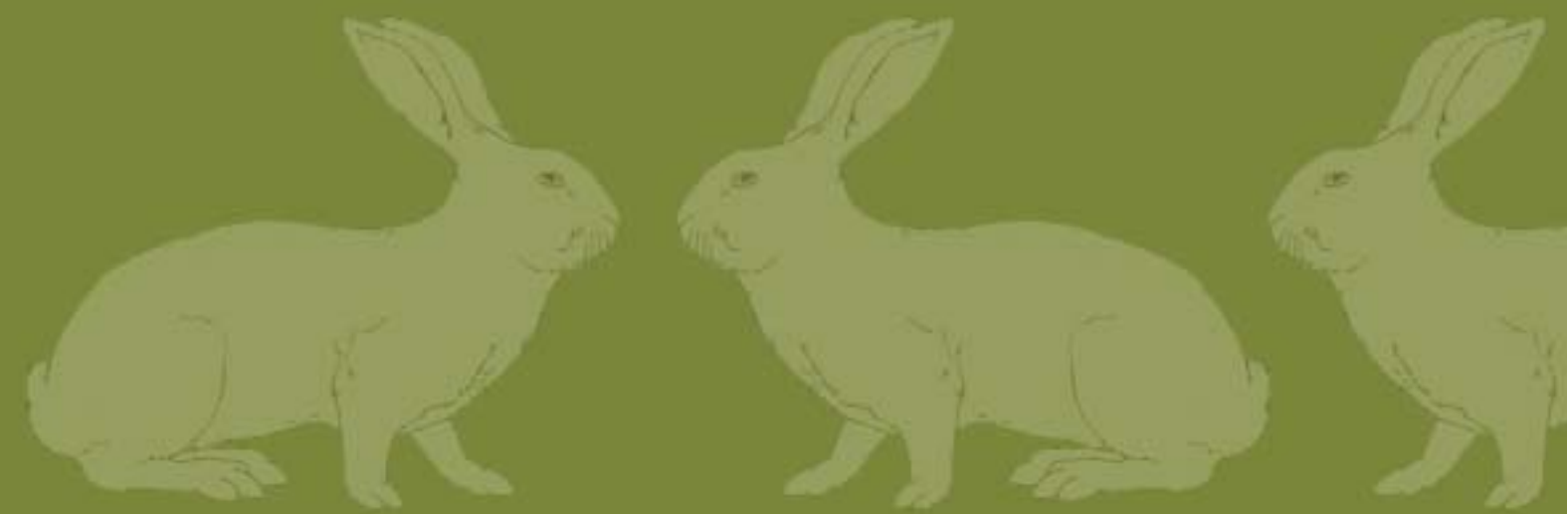
Rabbit Production Guidelines

for the Malawi Prison Service



Penal Reform International

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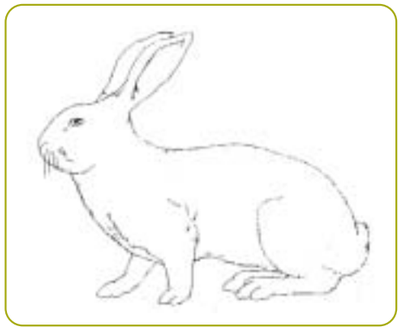

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Penal Reform International
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Preface

This rabbit production manual is written for the Malawi Prison Service Farm Development program. This manual should be used as guidelines to produce rabbits under Malawi Prison Service circumstances. Rabbits are produced in the Prison Farms for meat consumption. As the prison farms had not enough funds to buy animals such as cows and to provide them with the high quantities of feed they need, a solution was found in rearing small animals such as rabbits. Rabbits offer an alternative to other meat-producing animals for the improvement of protein supply due to the fact that rabbits do not compete with humans for food and the meat is tasty, of good quality and similar to chicken meat.

This manual is based on relevant literature and on practical experience gained during Rabbit production in Malawi. It is a practical manual and not an in depth guide to rabbit production, for that purpose reference is made to the literature listed in this manual.

Acknowledgements

I should like to express gratitude to all the persons who assisted me in the development of this practical rabbit production manual, in particular Marie Dominique Parent, Country Director PRI Malawi and Adam Stapleton.
As this manual is a compilation of my own experience in rabbit production and relevant literature I would like to express gratitude to the following sources of which illustration and text can be found in this manual:

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Glossary of meanings

Albino	White offspring of a coloured rabbit.
Buck	Male rabbit.
Burrow	A hole or tunnel dug in the ground by a rabbit.
Coprophagy	Eating and re-digestion of the soft droppings.
Cross breeding	Mating two different breeds of rabbits.
Doe	Female rabbit.
Domestic	Animal that is kept as a pet or for purposes such as food supply.
Droppings	Rabbit manure.
Faeces	Droppings, rabbit manure.
Fertility	The ability to produce baby rabbits.
Gestation	Duration of doe's pregnancy from mating to kindling.
Herbivorous	An animal that feeds on grass and other plants only.
Herd	A large group of animals living and feeding together.
Hutch	Individual rabbit cage or house.
In-breeding	Mating closely related rabbits of any breed such as father and daughter, mother and son.
Kindling	Giving birth to young, young rabbits.
Lactation	Period of time in which the doe produces milk for her young.
Litter	All young produced per one birth.
Mucus	Slimy secretion.
Omnivore	An animal that feeds both on plants and other animals.
Productivity	The number of young per doe per unit of time.
Reproduction	The ability of male and female animal to produce young.
Rodent	Small animal which has special teeth for gnawing.
Ruminant	Animal that has a stomach of four compartments and re-digests its food.
Tanning	Process of curing or preserving the skin or pelt of the rabbit by using chemicals.
Sanitation	The art of maintaining cleanliness in the rabbitry, the most important part o f stable management.
Stable	Large building containing rabbit hutches.
Warren	Series of interconnected underground tunnels in which rabbits live.
Weaning	The act of separating the young rabbits from their mother permanently, stopping them from drinking mother's milk.

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Module 1 Introduction to rabbit production

Session 1.1 Why rabbit production in the prisons

Originally agriculture production in the prison farms was focussed on crop diversification and increasing yields in order to improve self-sufficiency in food production within the prisons. Less attention was paid to the production of animal protein for consumption. As the prison farms had not enough funds to buy animals such as cows and to provide them with the high quantities of feed for these animals a solution was found in rearing small animals such as rabbits. Rabbits offer an alternative to other meat-producing animals for the improvement of protein supply due to the fact that rabbits do not compete with humans for food. They can live on waste materials such as maize husks and vegetable leaves. Rabbit meat is of good quality and tastes similar to chicken meat. The meat production per animal is higher than in all other herbivorous farm animals (see table 1). Does can produce almost 10 times her body weight in weaned kindling within a year and her kindling can double their body weight in 6 days.

Table 1.1 Meat production of various domestic animals in percentage of the adult weight of female animals. (Source: GTZ, Compendium of Rabbit Production, Eshborn, 1985)

Animal Species	Weight Adult Females Kg	Young reared per year	Yearling weight Kg	Carcass weight/year in relation to live weight of mother %
1. Herbivores				
Cattle Pasture 800 g/day	500	0.9	350	35
Camel	600	0.5	-	18
Sheep	60	1.0	50	42
Goat	45	1.5	35	53
Rabbit, intensive	4*	48	4	2900
Rabbit extensive	4*[1]	8	3	390
Guinea pig	0.8	20	0.6	825
2. Omnivores				
Pig	200	20	150	1200
Chicken	3	100	3	9000*[2]

*Note: 1 adult rabbit weight of 4 kg in optimal circumstances

2 although a chicken is highly productive it is in competition with human consumption and they can not live on green waste materials only.

Objectives of the rabbit production units in the prison

The objectives of the rabbit production in the prisons is to:

1. diversify agriculture production;
2. produce food/meat from vegetable and fruit waste which is not in competition with human consumption;
3. train staff and prisoners in rabbit production and empower the prisoners to apply the skills learned on their release.

To accomplish the objectives 12 production units will be established in selected prisons within 3 years.

Session 1.2 Rabbit characteristics and behaviour

Good rabbit production depends upon knowing about and understanding the animal that you are keeping and in particular its behaviour.

Rabbit behaviour

The scientific name for the rabbit is Oryctolagus cuniculus. The wild rabbit lives in a so-called burrow, which the rabbit digs into the ground with its strong nails on its feet. The wild rabbit is a social animal and lives with other rabbits sometimes in groups of over a 100. All the burrows of the rabbits are close to one another and this creates a relatively safe area where the rabbit sleeps during the day and leaves in the early morning and evening to feed. The collection of burrows is called a rabbit warren. During the time the rabbit is searching for food it is constantly alert and ready to react to being caught by a predator. Although the rabbit cannot defend itself when it is attacked, it has several adaptations which enables the rabbit to detect the presence of a predator before they detect the rabbit. The rabbit has a good sense of hearing using his well developed ears. Also, rabbits are able to see very well during the night and due to the placement of the eyes a rabbit can see movement in all directions, front, back and sides at the same time.

Whilst the rabbits are feeding, various animals are looking out for danger sitting on their hind legs. If a particular rabbit detects danger it signals it to the other rabbits by jumping on the ground with its back feet.

Rabbits, especially the bucks, show several forms of territorial behaviour and they mark their hutch as their territory. The rabbit is able to mark its territory in several ways; the most common one is the so called "chinning". By rubbing a new object with the active scent gland under their chin they will mark the object.

Rabbit breed

There are many rabbit breeds (or types), varying externally as to body size, shape and the length, density and colour of their hair. Rabbit can be grouped in

1. Fancy and fur breeds
2. Meat breeds

Fancy and fur breeds are breeds for their nice skins, colour, funny ears etc. Meat breeds are produced for their fast growth and large and frequent litter (productivity). Meat production breeds can be further divided according to weight:

1. light breeds (up to 2-3 kg adult weight)
2. medium breeds (3 to 5 kg)
3. heavy breeds (more than 5 kg)

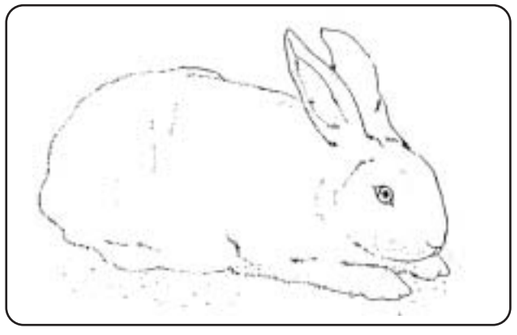


Figure 1.1 A NZW rabbit

In the prisons we are producing rabbits for meat and the breed we are using is the so-called New Zealand White (NZW) rabbit. The NZW is a medium breed, which originates from the United States. The NZW is completely white and it is an albino offspring of a coloured rabbit. The NZW is well known for its:

- High fertility
- High growth rate
- Its feet being densely covered with fur which makes them resistant against wire mesh.

As the NZW is not indigenous for Malawi it means that it is more susceptible to disease than the local rabbit.

Rabbit characteristics

In the following figure all the body parts of the rabbit are identified.

