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Rabbit Breeding Handbook (Cuniculture)

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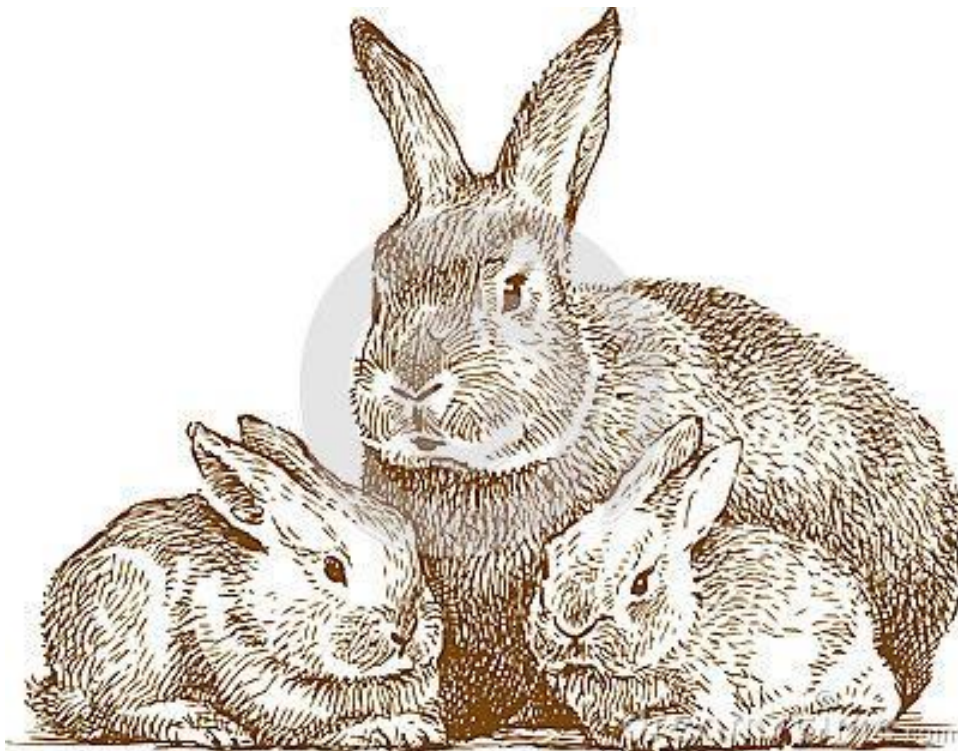
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RABBIT BREEDING HANDBOOK (CUNICULTURE)

Provided to Seeds for a Future Extensionists and Field Team

**In collaboration with the Institute of Nutrition of Central America
and Panama (INCAP)**

Chocolá, Guatemala - June 2014



Abstract

The information presented below is part of the support provided to Extensionists within the project entitled "INTEGRATED PROGRAM FOR MATERNAL AND CHILD HEALTH AND NUTRITION, AND AGRICULTURE: BEHAVIORAL AND NUTRITIONAL CHANGES IN RURAL COMMUNITIES OF SUCHITEPÉQUEZ."

This document is specifically about the production of rabbit meat and is intended to be used by Extensionists for operational development in rural households and to provide a model that is adapted to specific local training needs. In this way, Extensionists will better understand the reason for their work in urban and rural households (project objectives) and be able to carry out their work more efficiently.

Both Seeds for the Future and the Institute of Nutrition of Central America and Panama (INCAP) hope that this handbook will represent an alternative to technical-professional education and that it will guide and facilitate the actions of Extensionists in building, connecting, and providing rural and urban families with meaningful learning which constitutes a type of teaching and learning that enables extension in a social and productive context.

Information has been collected from various sites and from several people well-versed in breeding and raising rabbits. There is very little information available in a single document outlining areas such as management, breeding, maintenance, growth rate, prolificacy, adaptability to overcrowding, etc. Therefore, this handbook brings together diverse general information on existing practical aspects.

Introduction

Rabbit breeding, even if just a single litter, requires certain preconditions. **Rabbit breeding is the process of breeding, rearing, and fattening rabbits in an economical way with the goal of obtaining the maximum nutritional benefits for the family and, in many cases, for the sale of their products and by-products.** It should be a long-lived and widely spread farming activity (especially for its nutritional value) because it is a very interesting non-traditional activity from a productive and economic perspective. It is an activity that requires relatively little initial investment and has short rotational cycles, so it should offer excellent nutrition and good market potential.

