregnant, as verified by palpating, but fails to kindle within five days or so of her expected date, it may indicate a serious problem. In these cases, it is advised to cull the doe, as the process of breaking these unborn/dead kits down will take six months or longer and her ability to produce after that will be uncertain.

Figure 1-5: Shown is a culled doe months after its expected kindling date, with hardened, unborn kits.

Photo c/o Peace Corps



The following are causes of low conception rates or failure to conceive.

Pseudopregnancy

Does may be stimulated sexually and shed egg cells, yet fail to become pregnant when the caretaker fails to have her properly mated. In this case, signs of heat are present, forcing her to ride on other does if in colony-type hutches. Does that become pseudopregnant are unable to conceive until the false-pregnancy period of 17 days is over. After 18 to 22 days, the doe may give evidence of the termination of false pregnancy by pulling fur and attempting to make a nest. When the false pregnancy has terminated, the doe will resume normal reproductive activity and may be bred.

To address this, separate does that are to be mated and put each in an individual hutch 18 days before mating. Then they will have passed through any false pregnancy period by mating time. Sometimes the cycle of pseudopregnancy can be broken by abruptly changing the type of roughage and concentrate or by withholding feed for 24 hours. Forced mating can also break the cycle of pseudopregnancy if heat signs are present.

Age

Young does may not be sexually mature at the time of service, and old does may have passed their period of usefulness and fail to conceive. Do not attempt the first mating until the does are sexually mature and properly developed; the proper age is 5–6 months old and the doe should weigh at least 2 kilos.

Does should reproduce satisfactorily as long as they are maintained in good physical condition and can properly nurse their litters. Retain them if younger and better stock is not available for replacements. In commercial herds, does that are properly cared for should produce litters until they are 2 to 3 years old. An occasional individual rabbit may reproduce satisfactorily 4–6 years or longer.

Physical Condition

Rabbits that go “off feed,” go into a prolonged or heavy molt, become abnormally fat or thin, or that become poorly conditioned for any reason may have their reproductive powers impaired. The percentage that are able to conceive will be low, since they may become temporarily sterile.

Disease

Sickly animals produce inferior offspring. Never mate rabbits when they show any symptom of disease. Remove such animals from the herd and hold them in quarantine until they recover.

Extreme Heat

Rabbits have a tendency to become temporarily sterile in extreme temperatures, such as those over 30 degrees Celsius (86 Fahrenheit). It is recommended to breed in the early morning or late afternoon.

Ch 2: Rabbitry and its Equipment

Overview

The type of hutch and equipment for any rabbitry will depend on where the rabbitry is to be located, the climate, and the amount of money to be invested.

Before starting to build hutches, the construction and equipment should be designed to minimize labor needed in caring for the herd. Furthermore, a neat design and convenient arrangement should be considered to ensure the best working environment.

Many types of hutches are in use and no one design is entirely suitable for all purposes or all conditions. Hutches should be well ventilated and should provide maximum comfort for the rabbits by giving adequate protection from all kinds of weather and predators. The animals must be protected from typhoon, winds, and hot sun and they must be kept dry.

What is important to remember is that, as much as possible, resources for initiating and sustaining rabbit production should be obtained locally. In addition, rabbit production should be inserted into local livelihood systems as much as possible. In order to save on expenses, materials around your own home should be used whenever possible. Scrap lumber and bamboo are good building materials.

Wire Hutches

Chicken wire of different sizes is also used in the construction of many hutches today but depreciation is extremely high. Chicken wire can be used for the walls or ceilings of rabbit hutches. Care should be taken to use a small gauge of chicken wire that will prevent small kits that escape the nest box from passing through and away from the safety of the hutch and mother. Anything smaller than the diameter of an American quarter is safe to use. Do not use chicken wire for the floors. Use of chicken wire of any size for hutch floors will almost certainly lead to sore hocks and other sores on the feet of rabbits, leading to infections and eventual production losses.

Cages should be approximately 30 inches wide, 30 inches deep, and 18 inches high (minimum of 30-by-30-by-18). The floor should be one-half-by-one-inch 14-gauge galvanized wire (galvanized AFTER weld is best) and the sides and top should be one-by-two-inch 14-gauge galvanized wire.

Whether you arrange the hutches in single, double, or triple tiers depends upon how much room is available. If you have enough room, waist-high, single-tier hutches are preferable as they are most convenient for observing the rabbits and will also save time and labor in feeding and management.

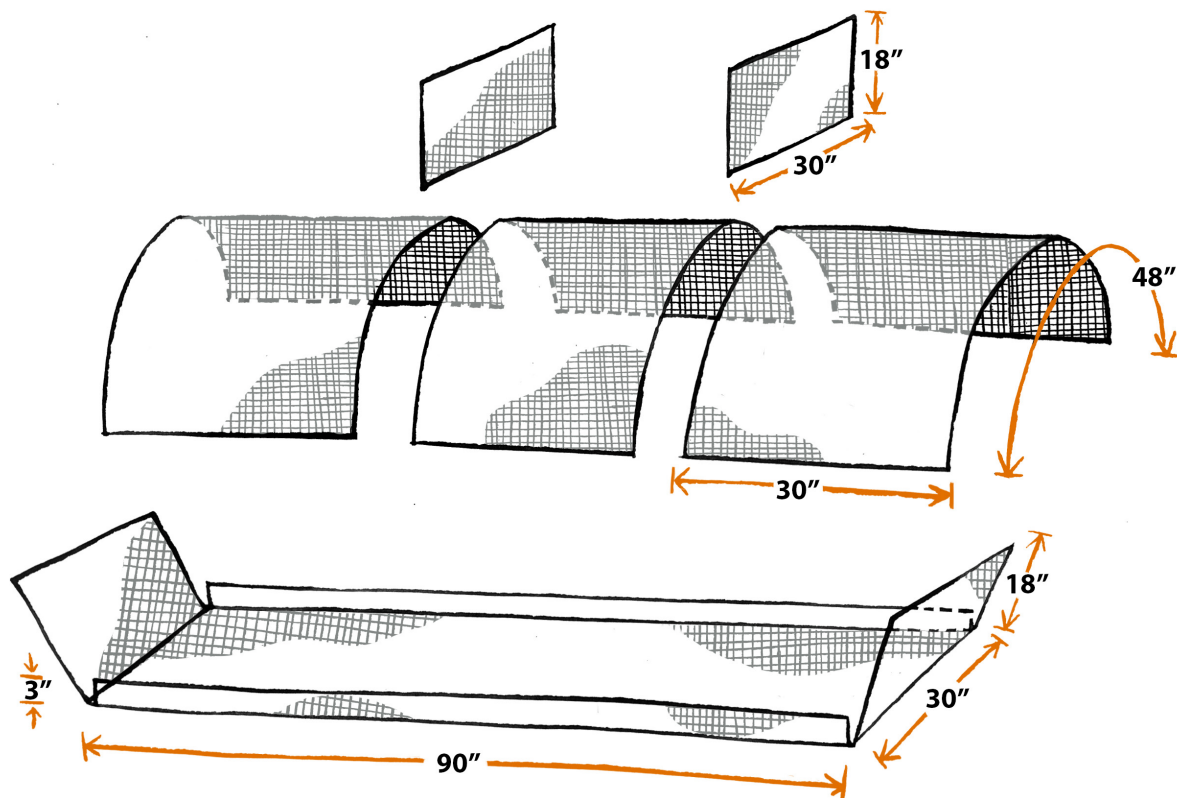
Ch 2: Rabbitry and its Equipment

A combination two-compartment all-wire hutch saves on labor and is simply designed, but it is more expensive to build.

The inconvenience of squatting or stooping to feed and care for rabbits in the bottom tier, and of having to use a stool or ladder for the top row of a three-tier arrangement, results in additional labor and time as compared to a single-tier arrangement. In addition, worst of all, good sanitation is sacrificed.

This diagram is an example of a design that has proven successful—it is a three-hutch system and “doors” are cut into each of the three-hutch stations.

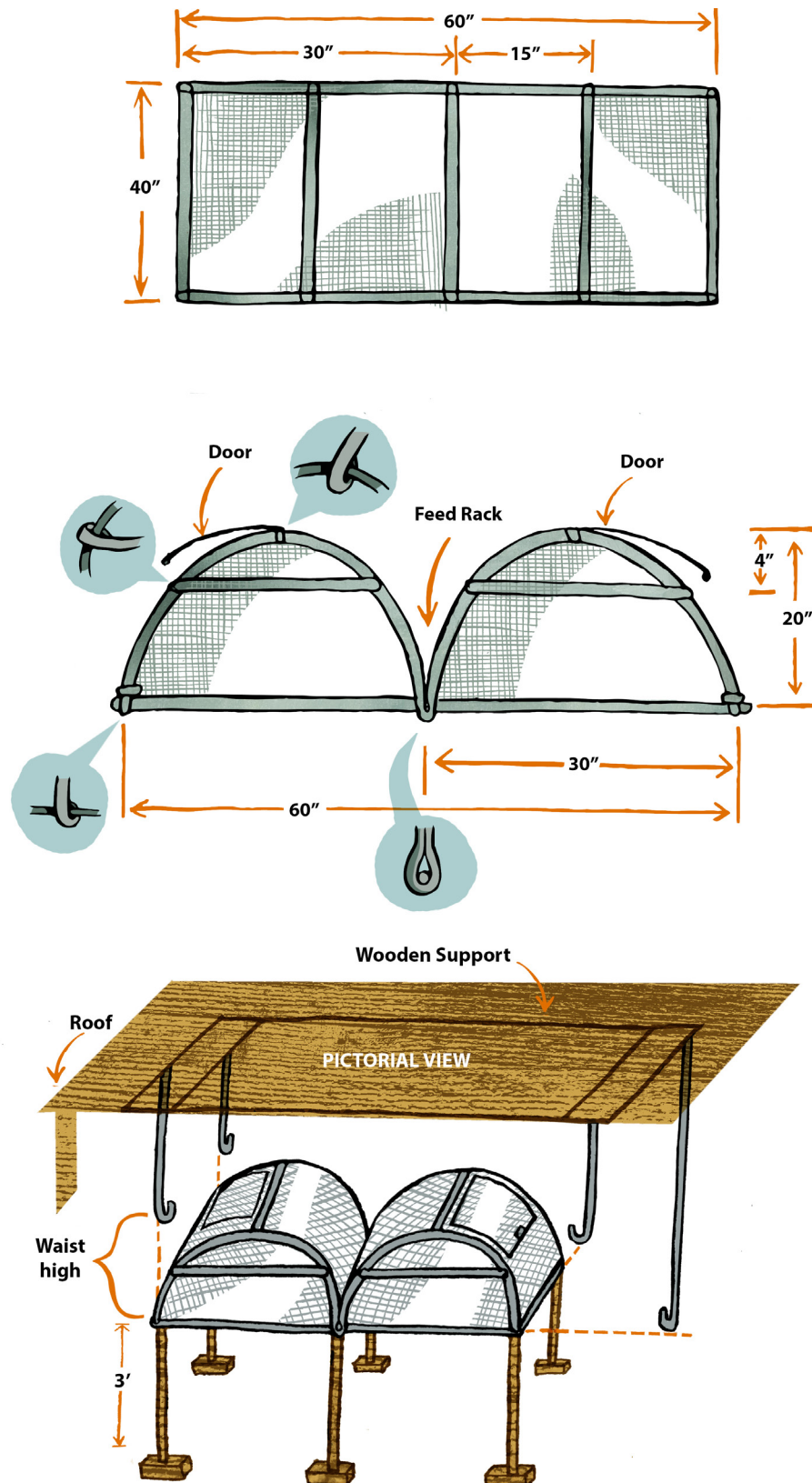
Figure 2-1: Three-hutch System



An all-wire, Quonset-shaped hutch has several advantages. It is easy to clean, neat in appearance, and requires less wire than a standard rectangle hutch.

Ch 2: Rabbitry and its Equipment

Figure 2-2: Two-cage, All Wire Quonset Hutch



Ch 2: Rabbitry and its Equipment

This type of hutch must be hung inside the building where it will be placed.