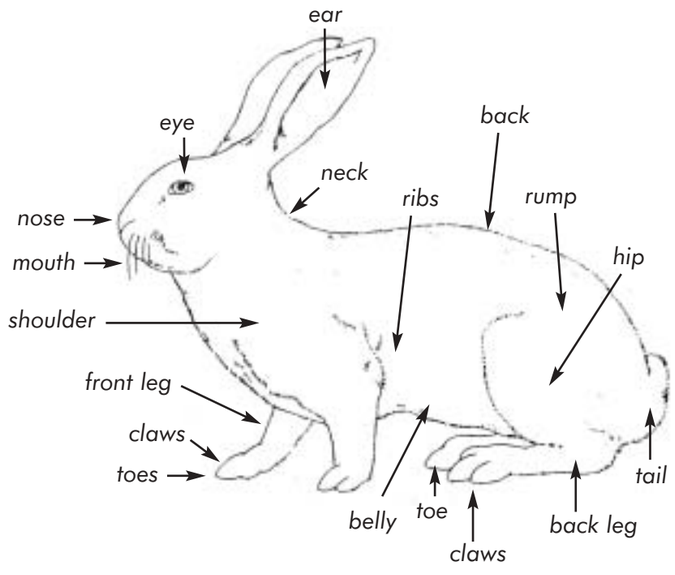
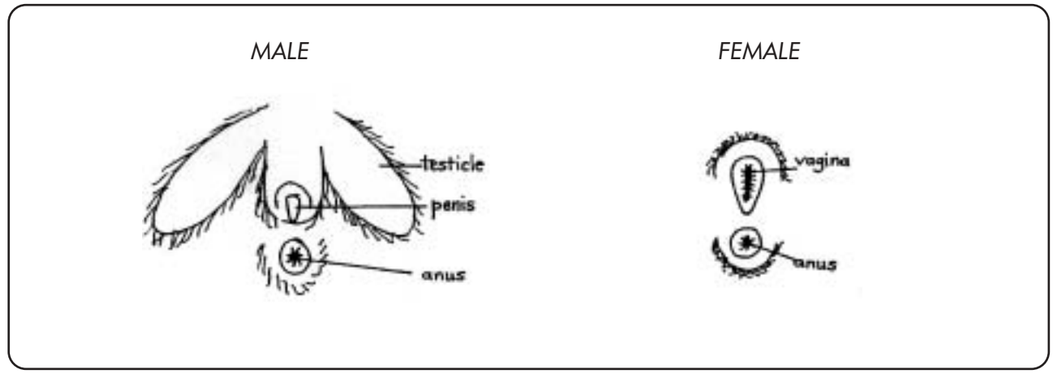


Figure1.2 Identification of the body parts of the rabbit

Rabbits reproductive organs

To determine the sex of a mature rabbit place the animal on its back holding it firmly around the shoulders with one hand and support the hips with the palm of the investigating hand. Hold the tail between the first and second finger and extend the thumb up and apply a slight pressure in the front of the genital organ located between the thumb and the anus. This pressure should expose the organ, see figure 1.3. The male organ is easier to identify due to his testis. Identification of the sex of young rabbits is not so easy. A picture of the reproductive organs of the young rabbit is shown in figure1.4



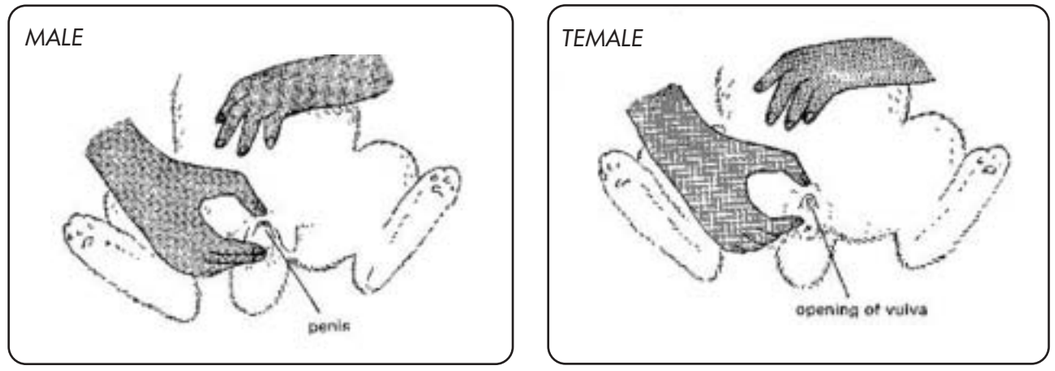


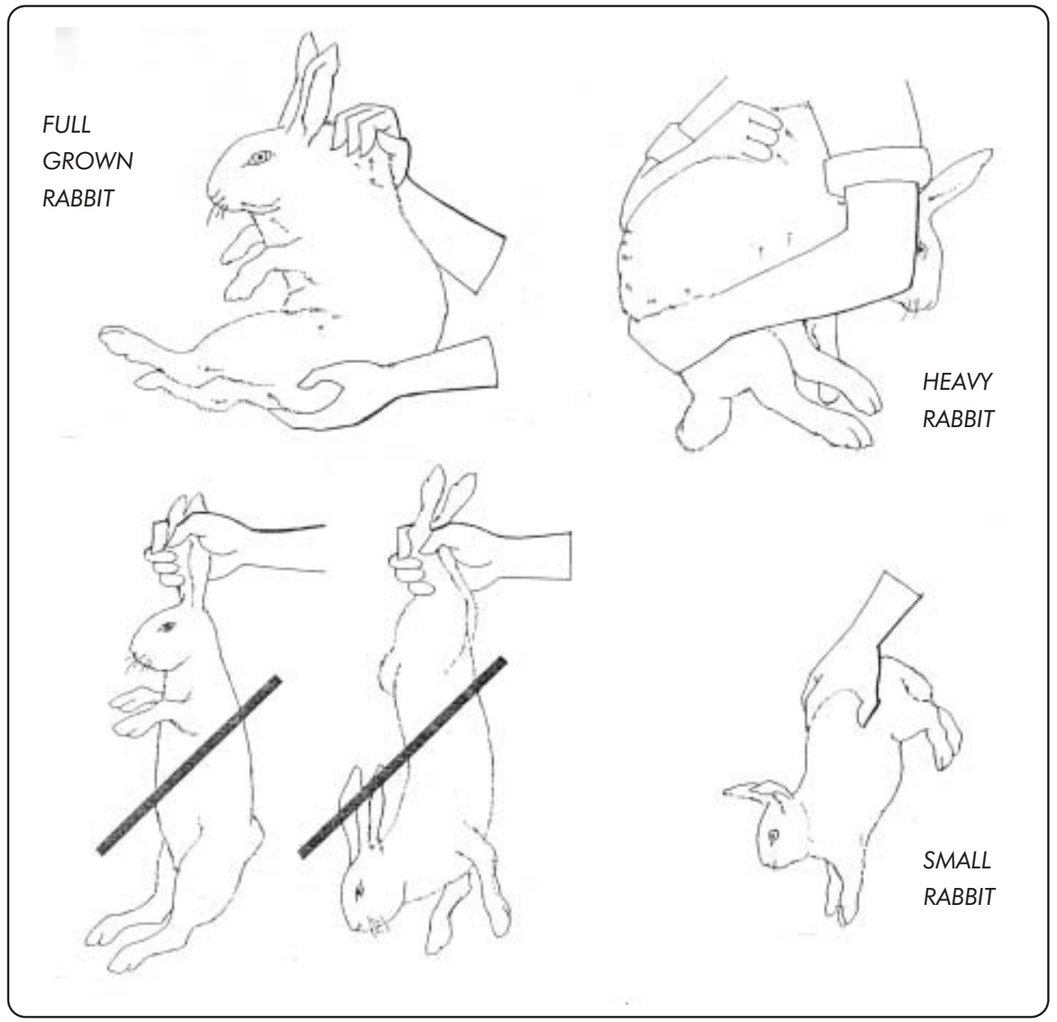
Figure 1.3 The male and female organs of the rabbit.

Figure 1.4 The reproductive organs of the young rabbit.

Session 1.3 Rabbit handling

Rabbits should be kept away from noise and should not be disturbed too often. Handle the rabbit only when absolutely necessary. In the figure 1.5 several ways of handling a rabbit are shown.
When a rabbit is fully grown the skin over the shoulder at the back is very loose. Gently grasp this loose skin with one hand to hold the rabbit and put the other hand under the rabbit to pick it up. Use both hands and do not pick it up by the legs or the ears! If it starts to show any signs of aggression or it struggles, lower it slowly and put it back in the hutch.
A heavy rabbit should also be picked up at the back of his neck with one hand and put the head of the rabbit behind the elbow of the other arm. A small rabbit can be carried and lifted by holding it firmly between the hips and the ribs with the head hanging down.

Figure 1.5 Different ways of handling the rabbit



notes

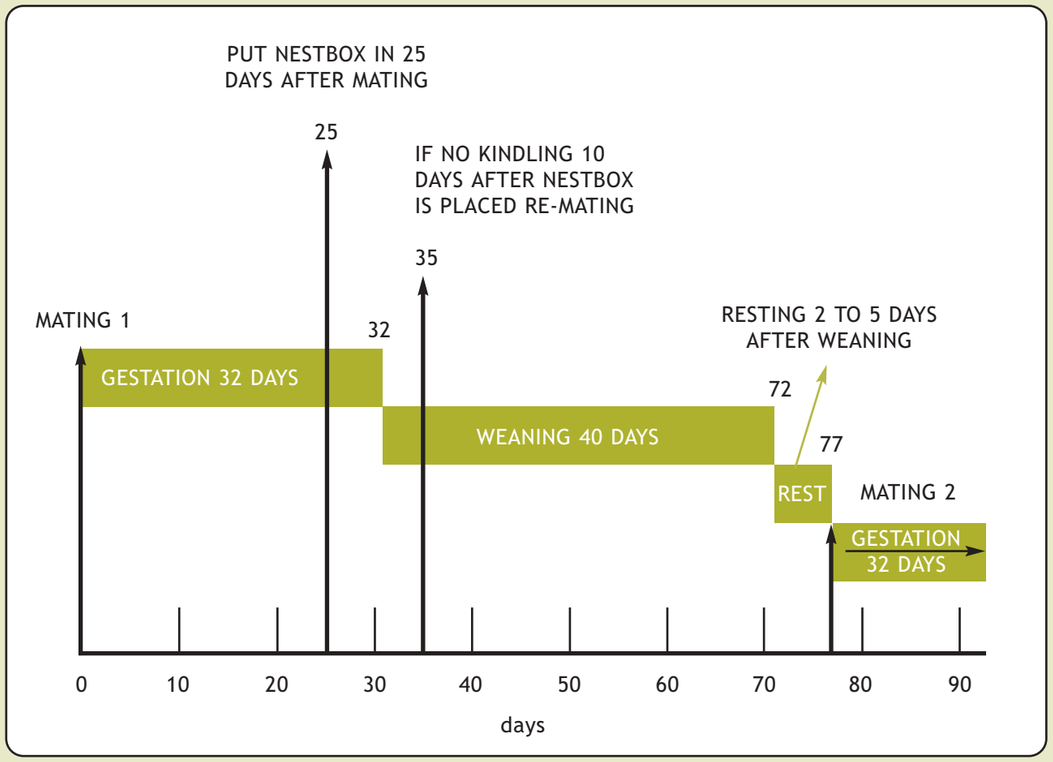
Module 2 Production and reproduction

Session 2.1 The production cycle and reproductive system

The production cycle

In figure 2.1 below, the production cycle of the rabbit production in the Malawi prisons is shown. The cycle starts with the mating of the doe at day 0. If she is pregnant, gestation will take approximately 32 days. 25 days after mating the nest box is put in. If the doe does not have kindling 10 days after the nest box is placed (day 35), she should be re-mated. The kindling will be weaned for 40 to 42 days (day 32 to 72). After weaning (day 72) the doe can be mated again after a 2 to 5 days rest period (rest period day 72 to 77, mating 2 day 77). This cycle repeats itself approximately 77 days to produce 4 litters a year. The production cycle will be discussed in more detail in the following paragraphs.