This handbook provides information on all aspects of the breeding and production of rabbits on a family level to provide food and improve nutrition. It covers valuable aspects such as the importance of rabbit meat, the prolificacy of rabbits, a better diet, what is needed to breed rabbits, what is needed to prevent and cure diseases, hutches and their cleaning, food and water requirements, the use of excrement in organic vegetable gardens, the types and breeds of rabbits, homemade food, the installation of hutches, weather and wind, knowing which rabbits to buy, how to handle them, etc. Finally, a series of recipes are provided using rabbit meat.

As it will be thoroughly explained throughout this handbook, its use (especially as an educational and training guide for Extensionists), may be outspread to individual families, those who wish to start a business, to understand (through training) the nutritional benefits of meat, how to become a business owner, etc.

Domestic rabbit breeding will always be productive, whether it is a primary or secondary activity or even done for fun.

Zoological Classification of Rabbits

Rabbits can be classified within the following zoological scale:

KINGDOM:	Animal
SUBKINGDOM:	Metazoan (multi-cellular)
TYPE:	Chordate
SUB TYPE:	Vertebrates
CLASS:	Mammals
SUBCLASS:	Placental
ORDER:	Lagomorph
FAMILY:	Leporidae (have a cleft upper lip)
SUBFAMILY:	Leporine
GENSUS:	Oryctolagus
SPECIES:	Cuniculus

Cuniculture is known as the breeding of rabbits for their meat and products. The concept is derived from the Latin word *cuniculus* ("rabbit") and culture (which can be associated with cultivating something). The *Oryctolagus cuniculus* is known as the common rabbit, a mammal from the Leporidae family considered one of the world's most harmful exotic invasive species. Domestic breeds descend from the subspecies *Oryctolagus cuniculus*. Rabbits can be characterized by their long ears, which can measure up to 7 centimeters, short tails, forelegs that are shorter than their hind legs, and incisor teeth that continuously grow.

All breeds of rabbits possess the following characteristics:

1. Mouth: the upper lip should be parted in the middle. The lower incisors should close behind the upper incisors.
2. Nose: should be moist and moving.
3. Nose bridge: should be long and round.
4. Face: broad and slightly convex.
5. Eyes: should be red or pink.
6. Front: broad and without protuberances under the skin.
7. Ears: strong at the base, covered with hair on the outer side and rounded tips.
8. Nape: should be short in meat-producing breeds.
9. Shoulder: the skin should be flexible and strong.
10. Back: well-muscled.
11. Torso
12. Loin
13. Croup
14. Thighs: fleshy and firm in consistency.
15. Rump: fleshy and continues from the croup without noticeable signs.
16. Tail: wide and well set in between the thighs.
17. Hock: should be rounded, fleshy, and strong.
18. Hind legs with feet apart parallel to the body with closed toes.

19. Knees: close together against the body.
20. Ribs: well-arched.
21. Belly: should be warm having soft, flexible skin.
22. Straight forelegs with short, closed toes.
23. Broad chest: should continue from the belly without visible signs.
24. Neck: short and round.
25. Dewlap: should be as small as possible.



Rabbit Handbook

The following information is intended for Field Staff and Agricultural Extensionists. Seeds for a Future Extensionists are expected to provide guidance on several key aspects of production:

- ✓ Remind families that they can live better and have better nourishment if they breed their own rabbits.
- ✓ By breeding rabbits, they can always have fresh meat that is not only nutritious but also tastes good.
- ✓ Several recipes can be made with rabbit meat and herbs from the garden.
- ✓ Even if only a few rabbits are bred, they will provide enough meat for the family to eat better.
- ✓ It is easy to breed rabbits. They are clean, calm, and small animals.
- ✓ It is a very nutritious meat for healthy and strong growth.
- ✓ Surface area requirements are low. Many rabbits can be kept in a small space.
- ✓ It is easy to feed a small number of rabbits and you can even grow some of the food they eat.
- ✓ Just one single rabbit makes a good family meal. It can be eaten by a family throughout the day without worrying about the meat spoiling.
- ✓ Rabbits are very prolific. With just two or three adults, you can produce a lot of nutritious meat for the family.
- ✓ If you have more rabbits, and therefore more kits, the family can use what they need for their consumption and the rest can be sold to their neighbors or at the market.



Rabbit meat provides an accessible and nutritionally viable source of protein in rural Guatemala.