The Quonset-style hutch features a door that opens up over the top. Then, when open, the door does not occupy aisle space or interfere with feeding and cleaning operations. In addition, when this type of hutch is single-tiered at waist height, one can reach all the corners without placing his or her head and shoulders inside the door opening.

Quonset-shaped hutches can be adapted to fit any type of rabbitry where hutches are housed. They are most easily constructed in two-hutch units.

Wood-frame and Wire Hutches

Often, the most economically constructed rabbit hutch is a combination of wood and wire. The skeleton is wood and the flooring, sides, and top are all welded wire to ensure proper sanitation. The wood frame is an external skeleton while the welded wire is attached inside. The positive characteristics of this type of hutch are its durability and excellent ventilation and sanitation.

For the design, make the corner posts long enough so that they can be cleaned underneath. Cement blocks beneath the corner posts will increase the longevity of the wood. In areas where ants pose a problem, a depression cut into the blocks can serve as containers for any locally available insect repellent or a gas and oil mixture. A hutch can be supported by resting it on a crosspiece nailed between the studs that support the shed, or hanging it from the rafters or ceiling of the shed with heavy wire or light lumber.

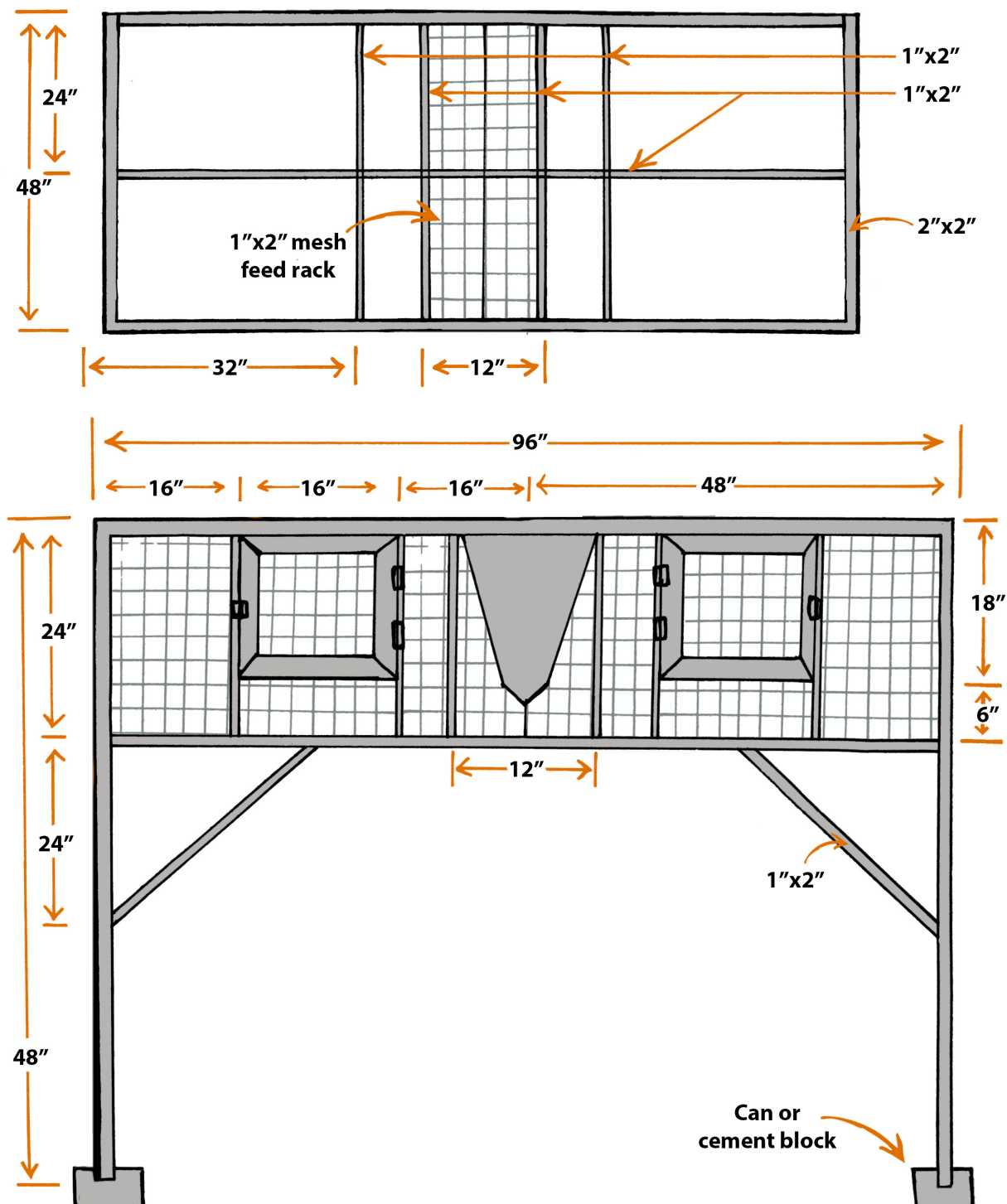
Figure 2-3: Pictured is a wood-frame hutch with steel wire mesh.

Photo c/o creativecommons.org



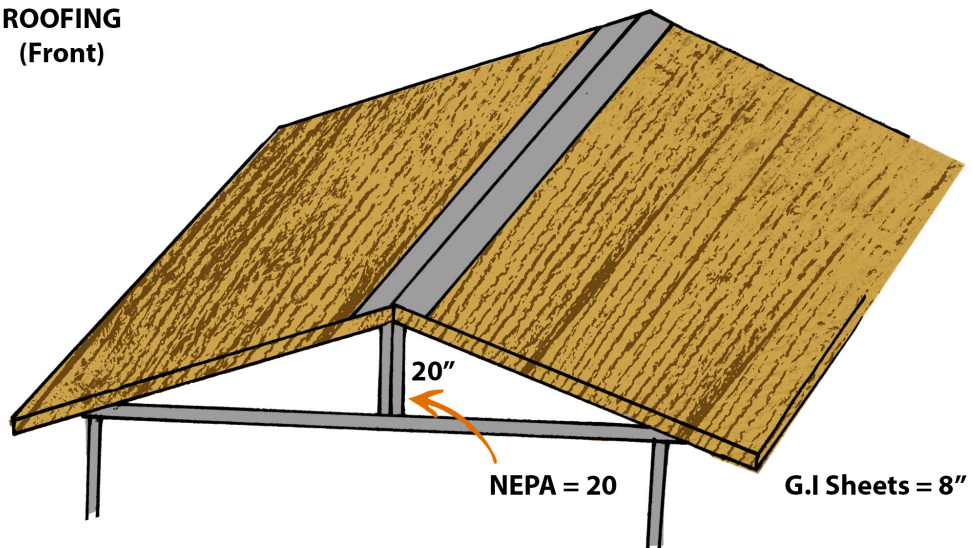
Ch 2: Rabbitry and its Equipment

Figure 2-4: Wood-frame Hutch with Galvanized Wire—Double Face

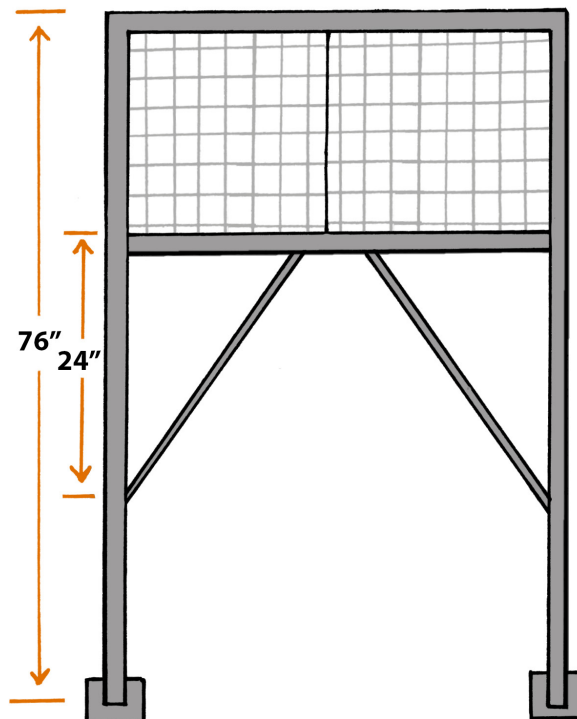


Ch 2: Rabbitry and its Equipment

**ROOFING
(Front)**



(Side)



Ch 2: Rabbitry and its Equipment

Bamboo Hutch

Bamboo is one of the most economical of all hutch materials when used with a nipa or cogon grass roof. The design is the same as that used for the wooden frame-wire hutch. For the sides and flooring, use 1-inch wide bamboo slats spaced one-half inch apart. Place the rounded portion of the bamboo slats facing the inside of the cage to eliminate gnawing by the rabbit. To prevent strangulation or breakage of the rabbit's feet, use straight bamboo for the flooring.

Hutch Floor

Several types of floors are used in hutches, and each has its particular merit.

Wire-mesh floors are used extensively where a self-cleaning type is desired. They are a necessity in commercial herds, where it would be impossible to provide enough labor to keep solid floors in sanitary condition. When installing this type of floor, examine the wire for sharp points, which sometimes result from the galvanizing process. Paint the galvanized wire with iron paint to lessen depreciation. Always put the smooth surface on top.

Though solid floors, in the end, pose problems with sanitation, this can be minimized if the floors are sloped slightly backwards to provide proper drainage. You can also use hardwood or bamboo slats as flooring. A combination of solid floor at the front part of the hutch and a strip of mesh wire or slats at the back may be used.

When using an all-wire mesh floor, it is advisable to place a resting board made of plywood inside the cage to eliminate sore hocks. The dimensions would be determined by the size of the animal (i.e., large enough for the rabbit to rest comfortably).

Feeding Equipment

There are a number of options for feeding. It is important to encourage innovation, particularly to use locally available materials when cost is a concern. To inform the innovation process, following are some things to consider:

- Small kits will frequently climb into low open top options (such as troughs), resulting in soiled food and spillage/wasted food.
- Forages on the floor of a hutch will quickly become soiled.
- Some rabbits will make a habit of chewing materials used for feeders (plastics and wood/bamboos, especially). Some rabbits are particularly habitual chewers so do not reject a material option based solely on one rabbit's behavior.
- Feeders need to be large enough to hold several feedings to save time. Use a type that will prevent waste and contamination of the feed.

Types of Feeders

Crocks

Crocks especially designed for rabbit feeding (about 6 inches wide and 3 inches tall), which are not easily tipped over, have a concave lip that prevents animals from scratching out and wasting their feed. The chief objection to these is that the young rabbits get into them and contaminate the feed. Earthenware and ceramics are the best-suited materials.

Bamboo Troughs

To form a concave container, one-third of the side should be cut away between the two nodes. To prevent the container from tipping, use wire to attach it to the side or floor of the cage.

Grass Mangers

Grass mangers are either U- or V-shaped and made of mesh wire that is 1-by-2 inches with a gauge of 16. The 2-inch wire is placed horizontally while the 1-inch wire is vertical to allow the rabbits easy access to the grass mangers by simply pulling the grass. Ideally, grass mangers are usually constructed between two cages to save space and labor but they can also be placed at the front or side of the cage, although it is more cumbersome for the animal and the caretaker.

Hoppers

Feed hoppers of the proper design and size save considerable time and labor. These can be constructed from metal, wood, ceramics, or other readily available materials. They should hold at least several days' supply of feed and be placed within the hutch or suspended on the outside of it. The opening through which the rabbits obtain feed should not be more than 4 inches above the hutch floor so young rabbits can readily eat. This is especially suited for complete rabbit feed pellets.

An inexpensive feed hopper that will hold about 15 pounds of pellets or home mixed feeds can be made from a common square 5-gallon can or can be constructed using plywood, lawanit (fiber board), or ceramics. The following are steps for constructing a hopper:

1. Cut off the top of a 5-gallon can.
2. Cut holes in two opposite sides. If the hopper is to be hung on the side of the hutch, cut a hole on one side only. The holes should be 4 inches high, 4 inches from the bottom, and 1

Ch 2: Rabbitry and its Equipment

inch from each side. Bend the rough edges inward to provide a smooth edge throughout and to add rigidity.