Figure 2.1 The production cycle



Three basic reproduction rates

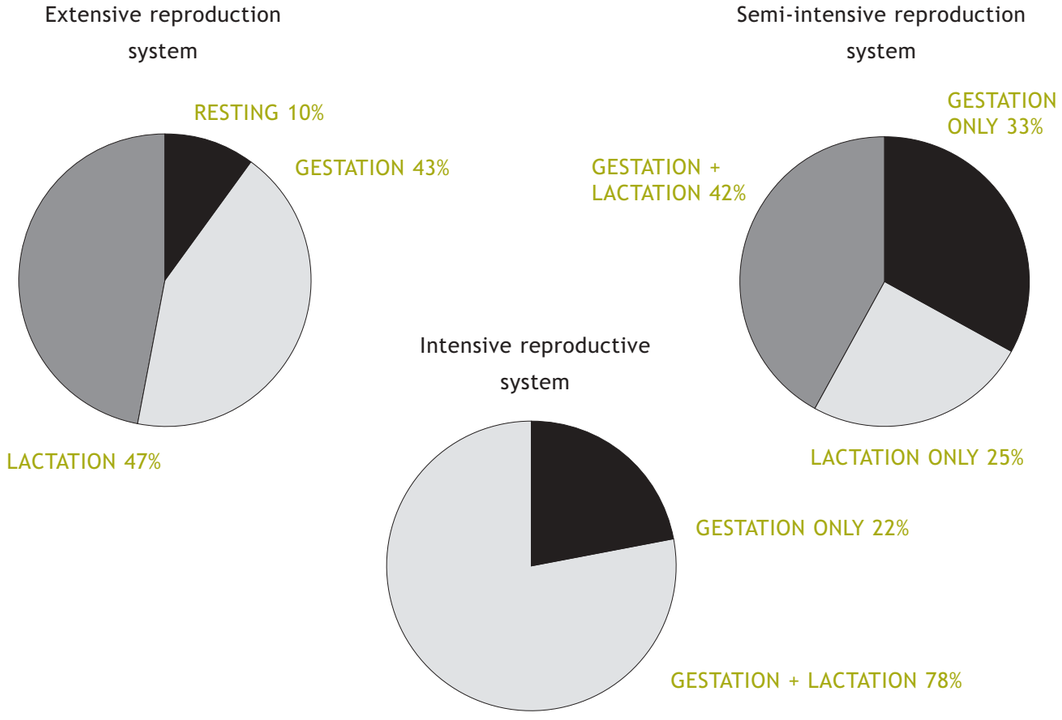
In rabbit production there are three basic rates of reproduction

1. extensive reproduction rate: The doe is allowed to nurse her young for five to six weeks and rebreeding will take place after weaning. In between weaning and rebreeding the doe has a so-called "resting period". This period gives the doe a chance to rebuild her reserves. Depending on quality and quantity of the food this period can vary in length. In an extensive system does are mated once every two and a half months.
2. Semi intensive reproduction rate: The doe is mated between 10 to 20 days after giving birth and the young are weaned for four to five weeks. For 10 to 20 days the doe is newly pregnant while still nursing (lactating). In this system does never have a resting period and they need a sufficient and well-balanced concentrated food.
3. Intensive reproduction rate: The doe is mated again the day after giving birth. The doe does not have a resting period and is always pregnant (gestation). This is only possible under optimal circumstances.

In figure 2.2 the different reproduction rates are explained using a pie chart diagram.

Figure 2.2 The three basic reproduction rates

Distribution (as percentage of productive life) of gestation (pregnancy), lactation and resting periods in does at different rates of reproduction



In tropical conditions the number of young produced in a semi-intensive reproduction system per doe per year is about 30 to 40. In the same climate in an extensive reproduction system, 15 to 30 young can be produced per doe per year.

Looking at the production cycle previously described, in the prisons the rabbits are reared in an extensive reproduction system. This means that the does are mated again 2 to 5 days after weaning. This system is applied because it will lead to the best results when food is not always sufficient and well balanced.

Session 2.2 Mating and kindling

Mating

The doe (female) is ready for reproduction for the first time at the age of 4 months when it reaches 75 to 80% of her adult weight. The buck (male) is ready to be used for mating at the age of 6 months. A doe does not have a clear reproduction cycle like a woman and is considered always to be fertile. Nevertheless they do show periods of great willingness. They also do sometimes refuse the buck! Signs of willingness are restlessness, production of noises (she will scratch the hutch), rubbing her chin on the feeding tray and her reproductive organs will have a redder colour than usual. In particular she is willing: the day after kindling, 10 days after kindling and 2 days after weaning. A doe that is maintained well should be able to produce litters until she is 2 ? to 3 years old, however productivity will reduce after the 4th litter.

Mating should be carried out during the cooler times of the day, early morning or late afternoon. Always bring the doe to the buck for mating and not the opposite, otherwise the doe might defend her territory and start fighting. By bringing the doe to the buck she will smell the male and she will not defend her territory. She may do some initial running away but will eventually accept the buck.

If she accepts the buck, she will sit down in his hutch and raise her rear end. When mating has taken place, the male will fall aside or backwards. Often he utters a characteristic cry. If a doe is willing to be mated, effective mating will take place twice within the first 15 minutes. Do not leave the doe with the buck overnight or for a few days.

A buck can service three to five does a day without problems. However, allow the buck some few days rest, for example 3 days time before serving another doe.

Productivity of a doe is defined as the number of young per doe per unit of time (for example a year) and it depends on :

1. interval (time period between two litters);
2. number of kindling born;
3. survival of the kindling born.

Pregnancy signs

When a doe is pregnant, she begins to grow and gain weight rapidly. Fourteen days later her, teats will become pinkish red and her vital organs begin to swell. She also will develop more fur. Other symptoms of a pregnant doe are:

a. She will try to tip over any container put in to her cage. For example, she will try to tip over her drinking cup after tasting the water.
b. When kept in a large room, she will always hide in a dark corner.
c. She will make some noise any time a buck approaches her.

A technique used in commercial rabbitery to detect pregnancy is palpation. However this is a delicate technical operation and it will not be performed in our production units. Nest boxes are systematically set up 25 days after mating. Ten days later if the doe has not delivered she is mated again.

That the doe accepts a buck is not a sign that she is not pregnant. She will accept him especially in the second half of her pregnancy. Sexual activity of a doe cannot be taken as a sign of pregnancy.
The rabbit has a gestation period of average 31 to 32 days, normally ranging from 29 to 35 days.

Nest boxes

25 days after breeding, the doe should be provided with a disinfected nest box. The purpose of the box is to provide protection for the kindling. However the doe is apparently unaware of ever stepping on her kids and in a poor designed box she may cause injury when jumping in the box. In the figure below, the standard nest box for production in the prisons is shown. If the nest box is too large the doe may sit in it and foul it with droppings and urine. Bedding can be provided by cotton wool mixed with the hairs that the doe will pull out of her own body. If a doe does not produce enough hair herself to keep her kindling warm, additional hair can be pulled from her body and added to the box. Two weeks after birth the young rabbits will start coming out of the box and after about three weeks the nest box can be removed.

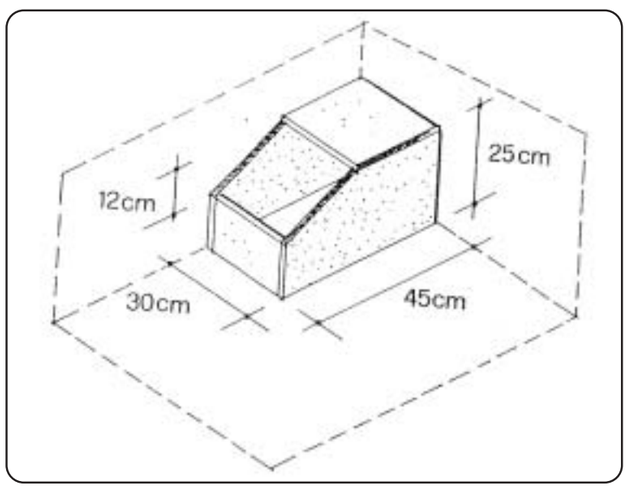


Figure 2.3
The nest box
(12 mm thick)

Kindling

Does give birth usually at night and it only takes 15 to 20 minutes. After kindling, when the doe leaves the nest box, the litter should be quietly inspected with a minimum of handling. Some does will abandon or kill their young if they have been handled during the first few days or if the doe is unduly disturbed. Human contact and handling do not have an ill effect on young rabbits.
When you enter the stable in the morning after birth the mother rabbit needs to be inspected:

1. Check whether all the rabbits are in the kindling box. If they are scattered in the hutch collect them and put them in the nest box.
2. See if the size of each kindling is normal. Any deformed or dead kindling should be removed to prevent their decomposing bodies from becoming a source of infection. If there are abnormalities or some are abnormally small, take them out and kill them. Note that if not taken out they will die anyway in a later stage.
3. Count them: as the mother has only 8 teats (see figure 2.4), remove the excess kindling if there are more than eight.

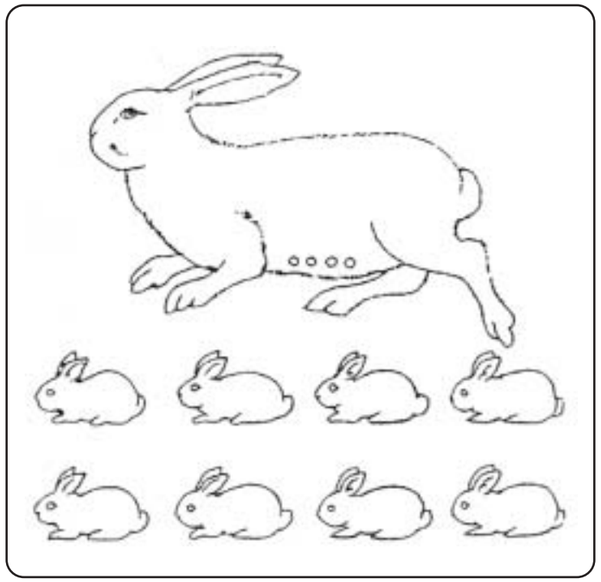


Figure 2.4 A doe has only 8 teats, four teats on each side

The average birth weight of a kindling is 50 to 60 grams. A large number in the litter reduces the birth weight. The babies which are born (kindling) are born blind, deaf and without fur. At seven days the fur begins to grow, at 11 days the eyes will open and at 20 days they start to eat solid food and drink water. The newborn babies will be confined to their nest for the first two to three weeks. Sudden death during this period is quite high (up to 30%). Reasons for the sudden death can vary: stillbirth, low birth weight, delayed birth and infectious diseases. It is very important that the nest box is thoroughly cleaned and disinfected before the doe litters.

Although a doe will only nurse her young one to two times a day, lactation by the doe is physically a very demanding activity. For five to seven days after kindling additional feed should be given. Generally, kindling depend on milk entirely for the first two weeks, at three weeks they get 17% of their energy from solid feed; four weeks 45%; five weeks 60%; at six weeks 73 % and at eight weeks they obtain 100% from their nutrients buy solid feed. The young ones are fed on milk once a day. This

mostly occurs at the early morning or late evening. When young rabbits leave the nest very early, it is a sign that the doe has not enough milk to nurse the litter. The aim in the Malawi prison programme is for a doe to produce at least four litters with an average of five live kindling a year.

Fostering

Fostering means getting a doe to accept babies from another litter. When a rabbit produces a litter of more than eight kindling or when there are complications such as death during birth, a foster mother can be found. Also fostering out some rabbits from a large litter of six to seven to a smaller litter of two to four will even out litter sizes and give every young an equal change to survive. As a rule no more than two babies should be fostered into a litter.

Guidelines for carrying out fostering:

1. Only foster babies, which are less than five days old;
2. Remove both foster doe and donor doe from their hutches;
3. Carefully remove the rabbits to be fostered from their nest with the minimum disturbance and without touching the babies, which are not going to be fostered;
4. Rub a cloth in the damp litter of the foster doe's hutch and wipe each baby to be fostered in the cloth;
5. Transfer the babies to be fostered to the foster nest without disturbing them;
6. Leave the newly mixed babies for a few hours so they all take the same smell;
7. Return the foster doe to the hutch.

Weaning

In the Malawi prison programme, the babies are weaned 40 to 42 days after birth. Later weaning has no advantage. Male and female rabbits should be separated before 14 weeks of age. After 16 weeks of age, males should be kept in individual cages. If this is not done bucks will begin to castrate each other, there will be fighting and commotion which will cause death among them. Does will also begin to ride each other causing false pregnancies and refusal to be mated later.

Session 2.3 Malawi Prison Service Rabbit Production System

In each selected prison, a rabbit production unit will be established to produce rabbits for meat. Production rabbits will be provided from the Grand Parent stock at Dedza prison. Initially each unit will be provided with 27 rabbits, 21 does and 6 bucks. To learn to take care of the rabbits it is important to start small. 21 does will provide a minimum 21 x 4 litters x 5 live kindling = 420 meat rabbits a year. The 21 does and 6 bucks will be divided in three production groups, see example below. Each group will mate systematically with only two identified bucks to prevent inbreeding.