- ✓ Families will eat and live better thanks to the earnings from the sale of the kits.
- ✓ If you have a large family, rabbit breeding could be a solution for a better diet for everyone.
- ✓ Rabbits reach breeding age when they reach sexual maturity, which is normally between 3 and 4 months and they have reached 80% of their adult weight.
- ✓ Most rabbits give birth between 28 and 32 days after mating.
- ✓ The females have special characteristics in their mammary glands: they suckle their newborns (lactation).
- ✓ Their bodies are covered with hair that protects them from the cold and prevents skin abrasions.
- ✓ They are classified as viviparous, as fertilization is internal, and the embryo develops inside the mother within a special double uterine organ, a particular characteristic of rabbits. They give birth to live offspring.
- ✓ The weaning process is a key point. A female rabbit (doe) produces between 5 and 10 kits, which must survive after weaning, which happens when they reach the age of 28 days.
- ✓ They are herbivores.
- ✓ Males should be used every other day. Mating once is enough, some recommend twice.
- ✓ If the female is left with the male for 3 to 4 hours after mating, there is a notable increase in productivity.
- ✓ In males, maturity is reached at 5 or 6 months and sexual activity lasts up to 4 years.
- ✓ Ovulation occurs 12 hours after mating.
- ✓ Females will be in heat again 3 or 5 days after giving birth.
- ✓ If mating occurs on the 4th day after birth, with a 30-day gestation, the female will give birth every 35 days, which will allow for 7 dry days.
- ✓ Cannibalism may occur, in which the mother kills and eats her offspring. A lack of water is the most common cause, most likely caused by a blocked drinking trough.
- ✓ Rabbit breeding can be developed as an additional activity alongside other productive activities and as a family operation, exclusively dedicated to the family's nutrition.

Feeding Rabbits

Rabbit's diets can take various forms:

1. Concentrate. This is the most successful and it is perfectly formulated to satisfy all requirements such as maintenance, reproduction, gestation, lactation, and production. This balanced diet should be pelletized and offered to rabbits in pellets (small grains) to avoid respiratory problems. Additionally, pellets have many advantages over other foods as they contain less dust, they make up a more balanced nutrition, they increase food consumption, and they are easy to store and transport.
2. Leaves, fruits, and vegetables only. This aims to fatten the rabbits and is very viable in the community. The properties of all herbs used should be investigated

to have more alternatives, fitting what can be grown or found in the market. They should be as fresh as possible.

3. Mix. A mixed diet (feed plus supplements) has the advantage of a lower cost. The following characteristics should be met for feed, by-products of crops, shrubs, and other feedstuffs to be optimally used by the rabbits:
 - a. Be tender: greens should be used before flowering because after that they lose their nutritional value and become lignified (wood-like).
 - b. Dehydrated: fresh, wet feed causes digestive problems, especially diarrhea.
 - c. As a rule: feed is cut in the morning and fed in the afternoon, or it is cut in the afternoon and dried, then fed in the morning.

Other foods that can be fed to rabbits:

- Lettuce
- Chard
- Spinach
- Carrots
- Potato leaves
- Lead tree (dried first)
- Citruses (leaves and fruits)
- Guava and mango
- Grass and hay (must not contain any mold)

Foods that should be avoided include raw potato, parsley, celery, and tomato leaves, as they contain substances that can be toxic to rabbits.

Symptoms of intoxication are:

- ✓ Trembling/nervousness
- ✓ Diarrhea
- ✓ Excessive thirst
- ✓ Muscle spasms

Rationing

How often and how much should you feed your rabbits?

The easiest way to feed rabbits which offers the best results, is based on giving them as many pellets as they want. Feeders should always be kept full, and feed should be available so they can choose according to their needs, preferably dry or very fresh and clean (never damp, moldy, or with other odors). This applies both to females with good reproduction rates and rabbits in fattening.

Water

Rabbits need a constant water supply. It is not good for water troughs to be full of green algae. This indicates that the water has not been changed and that the drinking trough has not been cleaned.

Water offered to rabbits must be clean.

Drinking troughs must be cleaned at least every other day.

Production of Manure

The amount of manure and urine produced in homes is very little; it can be collected weekly and used as compost in the vegetable garden. Urine practically evaporates.

Mating Protocols

A female rabbit is called a doe, while the males are called bucks. The doe should be taken to the male's hutch to mate for the first time when she is between 4.5 and 6 months of age. The male must be at least 5 months old. During lactation, does in hot weather will drink between 1.5 and 2 liters of water per day, and therefore, water levels must be checked day and night.

The nest should be checked daily, every day after birth and every two days until weaning, which will happen when the kits are 5 weeks old (35 days), which is 10 days before the next birth.

Reproductive Management

The animal is considered to reach reproductive age when it reaches sexual maturity and starts to produce offspring.