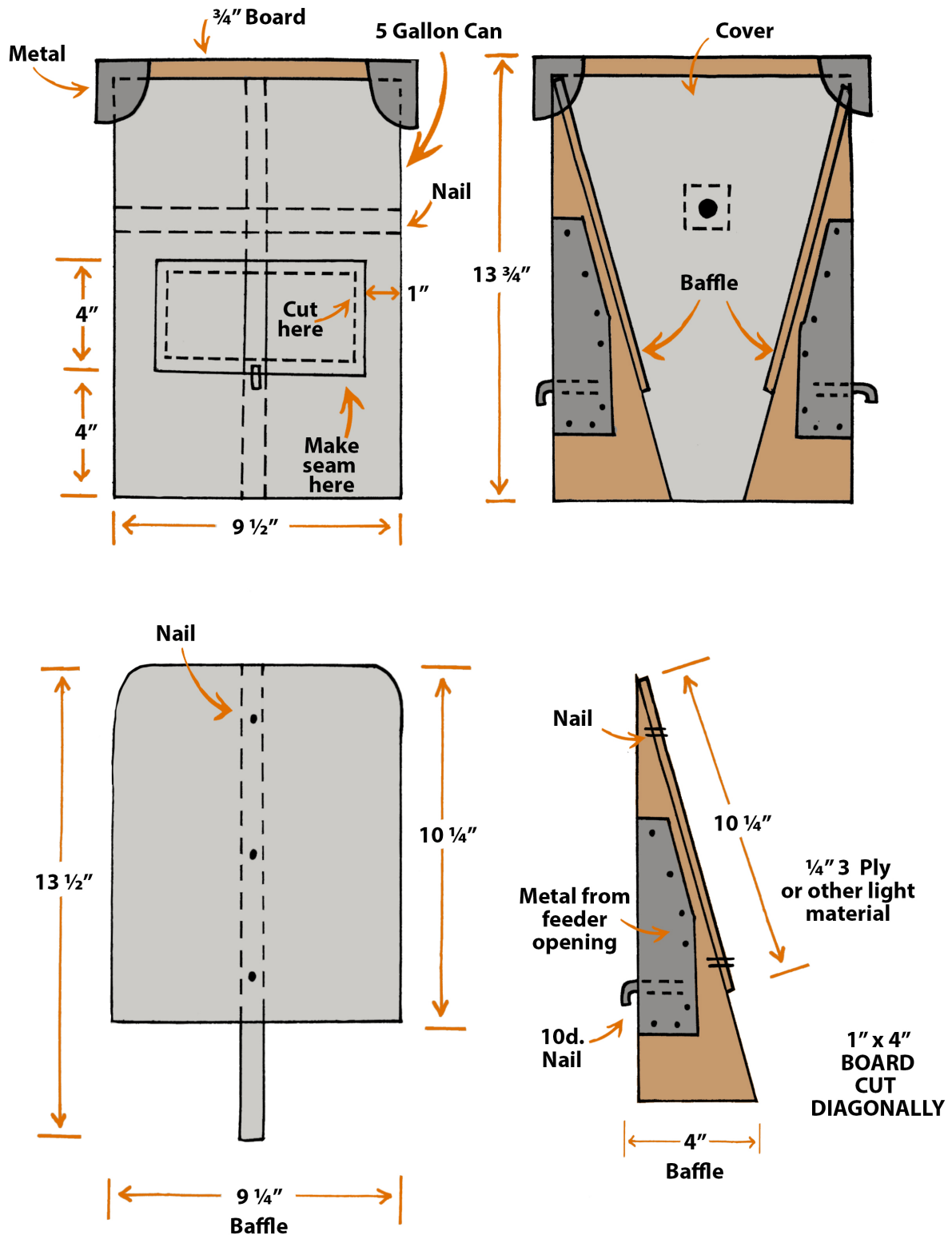
3. Take a 1-by-4-by-13.5-inch board and cut it diagonally into two equal triangular pieces. Use these as supports for the baffle boards, which are nailed to them.
4. The baffle boards, of one-fourth-inch plywood, should extend 1 inch below the bottom of the side openings of the can. The space between the lower ends of the baffle boards permits the pellets to flow downward as the rabbits eat. Cut the baffle boards to fit snugly against the insides of the can so feed cannot slip by. Mount the top corners of the baffles so each baffle will rest against the top edge of the can.
5. Cover the exposed edges of boards with tin to prevent gnawing.
6. Put a finishing nail in the outer edge of the triangular piece supporting the baffle.
7. Bend the nail to hook over the lower lip of the opening to hold it and the baffle in place.
8. You can save hutch floor space by using a hopper with a feed opening on one side only and by placing the hopper only partially into the hutch. Cut an opening in the side of the hutch large enough to accommodate the hopper, then wire the top of the hopper to the hutch for support. One short baffle on the inside, opposite the hopper opening, will keep feed out of the rear corners.

A one-compartment feed hopper is used when only one kind of feed is given. When mixed feed that the rabbits can separate is offered in the hopper, the feed will be selectively consumed. The rabbits scratch out and waste the parts they don't eat. This waste can be prevented by using a concave mouth and individual feed compartments.

Caution must be taken to ensure that no moisture enters the can during rain showers. If moisture does enter, mold may develop. When this moldy feed is ingested by the rabbit, it causes the buildup of fluids and gas that the rabbit is unable to expel. Bloat and death of the animal will result.

Ch 2: Rabbitry and its Equipment

Figure 2-5: Designs for Feed Hopper Made from a 5-gallon Can



Ch 2: Rabbitry and its Equipment

A common mishap of which one should be aware with litters is when the uneaten portion of feed is spoiled by urination of, and fecal excretion by, the bunnies who climb into feed hoppers.

Pelleted rabbit feed contains salt that will eventually corrode the metal can. If mash is used, a higher rate of corrosion will ensue due to the minute particles clinging to the sides of the can. To reduce rusting, coating the can with iron paint is a practical but expensive solution.

Equipment for Watering

Contrary to popular belief and practice, rabbits do need clean, fresh water at all times. During hot weather, a doe and her litter of six to eight will consume about 2 liters of water a day.

Types of Water Containers

Crocks

Inexpensive and yet sanitary, earthenware crocks are used quite extensively in the rabbitry.

Enamel Cups

Such cups are sanitary and easier to clean than crocks. They may be tied to the side of the cage to prevent spillage by the rabbit.

Figure 2-6: Shown is an enamel cup for water, wired to the cage to prevent spillage.

Photo c/o creativecommons.org



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Ceramic Crocks

Ceramic crocks are also recommended if they are within a reasonable price range.

Bamboo Troughs

The troughs are practical due to their availability but pose a problem due to their susceptibility to algae formation.

Cans

Cans are sometimes utilized but, again, problems arise when rabbits eat the rust that forms on such containers; thus, their use is not warranted. However, a 1-liter-sized plastic oil container may be cleaned and cut for both water and/or feed containers. These can be attached to the cage with wire to prevent spilling.

Automatic Watering

Automatic watering systems are widely used in commercial rabbitries in the U.S. Though they are very expensive to install, they could easily be adapted to commercial rabbitries in the developing world.

Automatic watering systems are better than conventional containers. They eliminate the tedious and time-consuming chore of washing, disinfecting, rinsing, and filling. They supply fresh, clean water for rabbits at all times. When an automatic watering system is properly installed, dirt and fur will not collect in it and plug it up.

While there are many positive aspects to automatic watering systems, the negative must also be considered. It takes time to train rabbits to use this system. In the beginning, water consumption may decrease to a level where production may be drastically affected. If the drinking valves are not properly installed and maintained, water leakage and dripping may eventually corrode the wire mesh.

Nest Boxes

Place the nest box in the hutch on the 28th day after breeding. If a doe has been observed scratching or mock digging in a corner of the hutch, that is the best place to put the box. Putting the nest box in too early can result in her using it as a latrine or eating all of the nesting material placed in it, or both.

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A strategy that can protect the kits from injury by the mother is to place a small wedge or block under the front of the nest box to create an angle that promotes kindling at the rear of the nest box.

When a doe is ready to kindle, a nest box is placed in the cage for her to give birth. This is a carry-over from a habit among wild rabbits, who often kindle inside trees or holes in the ground.

No one type of nest box is best suited for all conditions, but all should provide seclusion for the doe for kindling and comfort and protection for the young. Nest boxes should be large enough to prevent crowding while small enough to keep the young together. All types should provide good drainage and proper ventilation.

Counterset Nest Box

A type of nest box used in the U.S. is the counterset, where the box is recessed below the hutch floor. These may be placed at the front of the cage and fitted like drawers for access from the exterior of the hutch. They have the advantage of providing a more natural environment, since rabbits are burrowing animals, and of allowing the young easier access if they should be displaced from the nest at an early age. The young can jump out of the standard nest box, but they often cannot jump or climb back in. When the litter becomes divided, this means some of the young may go hungry. The doe usually nurses her young at night or in the early evening and morning hours. If the litter is divided, the doe will either nurse the young in the nest or those on the hutch floor. She will not nurse both groups, nor will she pick up the young and return them to the nest.

The counterset nest box is easy to keep clean because the inner drawer can be slipped out for washing and disinfecting. These drawers also can be interchanged from one hutch to another. When the young no longer need the inner drawer, it can be left out to provide more space in the hutch.

Standard Nest Box

It is a characteristic of most does to choose a corner in which to kindle her young. Therefore, the standard nest box is the most practical because of its mobility. Some signs exhibited by the doe to display which corner she prefers for kindling include scratching and gathering grasses or newspaper to serve as nesting material.

The nesting materials could be of local sources, such as trimmings of clothing or soft grasses, but shredded newspaper is the most ideal since it is free from mites and other insects, the usual causes of ear canker and skin mange.

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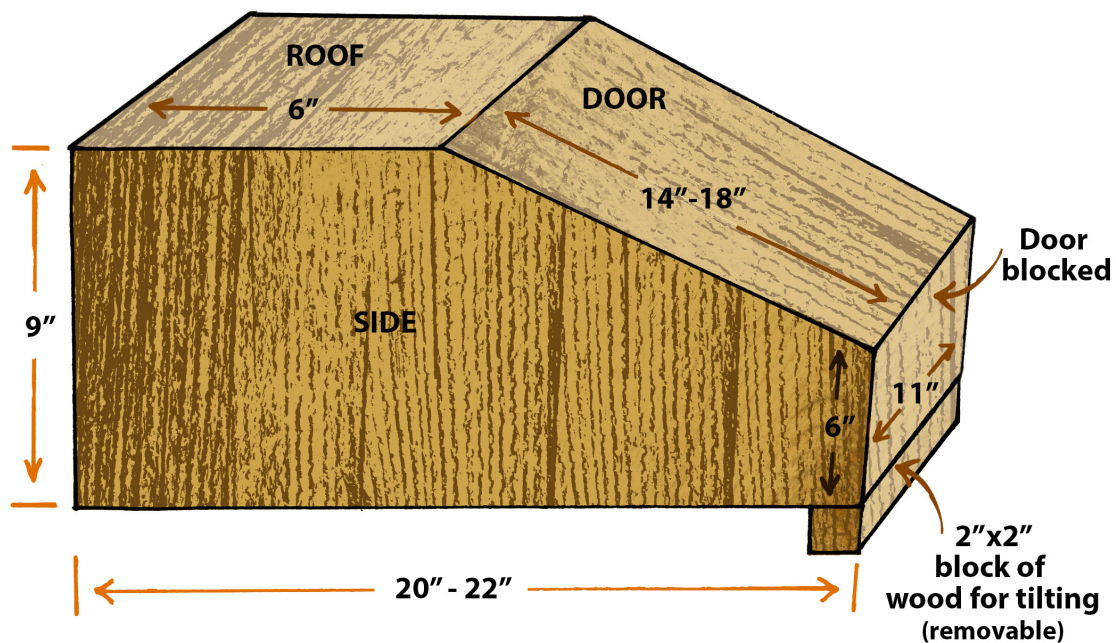
Place the nest box in any area where the signs are observed 25 days after breeding or a week before kindling to allow her to prepare for actual kindling.