Example of mating system

3 production group of 7 does and 2 bucks in each group

Production Group 1

Doe no	Ear no	Buck no	Ear no
1	140	B1	030
2	145	B1	022
3	143		
4	167		
5	144		
6	90		
7	38		

Production Group 2

Doe no	Ear no	Buck no	Ear no
1	125	B2	049
2	127	B2	019
3	126		
4	186		
5	123		
6	187		
7	381		

Production Group 3

Doe no	Ear no	Buck no	Ear no
1	29	B3	040
2	168	B3	081
3	110		
4	146		
5	69		
6	59		
7	55		

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Module 3

Nutrition and Feeding

Session 3.1 Nutritional requirements of the rabbit and feeding

Nutritional requirement

Proper feeding influences the rabbit's growth, fertility and health. Like all animals, rabbits need four major groups of nutrients:

- Carbohydrates
- Proteins
- Minerals
- Vitamins

Carbohydrates (and fats) provide energy. Energy is used by the rabbit for example to move, to produce meat and to make milk. All the body tissue of the rabbit other than bone, teeth and fat (e.g. muscle, hair and skin) are proteins. The recommended crude protein level in the dry matter in the ratio is 16% to 18%. Most of the minerals in the body of the rabbit are in the bones and teeth. Vitamins are chemicals that are required in small quantities to speed up chemical reactions within the rabbit's body.

A diet, which provides all the nutrients in the right amount, is called a balanced diet.

To assure normal passage of food through digestive system the rabbit need fibre in its diet. Fibres are carbohydrates and can be found in grasses and root crops. A good diet should contain 15 % of fibres.

Coprophagy

A rabbit has a very sensitive digestive system and a rabbit shows the phenomenon of coprophagy (sometimes called refection). A rabbit produces two types of droppings. A soft dropping at night which they consume and re-digest straight from the anus. This type of droppings contains vitamins and microbial protein. Night droppings can be distinguished from normal droppings (black and hard) by their softness and green colour. The rabbit can retrieve the soft droppings easily even from a mesh floor. Consumption of the soft droppings starts when the rabbit is about four weeks.

Feeding

As in most cases you do not know the levels of carbohydrates, protein, minerals and vitamins found in the different forages, the only method to satisfying all the requirements is therefore to feed a wide range of different foods. Try to give your rabbit at least three different type of forages to make sure they get a balanced diet.
Proteins can be found in greens such as fresh green grass, leaves and vegetables. Maize husks, rice bran, banana leaves and cassava tubers can provide sources of energy in the form of carbohydrates. Although green forage contains fibres and some minerals, it is advisable to add some minerals in the form of salt to the food. Salt is an essential part of the diet of a rabbit. Should you notice that the rabbit is gnawing at the wooden materials in the hutch abnormally, then the rabbit lacks salt. When feeding maize husks mix 1 spoon of salt with 1 kg of maize husks. Never add salt in the drinking water! Rabbits do not perform well on a high-energy diet of concentrated food only (for example growers mash for chickens).

The amount of feed to give a rabbit depends very much on the state of production. A lactating mother needs a lot of carbohydrates and proteins besides greens to maintain the body weight and produce milk for her young. Young rabbits also need a lot of carbohydrate food. Greens should not be given too wet as this will upset the stomach and cause trouble. Do not feed more than they will eat. A hungry rabbit will approach you as soon as you come near by the hutch. A good feeding method is give energy rich (carbohydrate) food during the day (maize husks, rice bran, banana leaves etc) and feed greens during the night (afternoon) (see figure 3.1 Feeding rabbits twice a day).

Uneaten residues should be removed from the hutch daily and rabbits should not be expected to eat spoiled feed.

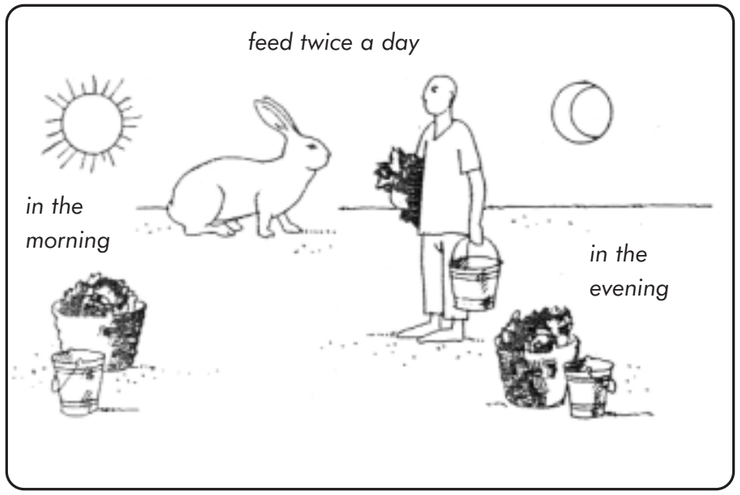


Figure 3.1 Feeding rabbits twice a day

In table 3.1 four practical examples of rations are given. Try to change your ration regularly.

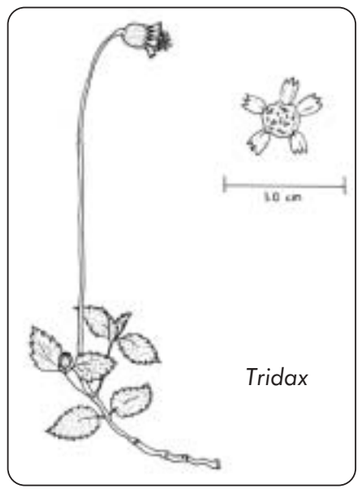
Table 3.1 Examples of rabbit feeding rations

Ration	Morning	Afternoon
1	Maize husks and banana leaves	Bamboo
2	Banana leaves and carrot waste	Sweet potato leave and vines
3	Maize husks and cabbage leaves	Fresh grass or green maize leaves
4	Rice bran and Amaranthus leaves	Sugar cane leaves

Session 3.2 Identification of local available feed.

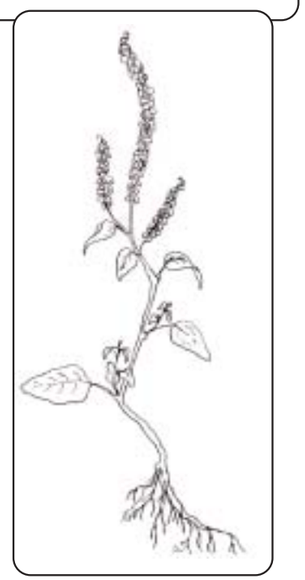
In the following table a variety of different local available feedstuff for rabbits are identified. As the list of feeds is very long this table is not comprehensive. Many more greens, which are suitable for consumption by rabbits, can be found. Do not feed rabbits Irish potato plant or leaves, tomato plant or leaves or spinach leaves and cassava leaves, as they are poisonous. When you are not sure a green food is suitable for rabbit consumption, feed it only to one rabbit for two or three days and see what happens. If the rabbit dies or gets diarrhoea do not feed it to the other rabbits!

Leuceana leucocephala



Tridax

Tridax



Spiny amaranthus

Table 3.2 Local available feedstuff

Feedstuffs can be classified into energy and protein sources, however most energy sources will also contain some protein. All sources contain certain amounts of minerals and vitamins. In the following table an E stands for source of energy and a P stands for a source of protein. To make sure to feed enough fibrous materials high fibrous plants are indicated with an F in the table.

	FRUIT & VEGETABLES			GRASSES & WEEDS	
1	Amaranthus leaves (Bononwe)	P	1	Alfalfa	P/F
2	Banana leaves and peelings	E	2	Bamboo leaves	F
3	Bean leaves and vines	P	3	Camomile	E
4	Broccoli	E/P	4	Chick weed (Stellaria media)	E/P
5	Cabbage leaves	E/P	5	Clover white	P
6	Celery	E	6	Elephant grass (Guatemala grass)	E/F
7	Chinese cabbage	E/P	7	Kikuyu grass	E/F
8	Cow pea	P	8	Maize leaves and stalks	E/F
9	Cucumber	E	9	Milk thistle	F
10	Endive	E/P	10	Napier grass	E/F
11	Groundnut leaves and vines	P	11	Sugar cane leaves	E/F
12	Guava leaves	E/P	12	Sorghum	E
13	Kohlrabi	E	13	Tridax	E/P
14	Lettuce	P	MILLS/MASH		
15	Mango	E	1	Chicken growers mash (finisher)	E/P
16	Mustard greens	E/P	2	Maize husks	E
17	Mulberry leaves	E/P	OTHERS		
18	Papaya	E	1	Hibiscus rosasinensis	P/F
19	Pumpkin + leaves	E	2	Leuceana (leucocephala)*	P
20	Radish greens	E/P	3	Prickly pear cactus	E/F
21	Raspberry leaves	E	4	Wild cosmos	E/F
22	Soy bean leaves	P	5	Wild marigold	E/F
23	Sweet potato leaves and vines	E	ROOTS		
24	Watermelon	E/P	1	Beetroot	E
			2	Carrot roots and waste	E/P
			3	Cassava	E

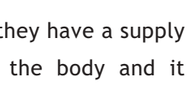
* Note: Only 25% of the daily ratio of a rabbit should consist of Leuceana. Feeding more than 25 % Leuceana will cause digestive problems

Session 3.3 Factors affecting food intake

There are many factors which affect food intake

1. Water availability
   Although rabbits are very efficient in their use of water, it is important that they have a supply of fresh clean water all the time. Water is present in every tissue of the body and it accumulates for over 70% of the total body weight. Restricting the water intake reduces the food intake. Raising the temperate to 30 degrees C will increase the water consumption by 50%. Lactation increases the water requirement three times. After 3 weeks nursing, kindling will require free water as they start consuming dry feed.
2. Health
   One of the first signs of illnesses is a decrease in food intake. Occasionally when the diet is not well balanced the rabbit will have a depraved appetite.
3. Temperature
   Feed intake declines with increasing environmental temperature thus animals tend to take advantage of the cooler night hours to eat.
4. Pregnancy and lactation
   Pregnancy and lactation stimulates food intake.
5. Food quality
   Rabbits can only eat more food if the food passes quickly through the digestive system. The higher the quality of the food the more will be eaten.
6. Level of choice
   The greater the amount of choice the more the rabbit will eat. The feeding of different grasses, herbs and weeds will encourage food intake.
7. Freshness of food
   Stale food will reduce intake, especially if it is contaminated with urine and droppings.

notes



Session 3.4 Growth rate and fattening

To be able to determine the growth rate you should weigh the rabbits, especially the young, regularly. By measuring growth rate you will have a much better idea of the well being of the rabbit rather than by visual observation only. Growth rate of 20 to 30 grams a day should be reached. Rabbits will achieve the highest growth rate in the first month. After becoming mature (four to six months of age) the body weight should remain constant.

Rabbits can be weighed in two ways using a pan scale or a spring balance (see picture 3.2 and 3.3). Pan scales are expensive and not always available. The alternative is the use of a spring balance and place the rabbit in a weighing bag (made out of an empty sack). Care should be taken in placing the rabbit in the bag.

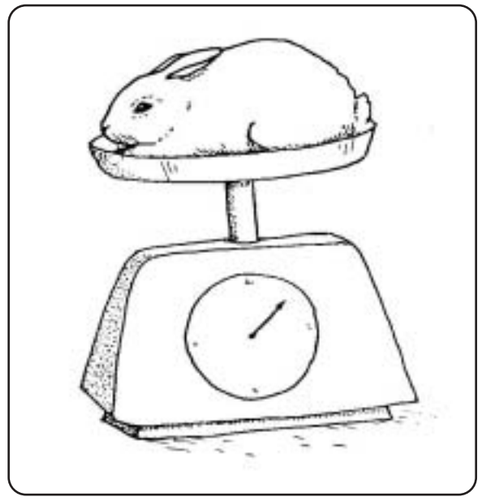


Figure 3.2 Using a pan scale

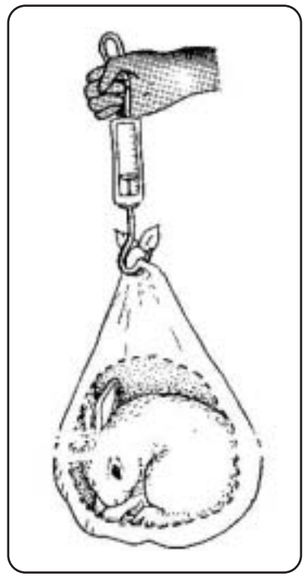


Figure 3.3 Using a spring balance and a sack.

notes

Module 4 Housing and equipment

Rabbits can never be kept successfully under free-range conditions as can be done with other domestic animals like goats. They can easily be stolen and as the rabbit is nearly defenceless, animals like dogs and cats are always around to eat or molest them. To prevent disease, inbreeding, etc., rabbits should be housed in a stable in individual hutches.