The physiological process which regulates the fertile and infertile stages of a doe is called the **Oestrous Cycle** and comprises two stages: **anestrus and estrus**.

The anestrus, or lack of heat, is a period that occurs in the first and last two days of the oestrus cycle. The following symptoms are present:

- The doe will not allow mating.
- The vulva appears to be cold and small.
- Other rabbits in close proximity do not attract her attention.
- The doe appears calm.

The estrus, or rut or heat, is the fertile period, i.e., when the doe can be fertilized. It can be recognized by the following symptoms:

- The doe will allow mating.
- The vulva appears to be red, hot, and slightly swollen.
- The female is restless and rubs her back against the walls of the cage or hutch, the feeder, and other objects, and tries to approach neighboring cages.

Normally this period lasts 2 days and the chances of getting pregnant are high.

Mating

When the male is taken to the female's hutch, it is frequently attacked by the female, even incurring injuries.

It is therefore better to take the female to the male's hutch. This hutch is larger and there are no obstacles that may interfere with mating.

For well-fed, mid-sized females, the first mating will take place at 4 months old. The males will be used for the first time at 5 months old.

Pregnancy

Gestation is the period during which the animals develop internally. This is from mating (if fertilized) until the birth of the kits, which lasts between 28 and 32 days. During the pregnancy, the females are calm and become fatigued quicker.

The most reliable method to determine pregnancy is palpation. This is a routine practice that determines if the female is pregnant or not when she is only 11 to 15 days pregnant. The advantages of this are as follows:

- ✓ Saves unproductive feed, almost 20 days of consumption with the female not pregnant.
- ✓ Increased chances of pregnancy in less time.
- ✓ Increased selection speed of the breeding female.

Some 15 days after birth, the female should be taken again to the male for mating until fertilization is achieved.

Birth

Most rabbits give birth between 28 and 32 days after mating. If the pregnancy is longer, it is possible that there are fewer kits, with one or two of an unusually large size.

The birthing box should be prepared several days in advance, with soft materials or hay. Four days before the due date, more hay should be placed within reach of the female for her to arrange her nest.

For two days she will be seen going in and out several times with hay in her mouth. During this time, she should not be disturbed and the food in her feeder should be reduced. A small number of greens will satisfy her appetite and plenty of fresh water should be available.

When birth approaches, the rabbit will have an instinctive reaction of fear towards natural enemies such as cats, dogs, or rats, even if not threatened by them. Additionally, if disturbed, she may give birth on the floor of the hutch or abandon her kits, leading to their death.

Birth generally takes place during the night. The kits are born one at a time, at regular intervals. When a kit is born, the mother licks it to clean and dry it and immediately suckles it. Once the whole litter has been born, she plucks hair from her body and mixes it with the bed to cover them. The number of births varies between 5 to 10 kits.



A birthing box keeps new-born rabbits contained and comfortable during early stages of growth.

After the birth and once the female is calm, the bed should be checked to remove the dead, deformed, and very small kits. This should be carried out calmly by one person known to the animal. If scared, the female may abandon her kits.

Nursing

After kindling, nursing begins. At first, milk secretion is limited, but then it increases, following the development of the kits.

Approximately 15 or 20 days after birth, milk production reaches a peak and then progressively declines over the course of lactation, which can last up to 45 days after birth.

When a doe gives birth to many kits, she divides them into two groups and feeds them alternately. These groups must eventually become a single group, so some kits are passed to any other doe with fewer kits of her own. This can be done up to two days after birth and between litters that are no more than three days apart.

To ascertain if the kits have drunk milk, the abdomen is palpated. If one or more have not had their milk or have had very little, another rabbit with well-filled udders is located for the purpose of feeding them.

Weaning

This is a critical juncture in the intensive management of rabbits. The rabbit produces a number of kits (between 5 and 10) that must be able to survive after weaning.

If mating is carried out on the fourth day of the postpartum period, bearing in mind 30 days of gestation, the female will give birth every 35 days. In this case, the kits should be weaned at 28 days in order not to compromise the condition of the adult female for her next nursing period and her next mating.

If the litter is of irregular size, weaning can begin on day 27 for the larger kits and end on day 29 for the smaller ones. The strict weaning age is meant to preserve the fertility of the doe and allow her to bear healthy kits in the following birthing cycles. She may have at least 7 days of rest before giving birth again.