The box must be tilted at the front with a 2-inch block of wood so the doe kindles her litter at the rear of the nest box. This protects the litter from possible injury when the doe enters or exits during nursing.

To keep the nest area clean and dry, holes should be cut into the floor of the wood nest box, but should be small in diameter (no larger than the head of a thumbtack) to ensure kits won't be at risk of passing through the holes. If available, a small-gauge wire mesh used for the floor of the box allows for waste to pass through freely. Depending on the construction of the hutch, it may sacrifice heat since wind may blow in from the bottom of the nest.

After each use by the doe and her litter, clean, wash, and disinfect the nest box.

Figure 2-7: Standard Nest Box



Ch 3: Feeds and Feeding

Success in rabbit production is based on ensuring a good diet and providing wholesome feeds in adequate quantity every day.

Rabbits can survive and live on forages only. However, the addition of basic grains (either by mixing one's own or by using commercially prepared concentrated feeds) makes a dramatic difference in the potential productivity of the herd. The management of the herd (i.e., how frequently it is rebred) will vary widely depending on the diet fed to the rabbits.

Feed is one of the major expenses of rabbit raising, and each herd is unique in terms of its needs. It is important to select diets that are suited to the needs of the rabbits, whether commercially prepared mixtures and/or pellets, or mix feeds.

Feeding Rabbits

Rabbits are generally divided into four classes based on their dietary needs. They are: (a) growing and fattening rabbits; (b) resting (non-pregnant and non-lactating) does and bucks; (c) pregnant does; and (d) lactating does with litters. Each of these classes should be fed a different ration in varied amounts. The "should be" is based on the assumption that you want the rabbits in each of these classes to perform to the best of their abilities.

The "should be's" of rabbit feeding can be expressed in the form of specific numerical nutrient levels (i.e., crude protein and Total Digestible Nutrients (TDN), a form measurement of energy) and daily amounts of feed. These "should be's" are requirements if you agree that you want certain things, such as at least eight bunnies per litter, at least 32 grams per day of average daily weight gain for growing and fattening rabbits, a small incidence of reproductive failure, etc. These conditions represent what a good commercial rabbit raiser would like to see on his or her farm.

Table 3-1: Nutrient Requirements of Rabbits (on air dry weight of ration basis)

Rabbit Class	Body Weight (kg)	Total Feed Animal/day (gm)	Ton (percent)	Crude Protein (percent)
Normal Growth Fattening Does/Bucks	1.8	114	65	-
	2.3	136	-	-
	2.7	155	65	16
	3.2	173	-	-
Maintenance Does or Bucks Resting	2.3	91	-	-
	4.5	150	55	12
	6.7	205	-	-

Ch 3: Feeds and Feeding

Rabbit Class	Body Weight (kg)	Total Feed Animal/day (gm)	Ton (percent)	Crude Protein (percent)
Pregnant Does	2.3	114	-	-
	4.5	186	58	15
	6.7	255	-	-
Lactating Does and litter of seven	2.3	-	-	-
	4.5	-	70	17
	6.7	-	-	-

Note: Expected daily gain is 32 grams (based on USNRC tables, 1966).

Following are guidelines for a commercial-sized rabbitry of 50 or more does:

1. Feed as much fresh grasses and/or legumes as the rabbits want each day—up to 85 percent grass.
2. Feed a commercial feed of at least 16 percent crude protein at the following levels:
 - Resting bucks and does—120 grams a day
 - Pregnant does—240 grams a day
 - Lactating does with litters—480 grams a day
 - Growing/fattening rabbits (after weaning to slaughter or 3-4 months old)— 960 grams a day
3. Have fresh water available at all times.
4. Rabbit diets should contain 0.5 percent trace mineralized salt.

Since the offspring of rabbits are intended for use as breeding stock, you want to produce young that are as healthy and vigorous as possible. If you cut down the amount of concentrates or unbalance the diet, a lowered reproductive performance will result, followed by a slower growth rate of the young produced. An insufficient or unbalanced diet, therefore, cannot be justified for an animal used or intended for breeding and for meat purposes since the cost of a single reproductive failure or of a greatly reduced litter size is much greater than the savings in reduced feed.

Ch 3: Feeds and Feeding

Concentrates

A variety of commercial mash and pellet feeds may be found available in-country and it is best to check with a local extension agent or successful farmer to determine local sources. In some countries, the following commercial products have been used with rabbit production:

- Pig starter pellets
- Pig grower mash
- Rabbit pellets

These have generally at least 16 percent crude protein and supply enough energy to meet the needs of a rabbit at the feeding levels suggested in the simplified feeding regime above.

In the U.S., pelleted rations for rabbits contain about 50 percent alfalfa hay, a leguminous roughage.

In some countries, the available commercial pellets or mashes are not formulated for rabbits but for hogs, pigeons, chickens, etc. These animals cannot utilize roughage the way rabbits can. Thus, commercial feeds are made almost entirely of concentrates (grains or grain byproducts) so you can feed less of them to your rabbits than the USNRC-recommended daily levels if you also supply them with plenty of grasses and/or legumes. You can reduce the amount of concentrate feeds since the forages you supply do not have the same nutrient value (due to their lower digestibility and large amounts of water) as the dehydrated alfalfa used in commercial pellets.

Pellets are preferable to mashes because the rabbits waste less (they are unable to paw them out of the crocks as easily). Also, they are not dusty so they won't irritate the nose and lungs. If you must use a mash, you can avoid the crustiness and reduce some waste by adding just enough water to slightly moisten the feed. However, beware of giving too much moistened feed to the rabbit or leaving it in the pen too long as it will sour and the rabbit will not eat it, causing further waste. In the low lands where fermentation is more prevalent, give the rabbits only enough concentrates to be consumed within a 10- to 15-minute time span. For example, in a large herd, 1 kilo of feed wasted daily is a substantial economic loss over one year's time.

Home-mixed Feed

In general, rabbits can be fed almost any food that is not sour, spoiled, or greasy. A few exceptions are meat, potatoes and/or potato peelings, and large amounts of cabbage. Thus, the rabbit's diet may be supplemented with many things, including vegetable trimmings, fruit peelings, bread crusts, and sun-dried leftover rice and leftover milk.

Ch 3: Feeds and Feeding

The ideal diet contains both commercial feed and greens, as the rabbit should eat 85 percent forage of good quality and quantity. In case the commercial concentrates or home-mixed ingredients are not available, green feeding composed of 50 percent legumes and 50 percent of other grasses will suffice in providing a minimum dietary requirement, especially for dry does and bucks.

As shown in the table below, many kinds of forages can be fed to rabbits.

Table 3-2: Feeds for Feeding Rabbits

Legumes	Grasses
Apples	Bahia grass
Bananas	Bermuda grass
Bean leaves	Brome grass
Beet, mangel	Coastal Bermuda
Beet, sugar	Dallis grass
Cabbage	Guinea grass
Carrot roots	Johnson grass
Cassava, tubers	Kentucky bluegrass
Cauliflower leaves	Napier grass
Celery	Orchard grass
Comfrey	Pangola grass
Dandelions	Ryegrass
Kale	Sudan grass
Kudzu	Tall fescue
Lettuce	
Pea vines	
Potatoes	
Raisins	
Rape (colpa, colsa, colerape, tori, and chou oleifere)	
Rutabagas	
Sweet potatoes	
Turnips	

As with other sources of feed, a few basic guidelines should be followed with forages:

Ch 3: Feeds and Feeding

Do NOT feed:

- Green feeds that stand in piles before feeding because they will become heated and cause digestive disorders due to fermentation
- Kangkong leaves or stems (they generally carry the parasites found in swampy areas)
- Forages collected from places where dogs and cats and other animals commonly defecate as this may cause tapeworm and/or coccidiosis
- Forages sprayed or recently in contact with insecticides

DO feed:

- **Salt.** Salt should be provided in the feed at a level of 0.5 percent or provided in the cage in a block or small container, placing at least 1 teaspoon in the grain ration once a week or when needed.
- **Water.** Clean, fresh water **MUST** be provided to rabbits at all times. This is important especially in tropics where a doe and her litter may consume as much as 2 liters of water a day.

One last point to mention regarding feeds is if you wish to make a change in the rabbit's diet, do it slowly. Serious damage or even death may result if large quantities of lush greens are fed to animals accustomed to concentrated feed only. Even sudden changes in a grain diet may cause minor, or possibly serious, digestive disorders. The best method is mixed feeding (providing greens and commercial food) to avoid any sudden change.

Coprophagy

Coprophagy refers to rabbits eating their own feces. Beginning rabbit producers, upon learning this fact, might worry that the nature of a wire-bottomed hutch system will not allow this behavior as droppings will fall through the wire. However, this is not a concern as rabbits consume these cecotropes as they exit the anus.

Rabbits re-ingest part of their food, usually in the early morning when they are unobserved. They re-ingest only the soft matter that has passed through the digestive tract. Investigators have called this trait "pseudo-rumination," named due to the characteristics of ruminants (cows, sheep, and others) that chew the cud, which is food regurgitated and chewed again. Most rabbit breeders are unaware of this practice. Some believe it indicates a nutritional deficiency and lack of quantity and quality of feed; however, it is normal in rabbits and may actually enhance the nutritive value of the feed by virtue of a second passage through the digestive tract.

Lactation

During the last week of pregnancy, the mammary glands develop rapidly. Though milk may be produced before kindling, and actually leak from the glands of high-producing does, the actual letdown and production is usually delayed until kindling and is initiated under hormonal and nervous stimuli induced by the action of suckling. Maximum milk production is usually reached by the third week, after which production gradually declines.

The duration of lactation varies depending upon diet, number of suckling young, and the length of time the young are left with the doe. Ordinarily, milk production is negligible after the sixth or seventh week, though in well-nourished, high-producing does with a litter of eight or nine, milk production may last eight weeks or longer. Milk has been observed in the stomachs of young weaned from the doe at 8 weeks of age, and milk can be secreted from the glands for several days thereafter.

The amount of milk produced depends upon several factors, such as breed, strain, diet, and genetic constitution. Various studies of milk production in rabbits indicate that during the height of lactation, milk yield may reach 35 grams per kilogram of live weight. On this basis, a 4-kilogram doe would produce approximately 140 grams (5 ounces) of milk a day.

Contrary to popular belief, the doe does not nurse her young throughout the 24-hour period. Nursing is usually performed during the night or early morning, especially for the very young in the nest box. It may consist of a single feeding of only a few minutes. After the young leave the nest box and are consuming solid food, they will try to nurse several times during the day. However, the doe will usually push them aside and restrict their nursing to nighttime hours. Occasionally, does will allow the young to nurse during the day, as most rabbit breeders have observed. Students of animal behavior attribute the nursing habits of the doe to the fact that rabbits in their natural habitat are extensively preyed upon and are rather helpless to defend their young. Therefore, it is advantageous for the doe to stay away from the young as much as possible.

A regular feeding program determines a regular and consistent nursing schedule by the doe. Therefore, if a doe is fed both concentrate and roughage at 5:30 a.m. and again at 5:30 p.m., the doe can be expected to nurse her young regularly between 6 a.m. and 7 p.m.

Ch 4: Managing the Herd

The following description comes from a project that saw five medium-sized rabbit farms that worked collectively as a single enterprise to produce and sell rabbit meat and live rabbits. Though the project was of a larger scale than a typical backyard production system that Volunteers might frequently encounter, the detailed nature of the system offers some insight into how one might adapt the system for a given context.

Materials Needed

- Large calendar, sometimes available for free at agricultural sales outposts (promotional calendars from manufacturers of feeds, seeds, and other agricultural inputs).
- Dry-erase board and set of colored dry-erase markers. Although there are cheaper alternatives (notepad and pen), the white board system uses simple color coding for ease of use and is efficient as outdated information can quickly be wiped clean and new details entered. It is also easy to prominently display within the rabbitry, making the activity and tasks highly visible.
- Notebook or binder (suggested). The system could work with only the daily management system offered by the white board; however, the notebook/binder provides an opportunity to maintain a permanent written record that can be used to monitor production over time and serve as a way to continually improve breeding stock.