Session 4.1 Stable climate

The stable is the main building in which or under which, you place the individual hutches.
The stable can consist of a brick building but it can also consist of a grass roof depending on the climatic circumstances (See figure 4.1 Wire hutches under grass roof). When we are building a rabbit stable it should be durable but affordable and the prison service should be able to maintain it using cheap local materials.

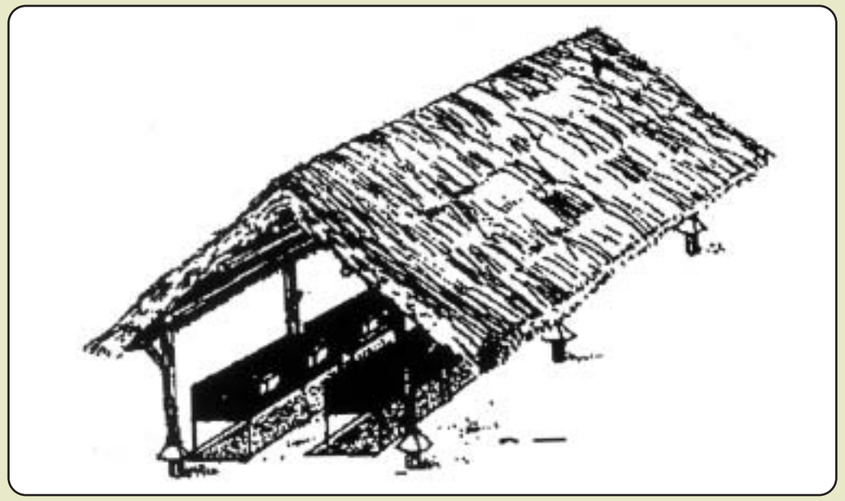


Figure 4.1 Wire hutches under common roof

Several features need to be taken into consideration when building a stable near the prison:

1. Rain, wind and sunshine

Rabbits must be protected from rain and direct sunlight. Stable design depends among others on the wind direction. If the wind always comes from the same direction it is easy, if the wind comes from different directions we should think of building walls in the stable. Walls will also prevent thieves from entering, but building walls will increase the cost of the building. A large overhang will prevent sunshine from coming in.

2. Temperature

The comfort zone for rabbits is 15 to 20 degrees C. In colder weather rabbits eat more and in warmer weather the rabbits will eat less. Above 30 degrees C, rabbits can start suffering from the heat, pregnant does are especially susceptible to heat stress. Trees around the stable can decrease the amount of heat, by providing shade and by decreasing the impact of wind and rain (see figure 4.3 Trees around the stable). Some fast growing trees like Leucaena can be planted and serve as rabbit food as well. Besides trees the roofing materials can influence the heat inside. Corrugated iron is much hotter than straw or grass roots.

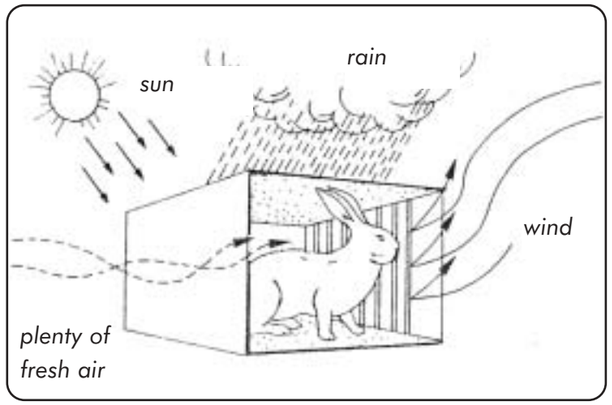


Figure 4.2 Rabbits must be protected frmo wind, rain and direct sunlight.

3. Humidity and fresh air

For a rabbit to feel comfortable the stable needs good ventilation. A rabbit produces moisture (like human beings) and, if not well ventilated, humidity can become very high. Open walls help good ventilation and a high building is better than a low building (see figure 4.4). If you do not have the wind blowing through the stable, ventilation holes should be made in the wall. However make sure to avoid draught; draught is harmful and rabbits will die when they are standing in the draught.

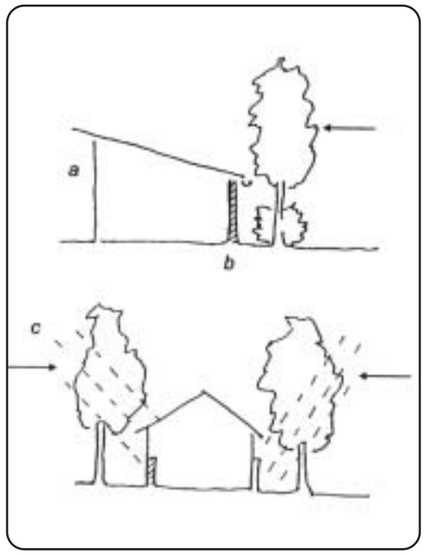


Figure 4.3 Trees around the stable

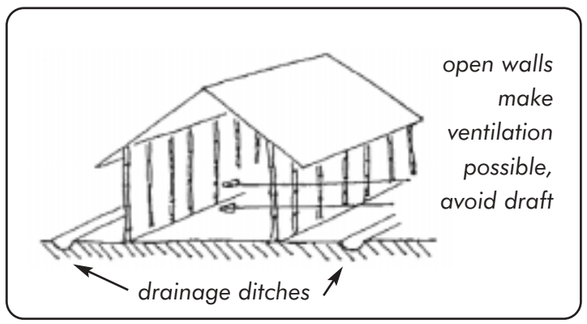


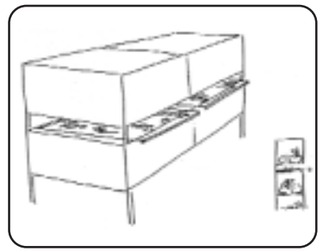
Figure 4.4 A rabbit stable with open walls

The best judge of the stable climate is yourself. If you are entering the stable and you are bothered by the heat, humidity or ammonia smell you may be sure that the animals have a similar problem.

Session 4.2 Hutch climate and design.

Important features in building the hutch are:

1. protection from predators coming in such as rats and ants. Rats will eat the young rabbits if they can enter in the hutch.
2. hygiene. The design and building materials have an effect on the hygiene of the hutch.



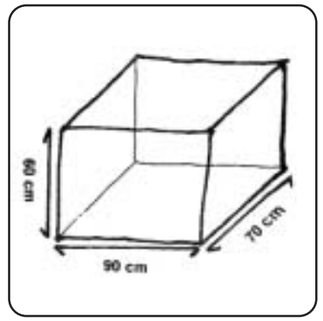


Figure 4.5 Hutch size

A standard size of hutch will be built in the prison service, at the rabbit production unit. The hutch should be 0.7 m deep, 0.9 m wide and 0.60 m in height. See figure 4.5 for the hutch size. For the hutches many building materials can be used such as bamboo, wood and mesh wire. Hutches made of wood and chicken wire are the easiest to make but also the most expensive. When building the hutch the most attention should be paid to the floor. As mentioned in session 1.2 we have NZW rabbits with the characteristic that its feet are densely covered with fur, which makes them resistant against wire mesh floor. As chicken wire is the most hygienic option, it should always be used for the floor. For the sides of the cage, other materials can be used such as bamboo. In figure 4.6 an example of the hutches in Domasi prison is given.

Figure 4.6 Examples of Hutches in Domasi prison

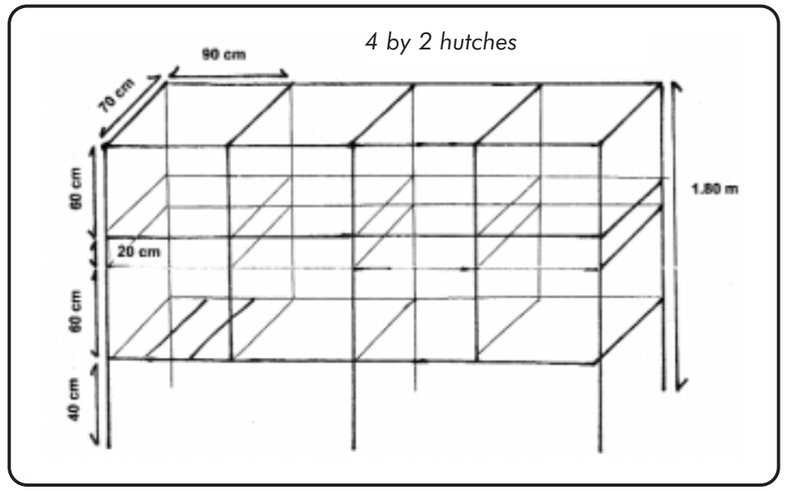


Figure 4.7 Hutch block design 2 by 4 hutches

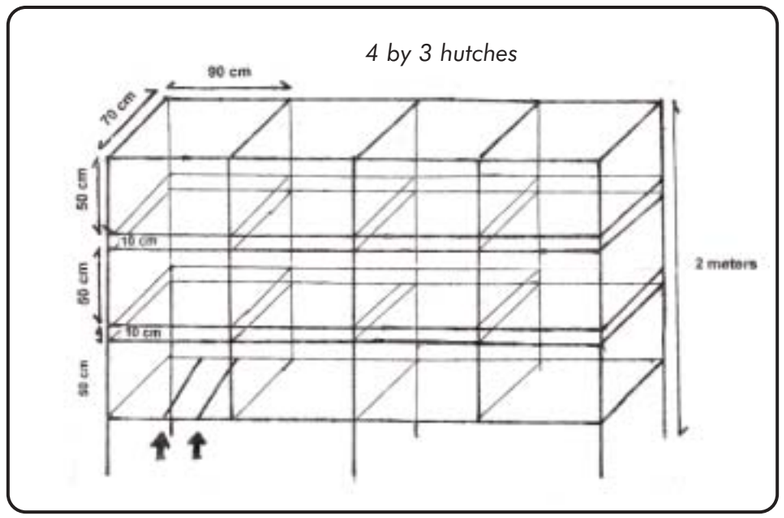
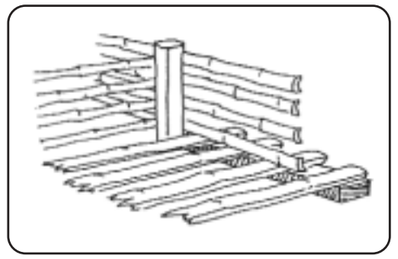
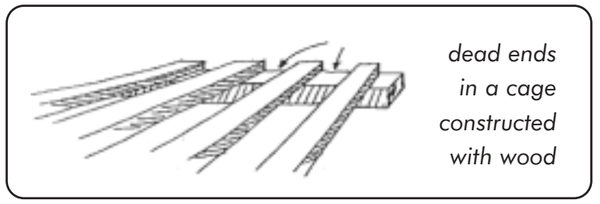


Figure 4.8 Hutch block design 3 by 4 hutches

In figure 4.7 and 4.8 a detailed lay out of the hutch block design is given. Depending on the height of the roof of the stable and number of rabbits you want to house you can build blocks of 4 by 2 = 8 hutches or 4 by 3 = 12 hutches.

When constructing the hutch try to avoid corners, which are difficult to clean (see figure 4.9) .If you have problems with ants in the area of the stable put the legs of the cages in cans filled with old oil or kerosene.