Female Rabbit Tracking Form

Each doe must have an individual card that will hang in front of the hutch where she is located. The following data must be included:

FEMALE #	DATE OF BIRTH	BREED
FATHER	MOTHER:	LITTER #

DAILY FOOD: WEIGHT IN KILOS	DATE OF SERVICE	MALE NUMBER	DATE OF BIRTH	LITTER NUMBER

KITS BORN				
ALIVE	DEAD	CULLED	WEANING DATE	KITS WEANED

AGE OF KITS AT WEANING	TOTAL WEIGHT OF EACH IN KILOS	AVERAGE WEIGHT IN KILOS	NOTES

This is the card that must be completed to monitor the productive does, the most prolific bucks, the weaning age, and the details of the rearing and fattening of the rabbits.

Use of Male Bucks

Male rabbits must be used only on alternative days at most. With respect to the breeding itself, although a single mating will suffice, some experts recommend two. A single mating should be contemplated only if bucks are scarce or the does are very receptive. If the doe is left with the buck three or four hours after the mating service, there is a notable increase in productivity.

It is advisable to maintain an information card in the hutch of the males to monitor their output. This makes it possible to determine whether the buck can be used at the time and what his level of performance is. In other words, the information cards allow for the selection of the bucks. If a buck begins to underperform, several does are implicated, so this affects the productivity of the rabbit stock to a larger degree than if a doe underperforms.

If this occurs, the buck may be checked, given a break, and then tested or culled. The information card for the bucks is as follows:

MALE #		DATE OF BIRTH:			BREED:	
FATHER:		MOTHER:			LITTER #:	
DATE OF SERVICE	DOE NUMBER	LIVE KITS	DEAD KITS	CULLED KITS	TOTAL WEIGHT IN KILOS	AVERAGE WEIGHT IN KILOS AT WEANING

From Weaning to Slaughter

During the period between weaning and slaughter, the animals are held in an area (cage) designated for "fattening." The light exposure inside the cage is less important here than in the maternity area and generally consists of one or more hours of artificial light per day.

Mortality during this period should not exceed 2-3%. Unfortunately, this index is often higher, reaching as much as 7-15%. Health-focused prevention and strict hygiene measures are essential in the fattening period but are often neglected more than with the reproducing rabbits.

It may be said that breeding rabbits, from weaning to slaughter, is simple and poses few problems for the breeder; however, many times, the risk of mortality can be an important factor, which must be considered.

Upon slaughtering the rabbits, their meat may be sold or eaten. The overall turnaround time is roughly between 70 and 90 days, depending on the duration of the fattening period. For families that want to consume rabbit meat as a way of contributing to Food Security, this is the age most frequently and commonly recommended.

Signs of Health

An Extensionist should be able to recognize and impart knowledge of the following signs of good health:

1. Healthy rabbits eat and drink regularly.
2. They must be alert and curious.
3. They clean themselves.
4. They keep their skin and fur clean and healthy.
5. Eyes and noses are kept clean, without mucus or dirt.
6. The temperature in the rectum should be between 38 and 38.5 °C.
7. Breathing must be silent.
8. They must have between 40 and 65 movements per minute.
9. The anus must be free of diarrhea.
10. Adults maintain their weight and those destined for fattening must gain weight.

Hygiene and Prevention

Prevention is always the best treatment. It is the same for any animal as it is for people. This is especially important for rabbits. The best solution is to cull any doe or buck that shows signs of ill health, because of the costs associated with our own breeding rabbits, plus the risk of its problems being passed on to others.

Germs, scabies, mites, and parasites are extremely small, while viruses are even smaller and cannot be seen, but they exist and are often the cause of disease. To avoid them, thorough cleaning, and disinfection of the hutch and all the tools that are in contact with the rabbits are required. Health problems are largely avoided with a

thorough cleaning and the system of early culling of rabbits presenting symptoms of any disease.

If, despite our best efforts, any rabbit falls ill or dies, it must be removed from the hutch or cage IMMEDIATELY. **The entire hutch or cage must be removed for cleaning and disinfecting.** Animals found dead or those in serious condition (which must be slaughtered) will then be destroyed in a septic tank or by fire.

Be reminded that feeding with aqueous food, overall poor hygiene, feeders, drinking troughs or nests that have not been cleaned sufficiently, fermented straw bedding, environmental humidity, lack of ventilation, excess excrement in the hutch or feeders, the presence of pests (including rodents), and visits from neighbors or traders who have been exposed to sick animals, etc. all together constitute the main causes of contagion, contamination, and transmission of diseases.