Rules

The farm should have the white board and calendar prominently displayed together, as farmers will manage the white board using the calendar as a constant guide. A set of basic rules must be used for this system to function and these can either be used to train, and thus committed to memory, and/or the white board and calendar can be accompanied by a sheet that has these basic rules. The breeding rules are:

- **Day 1:** Check doe for receptivity (swollen, darkened vulva) and bring her to the buck's cage if she is receptive.
- **Day 14:** If mating is successful, then palpate her 13 days later. If mating is unsuccessful, check for receptivity again on the next day.
- **Day 28:** If pregnancy is confirmed, place a nest box for her in the hutch 14 days after palpation.
- **Day 31:** Expect kindling three days after the nest box is placed.
- **Day 33-Day 60:** Look for receptivity for rebreeding (this is highly dependent upon quality of diet and can be anywhere from a few days after kindling to two months).

The weaning rules are:

- **Day 14:** Remove the nest box 14 days after birth.
- **Day 28:** Wean the kits from the doe 28 days after birth.

Based on these aforementioned “rules,” use a grid of the farm (a visual representation of the layout or orientation of the hutches) created on a white board. Within the grid, make each square represent a hutch. For each square that has a doe, there must always be at least one “task” represented by a date written in a color that corresponds to a given type of task. The tasks, and therefore number of colored markers needed, correspond to the rules stated above. The general principle is that the daily work of the farm consists of an initial walk through the farm to feed and water the herd. While this is being done, a basic observation of the hutches can detect any extraordinary issues that need to be addressed. After the feeding and watering, the farmer consults the white board of tasks. He or she searches for that day’s date (and any boxes that hold a date that has already passed). Where that day’s date is found (or a circled date that has passed)¹ tells the farmer in which hutch there is a task to be completed (based on the grid that represents the layout of the farm) and what the task is (based on the color of marker used).

Figure 4-1: A rabbit breeder produces a visual representation of weaning and breeding.

Photo c/o Peace Corps



The system hinges on the principle that for every task completed, there is a new one that follows. Therefore, if a doe is successfully palpated (on Day 14), that tells the farmer to write the next date for which a task is required. In the example of palpation, that next task is to place a nest box inside the hutch 14 days later (Day 28). Due to the need to write in future tasks, the calendar displayed with the white board is essential for effective use of the system.

¹ It is recommended that when a task is unable to be completed for some reason, that it is circled to indicate a priority task.

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Usually there is only a single task in a given square on the grid, though sometimes there are multiple tasks. For example, after kindling, the doe will have a date for when she is to be observed for receptivity and, based on her date of kindling, will have a date for which to wean the kits. In the event that there are extra cages used for young fryer (non-producing) rabbits, they too can be mapped onto the grid, but don't have "management tasks" that use this system and therefore can either be blacked out or an "X" may be placed on those grid squares. If a doe is not found to be receptive on the day that task arises, then the farmer circles the date in the same color as that task. In this way, past due tasks are highlighted on the board and can be revisited the following day.

A separate but related management tool is a written log in a notebook or binder. In contrast with the white board, this provides a permanent record of the herd.

Figure 4-2: Written Log for Herd Management

Number		Cage Number		Origin		Date of Birth of Doe	
Commentarios							
Mounting		Palpate (Day of mounting + 14 days)		Expected Kindling		Date for Nest Box	
1 2 3		1 2 3		(Mounting + 31 days)		(Expected Kindling - 3 days)	
Buck							
Date							
Date of Kindling	# Kits	Live/Dead			Weaned Kits		How many?
					(Date of Kindling + 28 days)		
***** Date to check receptivity (Kindling date + 7 days) *****							
Mounting		Palpate (Day of mounting + 14 days)		Expected Kindling		Date for Nest Box	
1 2 3		1 2 3		(Mounting + 31 days)		(Expected Kindling - 3 days)	
Buck							
Date							
Date of Kindling	# Kits	Live/Dead			Weaned Kits		How many?
					(Date of Kindling + 28 days)		
***** Date to check receptivity (Kindling date + 7 days) *****							
Mounting		Palpate (Day of mounting + 14 days)		Expected Kindling		Date for Nest Box	
1 2 3		1 2 3		(Mounting + 31 days)		(Expected Kindling - 3 days)	
Buck							
Date							
Date of Kindling	# Kits	Live/Dead			Weaned Kits		How many?
					(Date of Kindling + 28 days)		
***** Date to check receptivity (Kindling date + 7 days) *****							

Maintaining production sheets on does can provide farmers with the opportunity to monitor the productivity of the breeding females in the herd and to begin selection based on the productivity of their breeding stock. For the sake of evaluating productivity, using the number of successfully weaned kits is a better measure than the number of kits born.

Methods of Handling Rabbits

Never lift rabbits by the ears or legs. Handling in this manner may injure them and even cause drooping ears.

A rabbit can safely be lifted by the scruff on the back of its neck. It is advised to support larger animals with a second hand under the bottom. While holding onto the scruff, a rabbit can be rotated, appearing to be lying with its back on the holder's forearm. This will frequently subdue many rabbits and is useful for inspecting general health, such as the condition of mammary glands or paws, or to determine the sex of animals or check for sexual receptivity in females.

After picking up a rabbit by the scruff, one effective way to carry the animal is to place the head in the crook of the opposite elbow and then support the bottom and hind legs with the palm of that hand. It resembles how an American football player is taught to carry the football.

You can lift and comfortably carry small rabbits by grasping the loin region gently and firmly. Put the heel of the hand toward the tail of the animal. This method prevents bruising the carcass or damaging the pelt.

Figure 4-3: Lift small rabbits by grasping the loin region gently, as shown here.

Photo c/o Peace Corps



To lift and carry a medium-weight rabbit, let the right hand stroke the ears down and grasp the fold of the skin over the rabbit's shoulder. This allows added control of the head portion. Support the rabbit by placing the left hand under its rump.

Lift and carry heavier rabbits in a similar manner. If a rabbit scratches and struggles, tuck its hind legs under the right arm and hold it snugly; or release the animal on the ground and follow the stated steps again.

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Figure 4-4: Carry heavier rabbits by tucking the hind legs under the right arm and holding snugly, as shown here.

Photo c/o creativecommons.org



Palpation to Determine Pregnancy

Palpation is perhaps the most valuable and practical “hands on” skill needed for a beginning rabbit producer. The basic concept is that just before the midpoint of a suspected pregnancy, it is possible to determine with near certainty whether a rabbit is indeed going to kindle. In a productive system, this is important as it avoids wasted time, and time can be money.

At 14 days after servicing by the buck, a doe can be palpated with virtually no danger to her or the fetuses. At this stage of development, the fetuses are adequately engulfed in a protective fluid and moderate pressure from palpation is safe. Later in development and before kindling, palpating poses increased risk of harm. A skilled farmer can determine at 14 days that the doe is not pregnant and begin to once again look for signs of receptivity (enlarged, red/purple vulva) as a prerequisite to returning her to the buck’s cage for service and the whole cycle starts all over again.

The technique is challenging at first, but quickly becomes a simply applied technique. The photo below shows how to restrain the doe by holding the skin on the back of the neck and ears with one hand while reaching the other hand underneath the body. This second hand should be relaxed with an open palm and can slide down the abdomen toward the lower region, nearly between the hind legs. Wait for the doe to settle down as palpating a tense doe is stressful for the animal and is difficult to do effectively. With the hand facing up and the palm in contact with the abdomen, the thumb and first two fingers should begin exploring

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the abdomen for round/oblong bulbs that are roughly the size of a large grape (smaller is palpating earlier than 14 days). Palpating is not simply done by gently rubbing the skin, but requires slightly greater pressure as the fingers and thumb come together and relax, feeling for contents in the actual abdominal cavity. Once the palpation has discovered the presence of fetuses, the exercise should be terminated and the doe returned to her hutch.

Figure 4-5: Shown is the proper way to palpate the doe.

Photo c/o Peace Corps



A rabbit farmer who is experienced in palpation can teach others the technique in a hands-on manner. As shown in the picture above, the Peace Corps Volunteer is teaching a counterpart the skill. The teacher should place the doe on top of the hutch or on a table or flat surface and place the first hand on the back of the neck of the doe to gently but firmly restrain her. Then, just as he or she is about to place the second hand beneath the abdomen, palm up, the person learning the skill should place his or her hand underneath the hand of the instructor. If the instructor is palpating with the right hand, then it must also be the right hand of the student that is placed underneath the instructor's palm that is turned upward. Next, and before the instructor moves this second hand underneath the doe, the student must slide his or her hand forward just slightly so that his/her first finger and thumb are visible while the rest of the hand remains generally hidden beneath the instructor's hand. As the instructor then moves the joined hands slowly beneath the doe, the palpation can be done as previously described. The difference is that with the second hand beneath and slightly forward, the instructor can locate the fetuses and pass them from between one's own thumb and forefinger to the same thumb and forefinger of the student. This requires that the thumb and forefinger of the student are closer to the tail of the doe and below the instructor's and that they "track" the movements of the instructor's fingers.

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If a novice rabbit farmer finds he or she is unable to effectively palpate, he/she should assume that the doe is pregnant and manage her accordingly. Though there exists some other potential signs of pregnancy, none are nearly as conclusive as palpation. Incorrectly assuming that there is not a pregnancy when there is and returning the doe for service can cause complications, as it is possible for her to become pregnant with a second litter at the same time as the first. The reproductive system of the doe has two “horns” and each can hold a litter on its own. Though the double litter is rare, it is not as rare as two successfully weaned litters born only days or weeks apart.

Kindling

Following are steps for ensuring successful kindling:

1. Place a nest box in the hutch about 28 days after the doe is mated in her preferred corner. This allows the doe to prepare a nest in advance and ensures a proper place for birth of the young.
2. Sometimes does fail to pull fur to cover their litter, or they kindle the litter on the hutch floor and let them become chilled. If you discover the young in time, you may be able to save them by warming, even if they appear lifeless. To warm the babies, prepare a cup of lukewarm water. Hold the baby by the head and dip a few times in the cup. Then, dry with a cloth. Arrange the bedding material to make a comfortable nest and place the warmed young in it. The doe usually will take over from there.
3. The doe’s fur is easily removed at kindling time, and you can pull enough from the doe’s body to cover the litter in the nest. It is advisable to keep extra fur on hand for such cases. Remove some fur from nests where does have pulled an excessive amount and keep it handy in a separate bag or box so it will remain clean. It is not necessary to sterilize or to deodorize the fur, but take special measures to prevent the doe from smelling the strange fur by holding her bunnies with the strange fur and rubbing your hand along the doe’s back before placing the fur in the nest box. This aids in transferring her smell to the strange fur. If the doe smells the strange fur, it is likely that she will eat it if these precautionary measures are not followed.
4. A day or two before kindling, the doe usually consumes less food than she normally would. Do not disturb her, but make her as comfortable as possible. You may tempt her at that time with small quantities of green feed and commercial feed. This will have a beneficial effect on her digestive system. After the doe kindles, give her plenty of fresh green feed.
5. Most litters are kindled at night. After kindling, the doe may be restless. Do not disturb her until she has quieted down.

Care of Young Litter

Young rabbits open their eyes at 10 days old and start coming out of the nest to eat feed when they are 19 or 20 days old. If the young come out of the nest sooner, they may not be getting enough milk or the nest may be too warm or the door blocker is too low at the front section of the nest box.

The doe usually nurses her young at night or in the early evening and morning hours during the first two weeks of nursing. After two weeks, she will nurse them at her will. If the litter becomes divided, the doe will either nurse the young in the nest or those on the floor. She will not nurse both groups, nor will she pick up the young and return them to the nest. This results when the nest box is too large or not tilted backwards or up at the front.