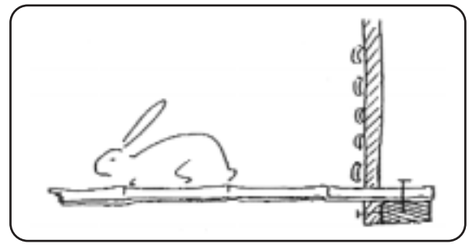


Figure 4.9 Try to avoid corners, which are difficult to clean.

Dropping trays

To collect the droppings and to keep the stable relatively clean, dropping trays of corrugated iron should be placed under each hutch (see example figure 4.10). The trays are easy to make and easy to clean. Every day the droppings should be collected from the trays and at least once a week the trays should be cleaned with disinfectant and dried in the sun.

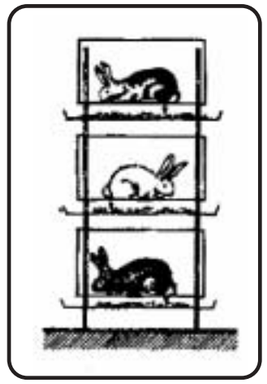


Figure 4.10 Example of dropping trays.

Session 4.3 Feeding and drinking equipment

At the moment different feeding trays are used for feeding the rabbits.

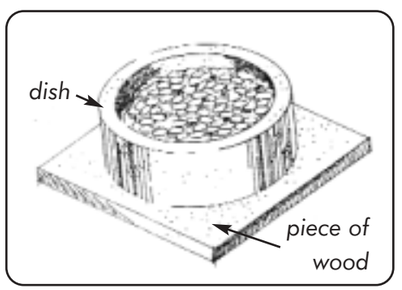
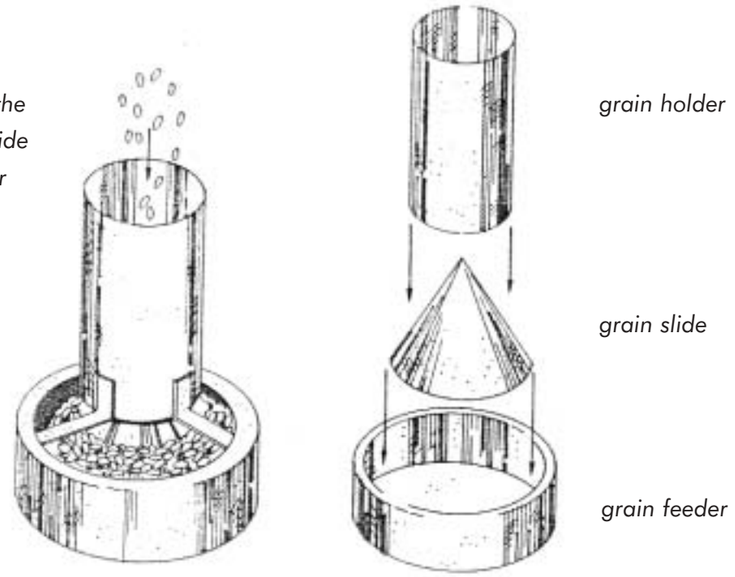


Figure 4.11 Feeding trays



The drinking equipment consists of an iron drinking mug attached by a piece of iron wire to the cage. This mug is easily available all around Malawi, easy to clean and, when well connected, difficult to tip over. Make sure you use iron wire to connect the mug as the rabbit will chew through a piece of string. Figure 4.12 shows a picture of drinking mugs.

Figure 4.12 Drinking mugs connected to the cage

Module 5 Disease and pest control

Session 5.1 Disease prevention.

Rabbits that are properly cared for, well fed and watered and kept clean and dry will avoid most diseases. The emphasis in herd management should be on prevention of disease in stead of treatment. Prevention is easier and cheaper. The golden rule in prevention of diseases is good sanitation.

Steps to prevent diseases:

1. Make routine checks on the health of your animal and note the follow points:
   - ❍ Check nose, eyelids, ear edges for little crust (mange) and inside the ear for ear mite
   - ❍ Check the droppings, is it dry or somewhat pasty.
   - ❍ Check the nose and front legs, certain coughs produce a kind of mucus which then makes the front legs dirty.
   - ❍ Check the hutch for smells; diarrhoea often causes a dirty smell.
2. Keep the stable and the hutches clean and dry, clean them every day. Clean the hutches from lose hair. If you suspect disease disinfect the hutches. Clean the floor of the stable once every week with disinfectant.
3. Keep animals away from their droppings.
4. Do not let droppings come into contact with food and water.
5. Separate animals you suspect are ill.
6. Clean fresh air in the stable is essential, a strong manure smell is no good. If you cannot stand the smell the rabbits probably cannot either.
7. Do not give excessive wet food.

Nail clipping

Rabbits in hutches do not wear down their nails on their feet. As a result the nails grow very long and it becomes easy for the keeper to get scratched and for the rabbit to get its nails caught in the wire floor. In the medication box you will find a small pair of side pliers, which can be used to clip the nails.

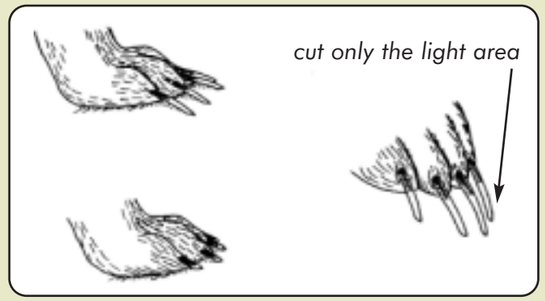


Figure 5.1 Overgrown nails before and after clipping

In a well-lit area or when you hold the foot to the day-light, it will be seen that the nail has a dark area and towards the end a light area. The dark area is the sensitive living portion of the nail and the light area is the area which should be cut. Do not cut all the way to the dark area as this will cause pain and bleeding. About 2 mm of the non living part of the nail should remain. In figure 5.1 overgrown nails before and after clipping are shown and in figure 5.2 the method of holding a rabbit for nail clipping.

Figure 5.2 Holding a rabbit for nail clipping

Session 5.2 Common rabbit diseases and their control.

Signs of sickness

One of the first signs of the rabbit being sick are the droppings and a rough hair coat (see figure 5.3). A healthy rabbit will produce droppings, which are sound, round and tablet like. Its odour can not be notified until you keep the dropping close to your nose. A sick animal becomes dull and inactive and the dropping will produce a smell and can be very watery. Sometimes the rabbit will produce a watery discharge from nose and eyes. Red urine is not a sign of illness, a normal finding in rabbits.

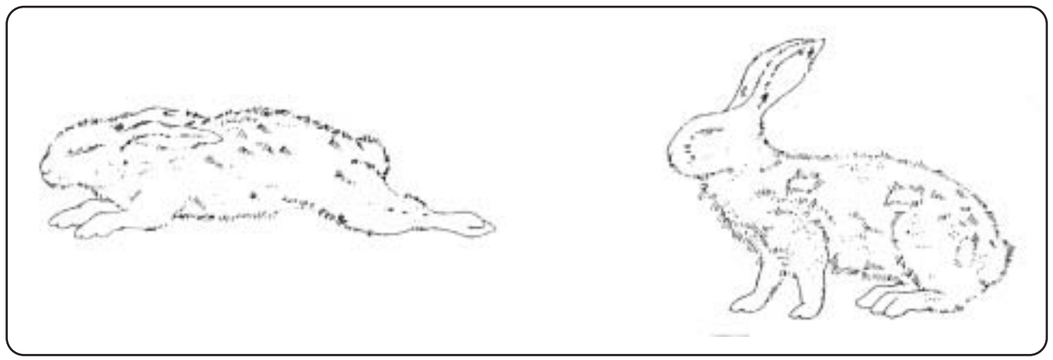


Figure 5.3 A sick rabbit identified by its rough hair coat and dull appearance.

Causes of sickness

The main cause of mortality in rabbits are probably intestinal problems. Second are diseases of the respiratory organs (such as nose and lungs). Problems of skin parasites are bothersome but hardly ever fatal and relatively easy to cure.

To prevent spreading any disease, treat the sick animal only after all other animals are cared for, then wash and disinfect your hands and even your dust coat before coming in contact with the rabbits again.
When a rabbit shows signs of sickness try to use common sense. Do not waste too much time waiting to see what will happen, kill the rabbit for consumption.

The following table lists the most common diseases registered in the rabbit production units in the prison. The table shows four columns, the first column describes the disease, the second column its symptoms, the third column discuses the cause and the last column will provide you with the appropriate treatment/ control.

Table 5.1 Common rabbit diseases, symptoms, cause and prevention/control

Disease	Symptoms	Cause	Prevention/control
Intestinal problems			
Diarrhoea (Enterisis)	Droppings are watery and smelling. Decrease of food and water intake and consequently weight loss.	Very different factors can cause outbreaks of diarrhoea. Incorrect feeding, mouldy or too wet food, or sudden food changes are the major factors causing it, but it can also be a sign of other diseases. Also improper watering can lead to diarrhoea.	Do not give excessive wet feed and make sure the rabbits get good quality well balanced feed with enough fibre. Do not change food suddenly!
Coccidiosis	Diarrhoea with a white mucus discharge. Decrease of food and water intake and consequently weight loss.	Coccidiosis occurs in the intestines, but also in the liver. Coccidiosis is caused when the rabbit consumes tiny parasite creatures. This creature appears crawling round in feeding trays, watering bowls and hutch walls after contact of this equipment with the rabbit droppings.	Keep floor clean, dry, remove droppings frequently. Prevent faecal contamination of water and feed. Remove lose hairs. Cleanliness!! Withdraw feed and provision of straw or fibrous roughage. Do not withdraw water! Preventive application of Esb3 1 teaspoon per 5 litres of water once a week in the drinking water. *

Disease	Symptoms	Cause	Prevention/control
Respiratory problems			
Pasteurellosis	Nasal discharge, watery eyes, weight losses, or mortality without symptoms.	Bacterial infection may be acute or chronic infection.	Good sanitary measures and removal of infected animals. Although low rate of success Oxytetracycline (100 mg per litre of drinking water) can be applied.
Pneumonia	Heavy breathing with nose held high	Bacterial infection of the lungs	Prevent exposure to draught and high humidity.
Snuffles or cold	Wet noise and sneezing animal. Dirty front legs because they are used as a handkerchief.	Bacterial infection of the nasal sinuses. Can be a symptom of Pasteurellosis. Snuffles can lead to pneumonia and weepy eye.	Ensure fresh air, dust free and clean surroundings, prevent exposure to draught and high humidity. It is better to remove infected animals from the stock.
Skin problems			
Ear and skin Mange	Reddened scaly skin, intense itching and scratching, some loss of fur, ear mange: shaking of head, scratching of ears, brown scaly crust at the base of the inner ear.	Mange is caused by mite and normally starts in the ears.	Wash hands before coming in contact with rabbits, the mites causing this disease are in the same family as the mites, which cause scabies in human! Apply oil in the ears and mix with a bit of iodine.
Internal parasites such as ring worm and tape worm	Circular patches of scaly skin with red elevated crusts. Usually starts on the head. Fur may break off or fall out.	Sometimes through infection by animals such as cats and dogs.	Make sure they do not come in contact with other animals or droppings of other animals. If severe: Ivomac solution, injection, 0.05 ml for babies after 6 weeks, 0.15 ml for a medium rabbit and 0.35 for a big rabbit.
Sore hocks	Bruised, infected or abscessed areas on hocks. May be found on front feet in severe cases. Animal shifts weight to front feet to help hocks.	Irritation from wire.	Small lesions may be helped by placing animals on lath platform or floor. Advanced cases are bested killed.

Disease	Symptoms	Cause	Prevention/control
Skin problems			
Conjunctivitis or weepy eye	Inflamitation of the eyelids: discharge may be thin and watery or thick and purulent. Fur around the eyes may become wet and matted.	Weepy eye is caused by a bacterial infection of the eyelid; it may also be caused due irritation from smoke, dust, sprays or fumes.	Protect the rabbit from dust, sprays etc. Gentomycin eye drops 3 times a day for 3 days, do not touch the eye when applying the eye ointment.
Other problems			
Heat strike	Rapid respiration, fluid from nose and mouth.	Extreme high temperature in combination with high and rapidly changing humidity.	Reduce temperature with water sprays on for example roof of the stable. Put grass on corrugated iron roof to prevent extreme temperature build up. In extreme cases wet the animal to help to reduce body temperature.