Diseases and Other Threats

Well-trained domestic rabbits can be excellent companions, but they are also very delicate animals. You may have a robust rabbit that does not get sick and another that, on the other hand, easily becomes ill. That is why it is so important to practice extreme hygiene and care of the rabbits. For this reason, it is critical that families be informed about the most common diseases in domestic rabbits.

The life expectancy of rabbits is seven to nine years, provided that their living conditions are optimal; that is, they have a fresh and varied diet, clean water, and a cool place to live.

Anything that causes stress (such as climate change, food changes, hutch changes, etc.) will lower the rabbit's defenses and lead to disease.

The four main diseases affecting rabbits are presented below.

1. DIARRHEA

Diarrhea is dangerous in rabbits because they can become dehydrated very quickly. Diarrhea can occur for different reasons, such as dirty or fermented foods or foods in poor condition. In rabbit production, diarrhea is a constant companion.

Diarrhea usually occurs during the fattening process and does not affect adult animals as much, because of their high stomach acidity. Kits only achieve the level of stomach acidity of an adult at 50 days of life. Therefore, up to that age, they are invaded by germs waiting to attack them through their deficiencies.

Prevention and treatment:

- Decrease the amount of food in the fattening house until kits are 50 or 60 days old.
- Place grass hay in or on the hutches. Dry grass from the ditches or vegetation from the garden itself may also be used.
- Place vinegar in the drinking water, that is, one tablespoon per liter of water.

- Place willow or poplar leaves in the hutches.
- Use two drops of hydrochloric acid per liter of water.

2. EAR MANGE

This disease is caused by mites inside the outer duct of the rabbit's ears. It is a **very contagious** disease among rabbits and if you have more than one rabbit with the disease, you must separate them. This mite can lodge under the skin or in the inner ear. It produces hair loss and the formation of reddish scabs.

To treat and prevent it, the following steps are important:

- Keep the hutch clean and disinfected.
- Prevent hair debris from accumulating in hutches.
- Isolate sick animals.
- Treat all animals if the disease appears.
- Use injectable products.

3. COCCIDIOSIS

It is a disease caused by a protozoan that is introduced through the mouth via contaminated food or water. It affects the liver, intestine, and lungs, and causes lack of appetite, inactivity, and diarrhea, as well as dehydration and irritation of the perianal area.

Prevention and treatment are as follows:

- Use hutches with wire mesh floors, which allow droppings to fall to the ground.
- Wash hutches frequently.
- Use feeders that prevent contamination of food with fecal matter.
- Add coccidiostats to drinking water.

4. PASTEURELLOSIS

It is a respiratory disease that presents itself in three ways: Hemorrhagic septicemia, coryza (rhinitis), and the common cold.

These diseases produce continuous colds, accompanied by discharge, thick and transparent or purulent nasal flow, and forced breathing. Prevention and treatment are outlined below.

- As a form of prevention, a vaccine is given to the rabbits at 15 days of gestation and to the kits at the time of weaning.
- In the case of coryza or the common cold, isolate sick animals and apply antibiotics in recommended doses.
- Remove dead and sick animals, burn the bodies and any combustible material that was in contact with them.
- In all cases, disinfect hutches or cages, feeders, and waterers used by sick animals.

There are other diseases that can occur, such as the following:

5. BODY MANGE

Like ear mange, this disease is also very **contagious**, and the rabbit must be separated from others immediately.

It is an infestation of the skin by mites also called "walking dandruff," which produces hair loss and dandruff, and sometimes also pruritis. It is easily treated with topical solutions.

6. CONJUNCTIVITIS AND EYE INFECTIONS

Conjunctivitis is an infection of the eyelids. The rabbit would have watery eyes and mucus and the eyes may even sprout pus.

7. MYXOMATOSIS

It is transmitted from wild rabbits to domestic rabbits by the rabbit flea. It is a very serious disease, but it may be prevented by annual vaccination of the rabbit.

8. GIARDIASIS

It is a potentially serious parasitosis of the intestines, more frequent in young, newly acquired rabbits. Affected animals have abnormal feces, dehydration, anorexia, apathy, and lowered body temperature. It should be treated aggressively with the appropriate medication, as well as nutritional support and relevant vaccines. In addition, it can be prevented if a stool analysis is performed after acquiring the rabbit.

9. FLEAS

This parasitic invasion causes stress and possible transmission of other diseases, in addition to itching due to bites. It is controlled with topical antiparasitic products at low doses, eliminating the fleas and preventing their reappearance.

10. COCCIDIOSIS

It can be acquired by eating food or water contaminated by feces with this parasite. It causes diarrhea or watery stools with mucus and/or blood, loss of appetite, weight loss, dehydration, and irritation of the perianal area. It is treated with antibiotics.