A few hours after kindling, remove the nest box from the cage and inspect the litter to remove any deformed, undersized, or dead young. If you are careful and quiet while making the inspection, the doe generally will not object. There is no danger of causing her to disown the young. If she is nervous and irritable, place some tempting feed in the hutch immediately before inspection to distract her attention and quiet her.

Litters vary in size. The more common breeds usually average eight young. Since does typically only have eight teats, many producers limit the number of kits per litter to eight. Since the doe only provides an opportunity to feed once daily, the concern is that only eight kits can feed at a time and, therefore, litters of nine or more have a disadvantage in terms of feeding. If possible, foster these kits to another mother with a litter of a relatively similar age and the kits will have a better chance of survival. Remember that the size of the litter at kindling is not nearly as important for a productive farm as the number that is successfully weaned.

You can transfer some of the baby rabbits from a large litter to a foster mother that has a small litter. Adjusting the number of young to the capacity of the doe ensures more uniform growth and development at weaning time. Therefore, mate several does so they will kindle at about the same time. For best results, the young that are transferred should be within three or four days of the age of the foster mother's young.

Fostering is relatively safe and usually successful if the kits are close to the age of the adoptive litter and are in good health themselves (not already chilled or otherwise clearly deteriorating).

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Causes of Losses in Newborn Litters

Disturbance

If the doe is disturbed, she may kindle on the hutch floor and the litter may die from exposure. Even if predators (e.g., cats, snakes, strange dogs, ants) cannot gain access to the rabbitry, they may be close enough for the doe to detect their presence, and she may be frightened and kindle prematurely. If she is disturbed after the litter is born and jumps into the nest box, she may stomp with her back feet and injure or kill the newborn rabbits. Discourage strangers, even your good friends, from entering the breeding section of the rabbitry during kindling. An exception would be the caretaker, whose voice and presence are familiar to the rabbits.

Loss of Milk

Occasionally a doe fails to produce milk. In such cases, the young will starve within two or three days unless the condition is noted and the young are transferred to foster mothers. Keep a close check on newborn litters for several days after birth to make sure they are being fed and cared for properly.

Eating Young

Does sometimes eat their young. This may result from a ration inadequate in either quantity or quality, or from the nervousness of a doe disturbed after kindling. It is also possible that the doe is of a strain that exhibits poor maternal instincts and cannibal behavior. Does usually do not kill and eat healthy young, but limit their cannibalism to young born dead, or those that are injured and have died. It is unfortunate and can be discouraging to a producer (especially a novice one), but a doe should always be given a second chance as many that exhibit the behavior with the first litter go on to become wonderful producing does. Proper feeding and handling during pregnancy will do more than anything else to prevent this tendency.

Weaning

As with other elements of production, time allotments for different stages will depend largely on the quality of the diet fed to the animals. In a production system that is able to provide a high quality concentrated feed, it is possible to leave the young rabbits with the doe until they are 8 to 10 weeks old. By that time, the milk supply will have decreased and the young will be accustomed to eating other feed, thus allowing the doe to prepare for the next kindling. Fryer rabbits should be of marketable size and weight by the time they are 14–16 weeks of age.

Determining the Sex of Young Rabbits

Separate the sexes at weaning if you are saving junior replacements or breeding stock. It is possible to determine accurately the sex of baby rabbits less than 1 week old, but it is easier to do so when weaned at 8 weeks of age. To keep the rabbit from struggling, restrain it firmly, yet gently. A commonly used method is to hold the rabbit on its back, between the legs with the head up. With your left hand, restrain the rabbit around the chest, holding the front legs forward, alongside the head. Using the right hand, place the thumb behind the right hind leg and use the index and forefinger to depress the area in front of the sex organs to expose the reddish mucous membrane. In the buck, the organ will protrude as a rounded tip, while in the doe, the membrane will protrude to form a slit with a depression at the end next to the anus.

Figure 4-6: Shown is the sex organ of a buck.

Photo c/o Peace Corps



If your eyes or hands are not keen enough to follow the above method, observe the rabbits during feeding. If they ride or mount one another at even 1½ months of age, surely they are males and are bound to be good quality breeders in the future.

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Figure 4-7: Shown is the proper way to determine the sex of a doe: With the thumb, depress the mucous membrane so the protrusion shows a slit with a depression, at the end below the anus.

Photo c/o creativecommons.org



Records

Record keeping is essential to good management. The most important features of a simple record system are illustrated in the hutch cards.

Mark each breeding rabbit for your record system. Tattooing is the best marking method because it is permanent and will not disfigure the ears. An adjustable box is convenient for restraining rabbits for tattooing. Ear tags and clips are not satisfactory for marking because they tear out and disfigure the ears.

A convenient and simple record system is needed to keep track of breeding, kindling, and weaning operations. Information from the records can be used to cull unproductive animals and to select desirable breeding stock.

Records need not be extremely detailed, unless the personal desires and time of the operator allow for such record keeping.

Any records kept should permit the operator to calculate costs of production and evaluate the progress made over comparable periods.

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Basic information desired includes: (a) the number of does bred, (b) the number of conceptions, (c) the number of does kindling, (d) the number of does raising a litter, (e) total young left with doe, and (f) total number of young weaned or raised per breeding. These facts will provide the necessary permanent production factors. Information can be obtained from the hutch record cards and compiled on a monthly summary form. The monthly figures can then be accumulated on an annual summary form; and an annual summary of the rabbitry can be ascertained by posting the accumulated investment, income, and expense figures on a summary chart.

Records are essential for success in a rabbitry, whether it be on a commercial level or in the back yard or a similar small scale. Highly productive does and bucks can be secured from past records for replacement stock and sale.

Figure 4-8: Sample of a Hutch Card for Record Keeping

Front Hutch Card								
Animal No.: W 301			Born: 12/12/13			Breed: New Zealand White		
Sire: W 394			Dam: W 604			Litter No.: W 714		
Date Bred	Buck	Date Kindled	No. Young Born		No. Young Retained	Litter No.	Date Weaned	Weaned No.
			Alive	Dead				
6/1/13	W 418	7/2	11	0	8	W 19	8/27	8
8/24/13	W418	9/24	9	0	8	W 175	11/19	8
11/16/13	W 418	Passed	11/30					
11/30/13	W 421	12/30	9	1	8	W 316	2/24/63	8
2/21/13	W 421	3/24	11	0	8	W 465	5/19	7

Back Hutch Card				
Litter No.		Weaning		Notes
	Number	Age (days)	Weight (gm)	
W 19	8	56	30.2	
W 175	8	56	31.0	
Passed	11/30	56		
W 316	8	56	32.0	
W 465	7	56	28.0	

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Figure 4-9: Sample Buck Breeding Record

Buck No. _____

Bred _____ Sire _____ Date Born _____ Dam _____

Doe	Location	Date Bred	Result of Breeding			Weaned	
			Kindled		Passed		
			Alive	Dead	Date	Number	Weight

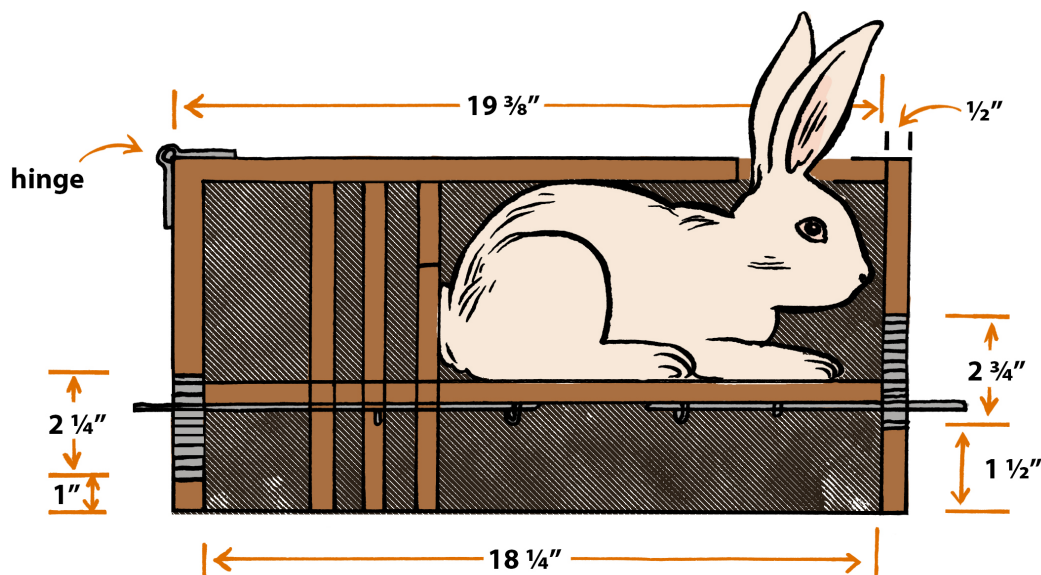
Figure 4-10: Annual Production or Inventory Record

Year	No. of Does	No. of Bucks	Marketable Business Total	Total Assets*(1)	Total Debits
2009	50	12	1,200		
2010	70	15	1,600		
2011	80	16	1,900		
2012	100	22	2,000		

*(1) Includes equipment, stock, and fur.

*(2) General overhead: feeds, labor, taxes, electricity, etc.

Figure 4-11: Here is a vertical section of a box for restraining a rabbit for tattooing. The spring-type holders tacked to the lower side of a movable floor compress the rabbit toward the top of the box. A movable cross partition holds the rabbit toward the front. Blocks of wood on each side hold the rabbit's head in the center of the hole at the top.



Preventing Injuries

Another aspect of good management—caring for the welfare of the animals—is preventing injuries. Many injuries, such as paralyzed hindquarters in rabbits, usually result from improper handling or from injuries caused by slipping in the hutch while exercising or attempting to escape predators. Such slipping usually occurs at night around kindling time. Another cause of injuries is faulty cages that possess protruding nails, wire, or improper wire size. Common injuries are dislocated vertebrae, damaged nerve tissue, or strained muscles and/or tendons.

If the injury is mild, the animal may recover in a few days. Make the injured animal comfortable and feed it a balanced diet. If it does not improve within a week, destroy it to prevent unnecessary suffering.

It is important, therefore, that your rabbits be provided with quiet, comfortable surroundings and be protected from predators and unnecessary disturbances. Again, we stress the fact that noise in the rabbitry should be avoided at all times. Also, do not allow visitors to poke the rabbits; instead, they should be courteous to them.

Trimming toenails is another preventive measure. The toenails of rabbits confined in hutches do not wear normally. They may even become long enough to cause foot deformity. The nails may also catch in the wire mesh floor and cause injury and suffering. Periodically cut the nails with side-cutting pliers. Cut below the tip of the cone in the toenail. The cone can be observed by holding the foot up to daylight. This will not cause hemorrhaging or injury to the sensitive portion.

Sanitation and Disease Control

Daily cleaning of hutches, containers, and surroundings is the easiest way to ensure sanitary conditions and control disease. With strict sanitation practices such as cleaning all cages and water containers every day and collecting roughage from uncontaminated areas (ideally, you will have provided space for planting your own forages), you can drastically minimize the danger of any disease in the rabbitry or of infecting yourself.

Backyard rabbit husbandry or smaller production systems are advised to consider carefully if they are interested in a medical approach to managing diseases. Though certain veterinary interventions can be of high utility, they also require financial resources, access, and a skill level to be able to determine the need.

To make things simple, many producers, even on a moderately large scale, effectively manage their herds and prevent the majority of diseases by maintaining a clean and sanitary rabbitry. This includes cleaning out hutches, nest boxes, and food and water crocks or receptacles.

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Additionally, such management involves occasional removal of buildups of hair on hutches and ensuring proper ventilation. Ventilation is the rabbit farmer's friend when it comes to disease control and prevention.

The rabbit is a highly reproductive animal. This evolutionary trait is no doubt due in part to the relative fragility of the animal (and in particular, young animals). Accepting that there will be disease and death on the farm is necessary to manage the system productively. With this acceptance, a disciplined approach to culling diseased animals can be the most efficient and economical (and even humane) way to deal with disease. As a general rule, unless it is known to be safe, an animal culled due to disease should be destroyed and deemed not fit for human consumption.