* When outbreak of coccidiosis, apply dosage as indicated on Esb3 container

Medication box

Each production unit will be provided with a medication box containing the following:

- Esb3, antibiotic to prevent coccidiosis
- Measuring spoons
- Gentomycin eye drops
- Wound ex (to prevent flies and worms on a wound)
- Methylated spirit for disinfection
- Cotton wool
- Pair of small side pliers (clipping of the nails)

Note: *When a rabbit is sick, do not give rabbits just any antibiotics as a wrong antibiotic can kill them. With the system of coprophagy the intestinal system is very sensitive and in most cases treatment with antibiotic will only make them sicker. The following antibiotics are tolerated: Chlortetracycline, Oxytetracycline, Doxycillin, Erythromucin, Oleandomycin, Spectinomycin, and Gentamycin.*

First aid

From time to time rabbits will suffer from injuries. These injuries can be caused by sharp edges or occasionally fighting. It is important to treat these injuries as soon as possible.
In the medication box you find several material to treat the injuries. First clean and disinfect the wound using some pieces of cotton wool with methylated spirit. When the wound is clean and disinfected, apply wound ex. Wound ex will prevent flies from laying their eggs in the wound.

Session 5.3 Pest control.

As mentioned in module 1 session 1.2, rabbits are animals, which are almost defenceless, and an easy prey for predator. Dogs, rats and cats can scare the rabbits by walking over the cage and they will eat (young) rabbits if they manage to enter the cage. Even if they do not enter the cage, the doe may be so scared that she eats her young. To prevent dogs, cats and rats coming in, the hutches should be made predator proof. Use materials a predator cannot go through such as wood and chicken wire. Make sure there are no holes in the cages. Make sure dogs and cats cannot enter the stable and use traps or poison to prevent rats from coming in the stable. Please take care when you use rat poison!
Another pest can be ants, which can feast on a new born litter. The only solution is to put the legs of the cages in cans filled with old oil or kerosene.

notes

Module 6 Stable management and administration

Session 6.1 Stable management

Many activities need to be executed on a regular basis to make sure you take good care of the rabbits. You have to make sure they are fed on a balanced diet, that water is available, to remove droppings every day, to clean the floor once a week with disinfectant, mate the rabbit, put kindling boxes in on time, etc. To make sure all the activities are executed, a daily work schedule should be developed. In the table below, an example of such a daily work schedule is given and all the activities, which need to be carried out each week, are included.

Table 6.1 Daily work schedule

Daily work schedule	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
Physical checking, health inspection animals and nest boxes	x	x	x	x	x	x	
Medication application	x						
Routine activities (supervision, feeding and watering)	xx	xx	xx	xx	xx	xx	xx
Cleaning individual hutches		x					
Cleaning floor sweeping	x	x	x	x	x	x	
Cleaning floor mopping (with disinfectant)			x				
Cleaning of drinking equipment (with disinfectant)		x					
Cleaning of dropping trays (with disinfectant)			x				
Maintenance of hutches		x	x				
Setting up nest boxes					x		
Weaning young					x		
Weighing of kindling					x		
Numbering kindling and first check				x			
Filling administration, update records							
Filling in buck cards				x			
Filling in doe cards				x			

Session 6.2 Rabbit production administration

One of the most important things, from a management point of view, is the registration of the animals; when they mate, when they give birth, who is their father and mother, how fast they grow and so on. In order to keep track of this information, proper administration is very important. The administration system in the rabbit production units consists of:

1. Individual rabbit identification;
2. Location, mating, birth, death and weighing record keeping;
3. Production calendar and daily journal;
4. Stock control system

1. Individual rabbit identification

Each doe or buck has an individual identification card, which is connected to their hutch. This card states the rabbit number, the hutch number, the breed, date of birth, the number of the father and the number of the mother. Also, all the litters produced are recorded on this card (see figure 6.1 Doe and buck card). This card moves with the rabbit. However, to make sure we can still identify the rabbit when this card is lost, all the rabbits, which come from Dedza prison, will have an ear number. An ear number starting with a 0 means the rabbit is male, a ear number starting with a C means that the rabbit is a cross breed. This number is punched in its ear using a tattoo and will be there permanently. Rabbits that are born for consumption at the production unit (the so-called broiler rabbit) will not get a tattoo number because they will be slaughtered within three months. These rabbits are identified using a broiler card. (see figure 6.2). All the broilers entered in a hutch are identified using only 1 card, which is filled when they are transferred to their own hutch after weaning (broilers of the same farther and mother only should be put together in one hutch and all of them should be registered on one broiler card)

To easily identify the difference between a doe and a buck, a red sticker is placed in the right corner of the doe card.

Malawi Prison Farm Rabbit Project

DOE CARD

Breed: ..... Hutch no: .....

Date of Birth: ..... Father: .....

Ear no: ..... Mother: .....

Litter no	Date of service	Buck	Date of birth	Born		Weaned			Tot. amount (cum)	Remarks
				life	dead	no	date	Weight		

Figure 6.1a A doe card

Malawi Prison Farm Rabbit Project ..... PRISON

BUCK CARD

Breed: ..... Hutch no: .....

Date of Birth: ..... Father: .....

Ear no: ..... Mother: .....

Mating no	Date of service	Doe no	Date of birth	Born			Young kindlings total (cum)	Remarks
				life	dead	Total litter (cum)		

Figure 6.1b A buck card

Malawi Prison Farm Development Project ..... PRISON

Rabbit Production unit

BROILER RABBIT RECORD CARD

Ear no

Breed

Doe no

Buck no

Litter no

Date of birth

Date of weaning

Number weaned

Average weaning weight

No entered this cage

Date slaughtered

Place slaughtered

Average weight at slaughter

REMARKS

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Figure 6.2 Broiler rabbit record card

2. Record keeping

A number of records are kept to track the location of each rabbit in the stable, the mating, birth, death and the growth rate of the kindling. In figure 6.3 to 6.6 the records used are given.

1. ***figure 6.3 The rabbit location sheet***
   This sheet needs to be filled in when the rabbits arrive at the unit and can be used for physical checking each week. Any changes in location of the rabbits should be noted on the list.
2. ***figure 6.4 Mating and birth records***
   On this sheet, mating and birth needs to be recorded. Besides the date of mating (DoM) also the expected date of birth (DoB) and if they are re-mated need to be indicated.
3. ***figure 6.5 Death record***
   Death should be recorded on the death record. Slaughtered rabbits should also be recorded on this sheet. Cause of death should be noted: did the rabbit die because it was slaughtered or because it was sick. Of which disease do you suspect it died?
4. ***figure 6.6 Kindling weighing record***
   To identify the growth rate of the kindling, the kindling should be weighed each week. All kindling should be weighed in grams and the same kindling weighing record should be used every week. Note that 1 kg is 1000 grams.

All these records are kept in the green rabbit administration file.

3. Production calendar and daily journal

To prepare the daily happenings in your stable a diary should be kept. (see figure 6.7) This diary, in the form of a production calendar, can be used to plan mating, to calculate when the nest box needs to be placed and when you can expect the kindling.

For example:

Doe 12 mates buck 04 on 1 March. You enter this date on your calendar. As the gestation takes just one month you can expect her to give birth, on 1 April , which you also note on your calendar. 25 days after mating, the kindling box needs to be put in the hutch so you calculate 25 days after 1 April and indicate the date on your calendar. By checking the date on your calendar every day, you know exactly what to do each day.

A daily journal should also be kept. By describing in a few lines the most important activities you have done that day anyone who enters the stable in your absence will be able to see what needs to be done next.

4. Stock control system

A stock control system needs to be in place in each rabbit production unit. This stock control system including stock control sheets on feeding, cleaning materials etc, monthly inventory records, rabbit monthly inventory, feeding records, delivery notes and petty cash sheets.

All stock control records will be kept in the black stock control file.

Figure 6.3 The rabbit location record

Malawi Prison Farm Development Project

RABBIT LOCATION RECORD

Rabbit production unit DOMASI PRISON

DATE . . . . - . . . . - . . . .

HUTCH NO	EAR NO	NUMBER OF RABBITS IN HUTCH	BREED	DATE OF BIRTH	DOE	BUCK	REMARKS
1	019	1	NZW	02-11-99	7	013	B2
2	049	1	NZW	05-06-00	2	02	B2
3	022	1	NZW	14-08-00	9	04	B1
4	030	1	NZW	05-09-00	3	013	B1
5	040	1	NZW	02-09-00	8	03	B3
6	081	1	NZW	02-08-00	18	06	B3
7	140	1	NZW	05-03-01	24	03	Production group 1
8	145	1	NZW	15-08-00	25	03	Production group 1
9	143	1	NZW	15-06-00	25	03	Production group 1
10	112	1	NZW	20-01-02	12	035	Production group 1
11	C 3	1	NZW	23-05-00	99	020	Production group 1
12	C 4	1	NZW	23-05-00	99	020	Production group 1
13	38	1	NZW	05-05-99	10	01	Production group 1
14	125	1	NZW	12-07-00	19	01	Production group 2
15	127	1	NZW	12-07-00	19	01	Production group 2
16	126	1	NZW	17-07-00	19	01	Production group 2
17	186	1	NZW	04-09-99	39	02	Production group 2
18	123	1	NZW	22-09-00	18	06	Production group 2
19	187	1	NZW	04-09-99	39	02	Production group 2
20	381	1	NZW	02-08-00	64	06	Production group 2
21	29	1	NZW	16-09-99	7	02	Production group 3
22	168	1	NZW	15-12-00	31	05	Production group 3
23	146	1	NZW	18-08-00	26	06	Production group 3
24	110	1	NZW	07-08-00	14	035	Production group 3
25	69	1	NZW	30-09-99	10	08	Production group 3
26	59	1	NZW	09-09-99	7	13	Production group 3
27	55	1	NZW	23-2-00	5	05	Production group 3

Malawi Prison Farm Development project

RABBIT PRODUCTION UNIT

MATING & BIRTH RECORD

DoM	Buck	Doe	Hutch no	DoB	Remat. 1	Remat. 2	Remat. 3	no of kindling live at birth	no of kindling live at weaning	remarks
20/09/2002	030	140	7	21/10/2002				5	4	
20/09/2002	030	145	8	21/10/2002	27/10/2002	27/11/2002	10/01/2003			no results after 3 matings -slaughtered
20/09/2002	030	143	9	21/10/2002	28/10/2002			7	7	
20/09/2002	022	112	10	21/10/2002				9	9	1 baby placed with doe no 140
20/09/2002	022	c3	11	21/10/2002	27/10/2002	27/11/2002		5	4	
20/09/2002	022	c4	12	22/10/2002				6	6	
20/09/2002	022	38	13	21/10/2002				5	0	all died
20/09/2002	019	125	14	19/10/2002				8	7	
20/09/2002	019	127	15	21/10/2002				5	5	
20/09/2002	019	126	16	21/10/2002				3	3	
20/09/2002	019	186	17	22/10/2002				5	4	
20/09/2002	049	123	18	21/10/2002				2	2	
20/09/2002	049	187	19	19/10/2002				1	1	
20/09/2002	049	381	20	21/10/2002	27/10/2002	27/11/2002		3	3	
20/09/2002	040	29	21	21/10/2002						died giving birth
20/09/2002	040	168	22	22/10/2002				4	4	
20/09/2002	040	146	23	22/10/2002	27/10/2002			5	4	

Figure 6.4 Mating and birth record

RABBIT PRODUCTION UNIT

Domasi Prison

DEATH RECORD

DATE	HUTCH NO	EAR NO	BREED	BIRTH DATE	DOE	BUCK	CAUSE OF DEAD
21-10-02	21	29	NZW	16-09-99	7	02	Died giving birth
10-01-02	8	145	NZW	15-08-00	25	03	Slaughtered

Figure 6.5 Death record

Kindling weighing record

All kindling's should be weight in grams !!!