11. INTESTINAL WORMS

They are not usually detected unless a stool analysis is carried out. That is why it is very important that these analyses are carried out periodically and, in any case, the rabbit must be dewormed at least 4 times a year.

12. HAIRBALLS

These animals often develop hairballs in the stomach, as a result of their grooming practices. The hair that they swallow when cleaning themselves accumulates until these balls are formed which can cause obstructions in the digestive tract. At first, the rabbit will refuse to eat different bits of vegetation, and soon after it will not want to eat anything. If it is not treated, the animal may die. Therefore, given symptoms such as loss of appetite, poor or absent stool, weakness, or weight loss, this illness should be prevented.

The best way to prevent this is to have alfalfa-based feed at your disposal that contains at least 18% fiber, and many love pineapple juice with bits of pineapple (if not, you can dilute half a tablespoon of the juice in the drinking water), which, administered several times, prevents the hairball problem.

13. MAGGOTS

This is one of the most unpleasant infections regardless of the animal affected. It occurs when flies lay their eggs in a wound, or in an irritated section of the skin (for example in the perianal area of an animal with diarrhea). The eggs hatch and the larvae feed on the tissue of the animal, very soon producing shock and death.

Prevention consists of keeping the rabbit in perfect health and hygienic condition and keeping the hutch area free of flies.

14. LEG SORES

These are wounds that affect the lower part of the legs, in the area of the paws, because of the overexposure to the wire making up the hutches. That is why in each living space, there must be cardboard or other surface where the rabbit can rest. If not, the wire may cut the rabbit and the wound may become infected.

This problem is treated with local antibiotics and bandaging of the legs, but healing is very slow, so the ideal course of action is to prevent the sores and to check the legs of the animal often.

15. MALOCCLUSION

It is caused by the incorrect alignment of the teeth and constitutes a structural defect that causes the continuous growth of the upper and lower incisors, which, as they do not meet each other when the rabbit chews, will prevent the animal from taking food into its mouth, even when it is hungry.

In addition, mouth injuries can occur, which worsen the situation. The only way to treat this problem is to periodically cut the teeth and to avoid it in the future, the rabbit in question must be prevented from reproducing because it will transmit this deformity to its offspring.

16. HEAT STROKE

Rabbits are very sensitive to heat stroke, especially if they are overweight or thick-haired. High temperatures, along with high ambient humidity, poor ventilation, or overcrowding are factors that can cause a heat stroke. The symptoms are weakness, panting, redness of the ears, and a refusal to move. The rabbit should be bathed in cool water immediately. The best option, as always, is to prevent the problem by ensuring that the rabbit's hutch has good ventilation and shade, etc. Another step that can be taken is to continuously refresh the rabbit's ears with cool water.

The following data card is important for ascertaining and tracking the health status of rabbits. It should be used generally throughout the project.

	Presence of the disease	Prevention of the disease	Treatment of the disease
Diarrhea			
Coccidiosis			
Mange			
Pasteurellosis			
Other			

Image of a healthy rabbit

Rabbits are generally in good health. The healthy animal always eats all its daily rations, has an elegant resting position and an attentive look. Its fur is clean and shiny, and its general expression shows pride and safety.



Image of a sick rabbit

A sick rabbit is generally nestled in a corner of the hutch with the body arched and the hair may be bristled. When it is in pain it makes a slight sound with its teeth. The eyes are slightly closed, and the animal's look reveals an expression of discomfort.

Meat Quality

Access to protein via rabbit meat is often the primary reason for the breeding of rabbits. Rabbits are typically slaughtered when they reach a live weight of about 4.5 pounds, which will give about 2.5 pounds of usable meat to the family. This is important to note since you can allow the rabbits to get fatter, but with the weight recommended above, the meat is quite tender and without excessive fat. Rabbit meat is considered white meat. It is easy to cook, adapts to all local dishes, and combines well with any flavor.

It is the meat with the highest protein content, providing twice and thrice as much protein for the same energy content as other common farm animals, thus an ideal option in areas where there is a desire to increase the intake of animal protein.

Rabbit meat is ideal for reducing the risk of heart problems, because of the low-fat content, and because it has the best ratio of polyunsaturated fat of all meats, these being essential for human beings. In addition, the rabbit does not accept, nor does it require foods with artificial additives or hormones, so it may be said that it is the healthiest meat.