Figure 4-12: Disease Prevention

Condition	Prevention
Ear mange—Ear mites	Keep a small spray bottle filled with baby oil; spray into ears to treat or even prevent
Skin mange	Check with local extension agents for information
Ringworm	Best to cull
Sore hocks	Use a quality material for flooring. Avoid sharp or abrasive edges, mend breaks or other imperfections that can tear or abrade skin
Warbles	Check with local extension agents for information
Lymphadenitis	Best to cull
Urine-hutch burn	Maintain hygiene in the rabbitry, avoiding buildup of feces or urine in cage corners
Vent disease	Best to cull
Weepy eye	Maintain high standard of hygiene, isolate infected animals, and monitor and cull if it persists
Infected nose	Check with local extension agents for information
Caked breasts	Wean kits gradually (e.g., in a litter of eights, wean two the first day, two on the third day, two on the fifth day, and the final two on the seventh day)
Mastitis	Best to cull
Snuffles	Can isolate initially, monitor, and cull if no improvement, but can be prevented or limited with hygienic environment
Pneumonia	Can isolate initially, monitor, and cull if no improvement, but can be prevented or limited with hygienic environment

Condition	Prevention
Heat prostration	Allow sufficient ventilation and adequate water. Rabbits overheat very quickly without water and when under stress. They are especially at risk while transporting
Buck teeth	Cull
Coccidiosis	Check with local extension agents for information
Bloat	Check with local extension agents for information
Fur block	Check with local extension agents for information
Tapeworm	Check with local extension agents for information
Pinworms	Check with local extension agents for information
Metritis	Check with local extension agents for information
Papilloma	Check with local extension agents for information
Milkweed poisoning	Check with local extension agents for information
Pseudotuberculosis	Best to cull
Listeriosis	Best to cull
Hydrocephalus	Best to cull
Paralyzed hind quarters	Best to cull
Wry neck	Best to cull—can prevent/limit by managing ear mites effectively

Figure 4-13: A rabbit is stricken with ear mites, causing him to keep his head askew.

Photo c/o creativecommons.org



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Figure 4-14: Manure collects daily in corners of the cage. If not cleaned regularly, skin mites multiply and infest the rabbit.

Photo c/o creativecommons.org



Following are other guidelines to prevent disease:

1. Disease is, in a sense, a natural phenomenon that can never be completely eliminated but can be greatly decreased through an intensive daily sanitation program.
2. Purposeful and intelligent sanitation practices may usually keep disease at a low level.
3. Prevention is vastly preferred to treatment and possible cure—proper sanitation practices are PREVENTION.
4. High natural resistance, long life, and high productivity are as certainly inheritable as other traits, such as size, color, ear length, etc., but not necessarily in such a simple pattern. Persistent selection of breeding stock on the basis of superior performance will pay well for the trouble expended.
5. Do not overcrowd the animals (see “Hutches”).
6. Observe good nutrition practices to permit the greatest expression of superior inheritable traits.
7. Provide plenty of draft-free ventilation. Up-drafts through a self-cleaning floor result from over-enclosure of the sides; and these drafts are particularly objectionable.
8. Permit the animals plenty of sunlight, if not attended by great heat. Shade must also be provided.

9. Keep all equipment CLEAN and DRY and, to minimize the possibility of injuries, keep it in good repair.
10. Avoid unnecessary handling of animals, their feed, their containers for food and water, or any equipment with which they come in contact. The clothing and hands of the caretaker may spread disease.
11. Isolate all stock being brought into your herd for 1-2 weeks, whether it is a new introduction or one of your own animals that may have had contact with other rabbits, directly or through equipment and handlers.
12. Isolate animals suspected of having infectious diseases, and care for such animals AFTER the healthy ones have had their attention.
13. Protect the animals from disturbing influences, particularly night prowlers. Allow the animals complete rest during the day, as routine care will permit.
14. If rabbits are sold on a regular schedule to a dealer, have marketable stock segregated and confined outside of the rabbitry or at its entrance. The pickup man or woman visits many rabbitries in rapid succession and will appreciate your cooperation in minimizing the possibility of him/her becoming a factor in the spread of disease.

Fur-eating Habit

Rabbits that eat their own fur or bedding material, or gnaw the fur of other rabbits, usually do so because the diet is inadequate in quality or quantity. A common cause is a diet low in fiber or bulk. Sometimes the protein content of the diet is too low. Adding more soybean, sorghum, peanut meal, or any other legume may correct the deficiency.

The experienced breeder notes the condition of each animal in the herd and regulates the quantity of feed to meet its individual requirement. Providing good-quality grass or feeding fresh, sound leguminous feed or root crops as a supplement to the home-mix or pelleted diet also helps to correct an abnormal appetite. Another option is to remove all feed for 24 hours.

Preventing Fur Block

In cleaning themselves by licking their coats, or when eating fur from other animals, rabbits swallow some wool or fur, which is not digested. The only noticeable result may be droppings connected by fur fibers. However, if the rabbit swallows any appreciable amount, it may collect in the stomach and form a “fur block” that interferes with digestion. If it becomes large enough, it blocks the alimentary tract and the animal starves. The most satisfactory method of

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preventing this is to shear Angoras regularly. Providing adequate roughage and protein also helps to prevent rabbits from eating their fur. A block of wood soaked in salt for three days and hung in the cage for the rabbits to chew may be used to reduce fur chewing.

Gnawing Wooden Parts of the Hutch

Gnawing wood is natural for the rabbit. However, in excess, it may indicate insufficient amounts of salt in the diet. Protect wooden parts of the hutch by placing wire mesh on the inside of the frame when constructing the hutch or by using strips of tin, galvanized iron, or flattened cans (make sure there are no rough edges protruding) to protect exposed wooden edges. Again, a block of wood soaked in brine solution and hung in the cage is the best solution.

Rabbits that have access to good quality grass and that are receiving legumes and root crops are less likely to gnaw on their hutches.

Disposal of Rabbit Manure

Rabbit manure has high nitrogen content when the rabbits are fed a well-balanced diet. It will not burn plants and is easy to incorporate into the soil. It is satisfactory as fertilizer on gardens and when placed at the bases of flowering plants, shrubbery, and trees. There is no danger when using it for fertilizing soil on which crops are to be raised for feeding rabbits if mixed well in the soil or covered.

The value of rabbit manure depends on how it is cared for and used. There will be less loss of fertilizing elements if the material is immediately incorporated into the soil. When manure is stored in piles and exposed to the weather, chemicals are lost through leaching and heat. Much of this loss can be prevented by keeping the manure in a compost heap or in a bin or pit.

Figure 5-1: Shown is a compost heap located directly below the rabbit hutch.

Photo c/o creativecommons.org



First-class Compost Fertilizer

Materials for Compost

- 60 kilograms of good quality rice straw or Kikuya grass (dried or wet)
- 110 liters of rabbit manure (wet)
- 2 kilos of ammonium sulphate
- 50–100 liters of rice bran or sawdust
- 100 kilos of sunflower leaves or any legume (in green form)
- Thin layer of soil for top of pile

Ch. 5: Various Uses of Rabbit Manure

Procedure

1. Gather all the materials.
2. Dampen straw or grass by placing it in water for 1–2 minutes.
3. Pile wet straw and cover to keep moist.
4. Cut straw into pieces 30 centimeters long.
5. Place a layer, about 15 centimeters thick, at the bottom of the hole.
6. Sprinkle in one-fifth of rabbit manure, one-fifth of rice bran or grass, and one-fifth of ammonium sulphate. Place another 15-centimeter layer of straw, another one-fifth of rabbit manure, one-fifth of rice bran, and one-fifth of ammonium sulphate. Repeat the process until all ingredients have been used.
7. Cover the pile with grass or pieces of sheet metal.
8. From time to time, turn the pile. In 3–4 weeks the compost is ready for use.

Earthworms in the Rabbitry

Where earthworms are active throughout the year (such as warm climates), they may be used under rabbit hutches to save labor in removing fertilizer. Construct the bins the same length and width as the hutch and make them 30 centimeters deep to confine the worms. Place the bins on the ground, not on solid floors, and keep the fertilizer moist to ensure that the worms can work throughout the bin.

Earthworms convert the rabbit droppings into casts—a convenient form of fertilizer. If you keep a large population of worms, there will be no objectionable odor. In addition, very few flies will breed in the bins. It is necessary to remove the manure only at three- to six-month intervals. This is especially conducive to areas that have porous soil.

Ch. 6: Rabbit Production and Marketing

Rabbit production is one backyard industry that promises a bright future. Almost 99 percent of the rabbit is useful—the meat for food, the fur for clothing, paws and tails for trinkets, and the manure for soil improvement and for bio or methane gas.

The returns from raising rabbits vary from place to place and from time to time. So rabbit producers may either expand or close down their projects based on local and national demands.

However, rabbits are perhaps the most economical and profitable among all kinds of livestock. They can utilize inferior feeds and still provide quality meat and fur. Moreover, with a better quality-feeding program, they can increase bunny production, thus allowing a higher profit margin for the producer.

A good rabbit raiser strives to raise as many bunnies as possible from one doe within a year or during her productive life. Good management includes the wise selection of initial breeding stock and the determination of how much time and capital is to be invested in the project. It also includes good care of the does, bucks, and bunnies and paying special attention to housing, cages, sanitation, and record keeping.

Fryer Production

A fryer or young rabbit carcass usually doesn't weigh less than 1.7 kilos and should be from 3–4 months old so the pelt is of prime quality to warrant tanning.

A kilo of marketable fryer (dressed weight) will need 5.7 kilos of commercial concentrates from birth to marketing age. It takes about 82.8 kilos of commercial concentrates to sustain a doe and her litter of six to eight, from breeding of the doe to marketing of the young at 3–4 months of age. This is in addition to roughage and root crops given daily (about 1-1.5 kilos total per day).

At 45 days to two months, the bunnies are weaned from the doe and separated by sexes to allow for the next breeding. If the young are kept with the doe for over two months, her milk supply will diminish to a level where the next kindling would not have a sufficient quantity.

Learn to castrate the bucks that are not intended for breeding stock to ensure less quarreling among the bunnies held in the colony. Castration demands much time, skill, and patience, but it is the only method to guarantee top quality meat and fur. It also maximizes space and feed.

Growth from 1 day to 2 months old is extremely fast, so be sure to give enough good quality feed in both roughage and concentrates to ensure proper development.

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Breeder Production

Breeder production is similar to fryer production. Breeders should be obtained from good producing does and have excellent looks, good performance, docile personalities, good conformation (such as stocky body, stub nose, short ears, and alert eyes), and be excellent consumers of feed.

Since these will be used as breeding stock, special care must be given to their diet because negligence will result in deterioration, thus propagating undesirable traits for generations to come. Select the future breeders when the rabbits are as young as 1 month old.

Secure initial breeding stock from reliable farms where records are available for your analysis. In the absence of records, utilize the observation signs listed earlier to determine breeder quality. In the end, it will pay to purchase the better quality breeder rather than the less expensive one that does not meet the recommended observation signs of breeder quality.

Roaster Production

A roaster or mature rabbit is a mature or old domestic rabbit carcass of any weight and has usually outgrown its productivity. You can fatten a roaster in two or three weeks to allow him to gain weight and improve fur quality.

It is doubtful if such production would be more profitable than that of rabbits of fryer weight.

Angora Rabbit Wool Production

Angora rabbits are raised primarily for wool production.

Figure 6-1: Shown is an Angora rabbit.

Photo c/o creativecommons.org



Ch. 6: Rabbit Production and Marketing

An Angora's wool grows up to three centimeters (one inch) per month. You can shear 14 to 15 ounces of wool a year from a mature Angora that is not nursing young. This wool is valued for its softness, warmth, and strength. It is used in blends with other fibers in the manufacturing of children's clothing, sport clothes, garment trimmings, etc. Used alone, it is usually too light and fluffy, besides, blends create better tensile strength and durability.