1 kg = 1000 grams

Use the same kindling weighing record sheet for the same litter all the time !!!

date of birth 05/03/2002 **no of kindling** 4

doe no 35 **average weight at birth** 52 grams

Date	No of days old	No of kindling	Total weight (gr)	Average weight	Remarks
04/04/2002	30	4	2250	563	
16/04/2002	42	4	4400	1100	
24/04/2002	50	4	5450	1363	
08/05/2002	64	4	6800	1700	
24/05/2002	80	4	7900	1975	

Figure 6.6 Kindling weighing record

Malawi Prison Service rabbit Production Unit RABBIT PRODUCTION CALENDAR

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
1												
2												
3												
4												
5												
6												
7												
8												
9												
10												
11												
12												
13												
14												
15												
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27												
28												
29												
30												
31												

Figure 6.7 Rabbit Production Calendar

notes

Module 7

Slaughtering and use of waste materials

In order to ensure a high quality product from your rabbits, you must know how to properly slaughter the animal and process the meat. To make optimal use of the animal also usage for the waste products should be found.

Session 7.1 Slaughtering

The broiler rabbits should be slaughtered when they reach a weight of 2.5 kg or more. At this weight the ratio between meat and bone is optimal. Up to a certain weight, the increase in body weight consists primarily of protein tissue (meat). Weight gain in older animals is primarily fat.

Before killing the rabbit it must be starved for about eight hours. This is done to reduce most of the intestinal matters present in the stomach. Water must be provided throughout the period to prevent de-hydration and subsequent weight loss. Application of medication should be stopped 7 days before the rabbit is slaughtered.

A rabbit should be slaughtered in a clean sanitary area. The preferred method of slaughtering a rabbit is by dislocating its neck (see picture 7.1). With the left hand, hold the rabbit by its hind legs. Place the thumb of the right hand on the neck just behind the ears, with the four fingers extended under the chin. Push down with the thumb. Then with a quick movement, raise the animal's head and dislocate the neck. The animal becomes unconscious and stops struggling. This method is instantaneous and painless when done correctly. Another method is to hold the animal with one hand on the ears and stun it by a heavy blow (with for example a iron bar) on the back of the head (see picture 7.2).

Hang the animal by passing a hook, or tying a cord, between the tendon and the bone of the right hind leg. Cut off the head and let the carcass bleed so the meat will have a good colour. Remove the tail and the rear leg at the joint and cut off the front feet at the elbow (see figure 7.3 picture 1). Cut the skin just below the hock of the suspended right leg and open it to the root of the tail, continue the incision to the hock of the left leg (picture 2). Carefully separate the skin from the carcass and begin working the skin free from the meat on the hind quarters using your fingers and your knife. Be careful to leave all the fat to the carcass as the skin is pulled down (see picture 3 to 5). The fat cover is important for preserving the quality of the meat. If we want to use the skin it should be tanned within a few hours after the slaughtering.

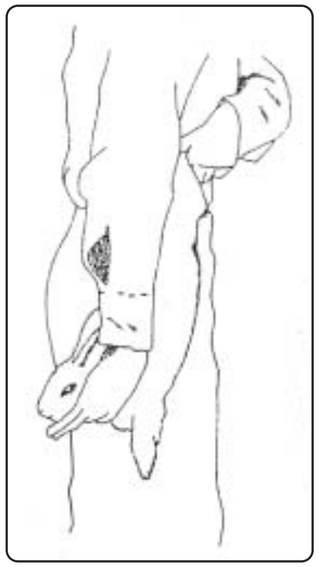


Figure 7.1 killing a rabbit by dislocating the neck

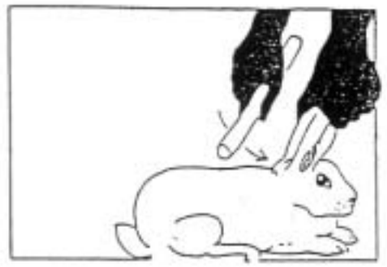
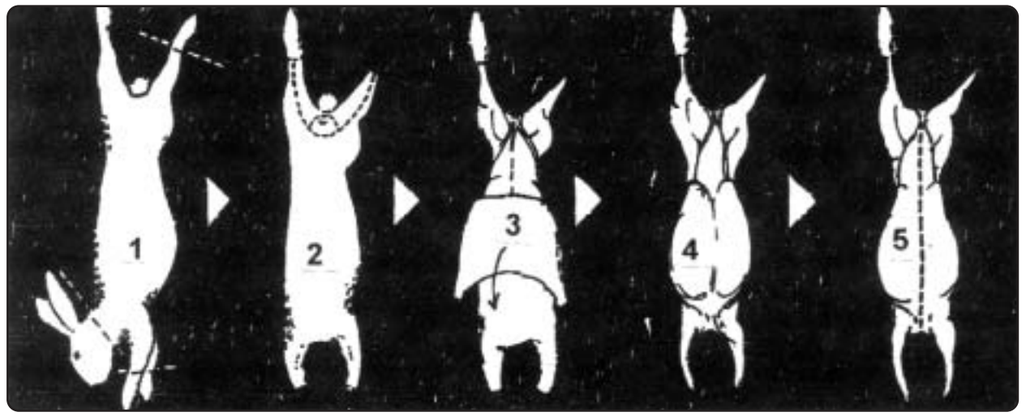


Figure 7.2 Killing a rabbit by hitting it on the back of its head

Figure 7.3 Skinning the rabbit



After removal of the skin, break the pelvic bone between the hind legs by inserting the knife inside the pelvic area and cutting outwards. Slit the belly down the midline from the pelvis to the chest area as far as possible. Be very careful not to puncture any of the internal organs as their contents will contaminate the meat. Cut around the anal opening and remove the reproductive organs and gall bladder. Leave the liver, heart and kidneys in place. Then take it of the hook and remove the right leg. Rinse the carcass in cold water to remove hairs, blood and other unwanted materials. Dry the carcass with a clean cloth and cut it in the desired pieces. Slaughter yields vary from 54% to 65% depending on sex, body fill and whether head, lungs, liver feet and skin are included with the carcass.

Before slaughtering a rabbit, always wash your hands and make sure your knife is clean! Work in a clean area to avoid contamination of the meat.

Session 7.2 Use of waste materials

Rabbit urine and droppings

Rabbit urine can be used as a pesticide and at the same time as a concentrated fertilizer applied round trees and vegetables after storing it for 7 days. It should be dilutes with water
(urine: water)=(1:3). Rabbit droppings contain 60 to 70 % dry matter and it is estimated that each rabbit produces 60 to 80 kg a year. The droppings can be used as fertilizer for the soil but can also be fed to animals like fish.

Rabbit skins

Rabbit skins can be used in the compost heap of the prison farm as the skins are high in both nitrogen and phosphorus. You can also try to tan the skin and use it for sandals or blankets.

Tanning of the skin can be a complicated and tedious job. The easiest solution (agent) to tan the skin is the use of sulphuric acid also known as battery acid. Be careful with acid because it is very dangerous. If you get it on your skin you will be badly burned. Never pour water in the acid, always pour acid into the water carefully.

You need the following to make the solution

- 240 g of battery acid
- 1 kg of salt (any cheap one)
- a 10 to 20 litter plastic bucket (do not use a metallic one)
- 7 litters of water
- a weight to hold the skin down in the solution, a brick or rock or a similar thing

Add the salt to the water. Then tip your container and let the acid dribble down the side in to water. Never add the water to the acid and be careful not to let it splash because it is a very dangerous liquid. Stir the solution with a wooden stick. At this point the acid is diluted enough so it is quite safe even if it touches your skin. Keep the temperature as close as possible to 21 C. Higher temperatures can damage pelts and lower temperatures slow down the tanning process.

Before entering the skin in the solution first rinse the skin in a bucket of water with one cup of salt to two litters of water. Wash the skin in warm water and detergent and squeeze out the excess water. Never wring the skin, always squeeze it gently. Finally put it in the tanning solution swish it around a little with a wooden stick and weight it down to keep it from floating. A small skin will be ready in

about 3 to 4 days. It does not matter if you leave the skin in for more than 4 days as long as you stir now and then. When the skin is ready it is taken out, wash again with detergent and rinse in cold water. At this point the fat and flesh should separate from the hide easily (see figure 7.4). If it is done really well you can separate the flesh from the skin in one single piece. After fleshing wash and rinse again and return it to the tanning container for another week. Finally wash, rinse and squeeze again and hang it in a shady place to dry. While it is still damp and limp you should "break" the skin. Breaking the skin is gently pulling and stretching small areas of the skin in different directions. The stiff brown hide will turn white and soft. In figure 7.4 a method of breaking of the skin is shown.

Figure 7.4 Separating the flesh from the hide

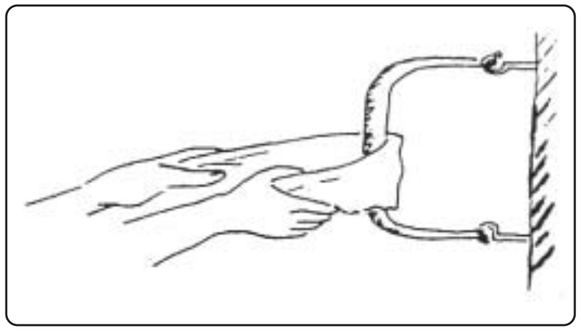


Figure 7.5 Breaking the skin

notes

List of used and recommended literature

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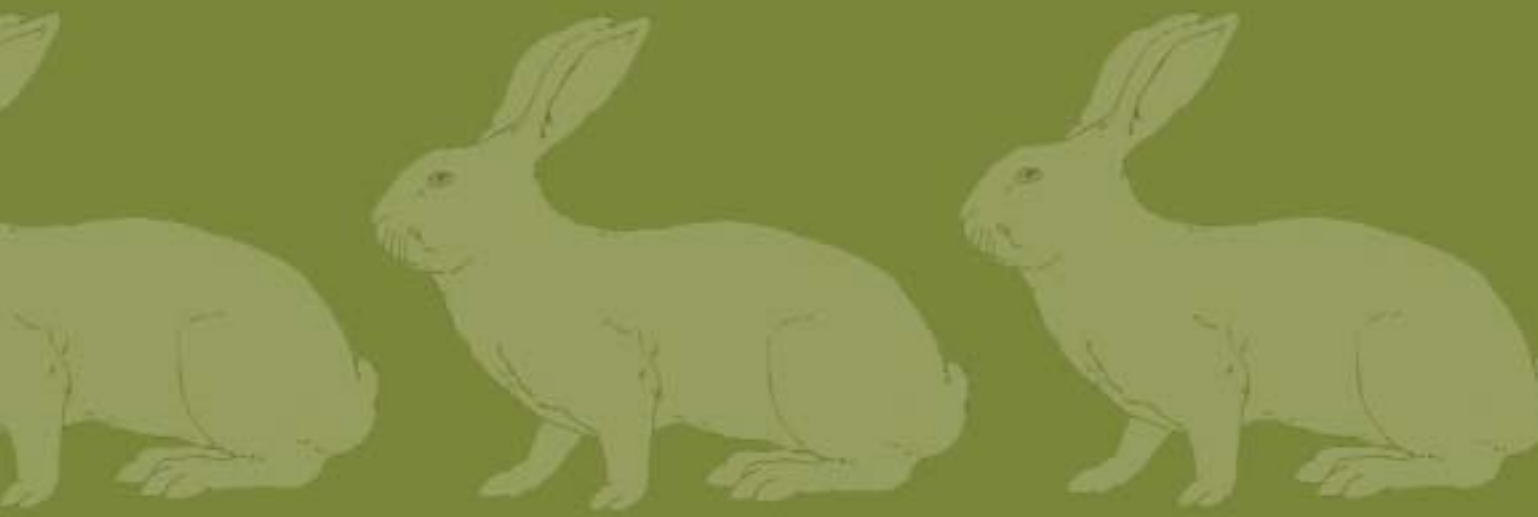

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