Other General Observations

The breeding of rabbits has been recommended by international organizations such as FAO, as it is an animal that presents great advantages:

- A. **As direct food**, rabbits are the ideal size for a family meal, and as a way of improving the family's economic prospects, given that they can be sold more easily than larger animals. They do not require conservation systems. Rabbits have been called a "biological refrigerator," compared to chickens, guinea pigs, and fish like tilapia.
- B. **They occupy little areas** and can be kept in spaces that are not used. Rabbits can even be placed outdoors, under simple roofs, so their breeding, therefore, requires only minimal investment, such as the hutches or cages and the first set of rabbits for breeding acquired in the initial stages.
- C. **Domestic rabbits** are interesting and grateful animals, equally for those who have four rabbits as for those who have several hundred, and they are very productive for those who treat them well and love them.
- D. **Each rabbit can produce 50 or 60 kits a year** on average, which is the targeted production level in the best industrial operations, but at the household level and with some minimum management standards, the producer can expect from 25 to 30, which if slaughtered at 2 kilos of live weight (4.5 pounds) or 1.1 kilos in carcass weight (2.4 pounds), and with the head, amounts to about 30 kilos of meat per rabbit per year (66 pounds of meat).
- E. **They multiply very easily** given that the initial 2 rabbits can produce up to 150 males and females. If the best females are selected, almost 200 breeding does a year are possible. That way, you can produce about 400 kilos of meat (880 pounds) a year, which is easy to distribute and preserve.

- F. **A single rabbit** has a reproduction level similar to that of three sheep or goats.
- G. **They are also animals that do not disturb** our comfort with noise or bad odors. They can be cared for by young boys or girls, thereby beginning to teach children a sense of responsibility, or they can be taken care of by elderly people, or persons with disabilities, which, in turn, helps these individuals and makes them feel useful. Anyone can care for rabbits in their spare time, as doing so may even be considered fun.
- H. **For the consumer**, the meat is not associated with any health concerns. On the contrary, it is the meat with the highest protein content, so it is of interest in places where increasing the consumption of animal protein is warranted. For every 1000 kilocalories of rabbit meat, you get 3 times more protein than with beef.
- I. **They feed on products and by-products available in the country**, with minimal or no consumption of caloric cereals, or leguminous plants, such as cereal grain, or soya cake, foods that should preferably be consumed directly by people.
- J. **There are some steps in management or care** that, although very simple, if they are not carried out correctly, will hinder the achievement of expected results.
- K. **The unique physiology and ethology** of rabbits require us to ensure a minimum standard of comfort to avoid, as far as possible, the risk of disease and low output for long periods. If these measures are not put in place, the multiplication of rabbit stock is virtually impossible. Hence, with rabbits, more than with other animals, it is essential to adhere to specific and proven management guidelines developed over many years, to be able to raise this prolific animal profitably and indefinitely.
- L. **The poorly recommended management systems** of raising rabbits in the yard, with leaves or leftover food, although they seem to be a means of easy savings, can never be profitable, and because of the many losses that will be experienced, the producer will likely lose interest and will become critical of this type of endeavor, and even of the consumption of rabbit meat. It is, on the contrary, a small farmer or complementary endeavor of great interest if it is carried out bearing certain minimum standards in mind.
- M. Rabbits produce many kits, **but the number of viable rabbits** depends on the four pillars for all livestock: quality animals, good management, adequate food, and strict health standards.

The Mating Process

Based on the experience acquired by the Seeds For a Future community regarding breeding rabbits, certain criteria should be considered for the mating of rabbits. These are outlined below.

- a. Have the hutch with the males that will be used for breeding located at the headquarters of Seeds for the Future in Chicolá.
- b. Establish two buck centers in the communities of Las Piedrecitas and Pacamaché.
- c. Have a small hutch, where the rabbits will be mated, where the does are taken ready for mating.
- d. If there are community members who have pedigree rabbits, pursue the mating of the does for at least 3 to 5 generations, and one generation, with local bucks.



- e. In the breeding rabbit facility, keep males of different breeds, including mainly the New Zealand rabbit (white or red) and the Californian rabbit. See examples of both breeds below.



- f. Using data cards, keep strict control of each of the homes using the services, to promote the largest number of kits per year.
- g. To ensure a successful process, the person in charge of the rabbits plus whoever assists them, as well as the Extensionists and the housewives, must all remain in constant communication.
- h. All families must be trained in the management and production of rabbits.
- i. Nutritionists and Extensionists should promote the eating of rabbit meat in different sectors of the community, using recipes that can indeed be used by the producers.



Rabbit vulva



Male sexual organ