There are two main types of Angora rabbits—the English and the French. Present standards of the American Rabbit Breeders Association, however, make English and French types of wool synonymous. It is difficult to distinguish English Angora rabbits from French when they are crossbred. The choice is largely a matter of personal preference. The typical French Angora usually is larger than the English. The wool fiber of the French is shorter and coarser than that of the English, but the wool yield is greater. Due to competition with other natural and synthetic fibers and competition with imported Angora rabbit wool, the market price is generally low. Therefore, it is advisable to use the Angora as a triple purpose animal for meat, for improvement of fur quality of other breeds by cross breeding, which is presently being undertaken, and for wool production. Cross breeding Angoras with other breeds has proven beneficial both for better meat and fur production. The commercial Angora weighs at least 8 pounds and is being bred more and more to improve its meat quality.

Keep herd bucks and does in individual hutches. Keep woolers—does and castrated bucks maintained primarily for wool production—in groups or colonies to save labor. Castration of bucks that are to be reserved for wool production may reduce fighting in the herd but wool production is not increased by castration.

Feed and care for Angoras is the same as for other breeds. Because of their long wool, however, determine the amount of flesh by running the hand along the backbone. Reduce or increase the quantity of feed to keep the animal in healthy condition.

Angoras are generally sheared or plucked every 10 to 11 weeks, though some producers pluck their animals monthly and some at intervals beyond three months.

Wool should be harvested prior to breeding to prevent mauling and soiling the wool.

To prevent internal parasite infestation and to keep wool clean (i.e., unstained by urine, etc.), install wire mesh floors in the pens and **clean daily**.

A properly constructed manger for grass and legumes, or the use of a hopper, protects the wool from foreign matter and prevents contamination of feed. It is to be noted, however, that it is harder to breed Angoras than other breeds because of the concealment of their genitals due to the length of fur. The caretaker needs to assist in mating by holding the doe's tail upward while the buck mounts.

Ch. 6: Rabbit Production and Marketing

The following equipment is required for grooming and shearing:

- A table, waist-high, with a top covered with carpet or a feed sack to keep the rabbit from slipping and equipped with castors to allow easy turning. A table equipped with straps or cords for restraining the rabbit is advantageous.
- A hairbrush with single steel bristles set in rubber, for brushing and removing foreign material from wool.
- A pair of barber's scissors.
- A ruler for measuring the length of wool.
- Containers for storing wool.

Grooming

Commercial Angora woofers require little, if any, grooming between shearing, provided they are properly cared for and sheared every 10 to 12 weeks. If the coat grows for a longer period, the fibers may become webbed, tangled, or matted.

Following are steps for grooming:

1. Place the rabbit on the table. Part the wool down the middle of the back. Brush one side, stroking downward. As you reach the end of the wool, brush upward and outward to remove all foreign material. Make another part in the wool about half an inch farther down the side. Repeat the operation until the job is completed. Groom the other side the same way.
2. For grooming the head, front legs, and belly, place the rabbit on its back in your lap. Hold its hindquarters gently but firmly between your knees. Separate small areas of wool and groom the way you did the sides.
3. For grooming the hind legs, place the rabbit on its back in your lap. Hold the head and front feet under the left arm. Use your left hand to hold the rabbit's hind legs.

Shearing

Following are steps for shearing:

1. Before shearing, cut off all stained ends of wool.
2. Place the back of the scissors against the rabbit's body to prevent cutting the skin.

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3. Begin at the rump and shear a strip about an inch wide to the neck. Repeat this operation until you have removed all the wool from one side.
4. Turn the rabbit around and repeat the shearing operation on the other side, starting at the neck and shearing toward the rump.
5. For shearing the head, front legs, belly, and hind legs, restrain the rabbit as you would for grooming. Separate small areas of wool and shear the way you did the sides. Do not injure the doe's teats. Do not shear wool from the belly of a pregnant doe.
6. After shearing, lightly brush the rabbit to straighten out the wool fibers and prevent the formation of mats. Take care not to include the flesh while shearing.

Grading, Preparing, and Marketing Wool

Following are steps for grading, preparing, and marketing wool:

1. Label a container for each grade of wool and place it near the shearing table. Grade the wool as sheared, following the usual commercial grades.

Plucked wool:

Super—.0825 or longer
No. 1—.075 or longer
No. 2—.05 or longer

Sheared wool:

No. 1—.057 to .075
No. 2—.038 to .05
No. 3—.025 to .038
Shorts—.0125 to .019 (may be slightly webbed)
No. 4—Matted
No. 5—Stained and unclean

While the above have been the usually acceptable commercial grades for Angora rabbit wool, some grading systems have been simplified to the extent that only three grades are considered: No. 1—Clean wool; No. 2—Clean mats; and No. 3—All other wool, including soiled wool.

2. Put each grade in a separate paper bag that isn't too tightly packed. Tie the bags and place them in sacks or corrugated boxes for shipment.

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3. If the wool is to be stored, store it in a dry place.
4. To protect the wool from moths, put mothballs or moth crystals in a small sack before placing this in the container with the wool.

Marketing Rabbits

Marketing is often a challenge for rabbit raisers. In theory, the demand would be great considering global food shortages. However, in actuality, the demand for rabbit meat is often too high or too low for rabbit producers to supply.

Marketing prospects should be located and developed promptly when one engages in rabbit production. The first market for meat is the family, neighbors, towns, and cities within the locality. Rabbit meat can then be sold in dressed form to hotels, restaurants, supermarkets, and open markets. Rabbit barbecue can be sold by sidewalk vendors. It is also important to successfully market to all strata of the population the idea of eating rabbit meat.

Cutting and Packaging Rabbit Meat

Following are steps in cutting and packaging meat:

1. Fold hind legs into chest cavity, leaving liver and kidneys exposed.
2. Chill the carcass in a refrigerated cooler. Arrange the carcass on a cooling rack so that moderate air movements and suitable temperature within the cooler will reduce the internal temperature of the carcass to no less than 2.22 degrees Celsius and to no more than 4.44 C within 24 hours. Hanging by the hind legs for chilling may cause a carcass to be drawn out of shape so that the pieces will not fit satisfactorily into a carton. Some processors chill carcasses in wire trays, arranging them so the pieces will be of a proper shape for packaging.
3. Place in cellophane bag and record weight.

Figure 6-2: Packaged rabbit meat.

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Hotels, restaurants, hospitals, clubs, and other establishments usually purchase the whole carcass with the liver intact. Their chefs prefer to cut them to meet their own requirements. Housewives usually prefer the cut-up packaged product. Cut up the fryer rabbit with a knife; using a cleaver may splinter the bones. For sale in supermarkets, a paraffined box with a cellophane window makes a neat, sanitary package for the chilled rabbit carcass. If the package is to be handled considerably or the meat is to be frozen, use a box without the cellophane window, but wrap the meat or the box in a special wrapping to prevent freezer burns and loss in palatability.

Figure 6-3: Shown are the common cuts of rabbit meat.

Photo c/o creativecommons.org



If you sell to the home trade or furnish butchers with meat that is to be consumed locally, a cellophane bag will suffice or you can make a neat, sanitary, and inexpensive package by arranging the pieces of fryer and a spring of parsley on a paper plate and covering them with a piece of clear cellophane or other wrapping materials.

Crating and Shipping Live Rabbits

Rabbits can be safely shipped almost any distance if they are in good condition, properly crated, and provided with food and water. Do not ship them in extremely hot or cold weather. Always use well-ventilated crates that are long enough to permit the rabbit to lie down. Use straw for bedding. Crates with slanted tops discourage stacking. Consult area quarantine laws.

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Figure 6-4: Shown is a crate used for shipping rabbits long distances.

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Put only one animal in each compartment of the shipping crate. Animals to be in transit 24 hours or less need only a small amount of feed and water. If the trip is longer, more feed and water are needed. It is wise to attach to each crate a bag of feed and a printed request to feed and water the animals once a day. Plenty of fresh water and feed should be accessible to the rabbits at all times. For rabbits in transit, use the type of feed given in the rabbitry. As an alternative, any root crop or vegetable, such as chayote, placed in the crate will provide enough feed and moisture for several days travel and eliminates the possibility of spilling feed and water that is provided in containers.

Label the crate clearly, advising against exposing the animals to sun or rain. Notify the purchaser when rabbits are shipped.

You can make shipping crates from packing boxes. It is good business, however, and effective advertising to ship rabbits in durable crates that are neatly built, lightweight, and attractive. Furnish ample space in each compartment and be sure that wire netting keeps the rabbits from gnawing the wood.

How to Assess Sales Prospects

To find out how your product will sell, gather and analyze the following information:

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1. Geographical information. Area of country, the terrain, the climate, and distance between main population centers. Things that will influence demand for the product. In other words, "Who needs it?"
2. Population. What is its size, age range, and concentration?
3. Income. What is the level of income, who has the income (distribution), and who might need your product?
4. Natural resources. Is it limited or not yet developed? (This is especially important in determining earnings from staple agricultural and other products.)
5. Industrial development. What is the extent and stage of industrial development plans at present and for the future? Amount of foreign investment?
6. Demand. What is the current and future demand for the product?
7. Domestic production. Who is now making the product, where are they located, and what are their plans for future expansion?
8. Imports for product. Are they increasing, decreasing, or staying at the same level? Need information on imports by volume, value, and country or origin.
9. Dominant price range for the quality. Choose the range with the largest potential sales. What are the prices for the importer? The wholesaler? The retailer? Is there market control by traditional suppliers? Acceptability of new products by buyers?
10. Grading. What is the standard or grade and a procedure for approval of the grading system?
11. Packaging. Is there special packaging because of climate, ship conditions, government regulations, or local tastes and prejudices?
12. Distribution costs. How much markup and commission is expected for importer, manufacturer commission, agent, distributor, etc.? Are there normal distribution patterns? One firm with exclusive distribution rights or several representatives in various locations? One large shipment or several smaller ones to meet quota?
13. Advertising. What media are available for advertising the product? Newspaper, magazines, radio, TV, cinema, or word of mouth? What is the cost of advertising? Which would give the most benefit for the cost? Where are suitable trade fairs/exhibits to display rabbits? What is the cost for participation? To what forms of advertising do customers best respond?

Appendix 1: Resources

Constraints and Opportunities to Rabbit Production in Zimbabwe: A Case Study of the Midlands Province, Zimbabwe (<http://www.ijsr.net/archive/v2i9/MTcwOTZMDE=.pdf>).

Useful case study of realities of rabbit raising in the developing world.

Cunicultureinfo.com (<http://www.cuniculture.info/>). Website with information on rabbit production, recipes, and a clearinghouse for links to other websites and resources in French and in English.

Le guide pratique de l'éleveur de lapins en Afrique de l'ouest (<http://www.cuniculture.info/Docs/Elevage/Elevage-fichiers-pdf/Elevage-Tropic-pdf/Guide-complet.pdf>). Guide to rabbit raising in West Africa (in French). Features great pictures, figures, and information.

Livestock Research for Rural Development (<http://www.lrrd.org/>). Features resources on rabbit raising.

"Production characteristics and constraints of rabbit farming in Central, Nairobi and Rift-valley provinces in Kenya" (<http://www.lrrd.org/lrrd25/1/hung25003.htm>). This paper gives some background on farmer practices and perspectives in a developing world context.

Rabbit production in developing countries (<http://world-rabbit-science.com/Developping/attente.htm>). Resource portal for rabbit raising in less-developed countries.

Rabbit project development strategies in subsistence farming systems ([http://www.fao.org/docrep/u5700t/u5700T0d.htm#rabbit project development strategies in subsistence farming systems](http://www.fao.org/docrep/u5700t/u5700T0d.htm#rabbit%20project%20development%20strategies%20in%20subsistence%20farming%20systems)). Guide details how to integrate rabbit raising in larger farming system.

Rabbit: Husbandry, Health and Production (<http://www.cuniculture.info/Docs/Documentation/Publi-Lebas/1990-1999/1997-Lebas-percent26-al-The-rabbit-Husbandry-health-and-production.pdf>). Detailed manual on rabbit production.