TVET CERTIFICATE IV in ANIMAL HEALTH



Credits: 8 Learning hours: 80 Sector: Agriculture and Food processing Sub-sector: Animal Health

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Purpose statement

This core module provides the skills, knowledge and attitude for a learner to be competent in a range of routine tasks and activities that require the application of practical skills in a defined context of the rabbit farming. Upon completion of this module, the trainee will be able to:

- Identify rabbit breed
- Sketch and equip rabbit hutch
- Manage rabbit farming
- Perform rabbit health and diseases control

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GENERAL INTRODUCTION

People keep rabbits for many different reasons. The main aim of this module is to give some reasons for small farmers, low income families, trainers and learners to do so, and to discuss management, breeding, nutrition, veterinary, and other problems for this type of backyard farming.

Most important in a situation where one is the first to start with rabbit is that often people are reluctant to accept something new. Whereas in Europe and the U.S. there is a well-established market for rabbit meat, in the tropics the market becomes more and more organized for chickens; there are few countries with a ready market for rabbit meat. This reduces potential money income, but it should be no problem where the intention is to raise rabbits as a family enterprise, mainly to provide meat for the family where the diet may be lacking in protein.

Several breeds of rabbit were known in the sixteenth century and this is the first indication of controlled breeding. Domestication can therefore be traced to the late middle Ages. This was probably mainly the work of monks, since it provided them with a more delectable dish than the tougher wild rabbit. During the sixteenth century breeding seems to have spread across France, Italy, Flanders and England. In 1595, Agricola mentioned the existence of grey-brown (wild), white, black, piebald (black and white) and ash-grey rabbits.

Rabbits are one of the most common pets that parents buy for their children, along with fish, hamsters and turtles. This may be because children are easily attracted to rabbits and have a great time playing with them. But anyone who has actually taken care of rabbits for a while knows that this task is no joke and they are not the best choice for small children; just as dogs and cats generally require far more care than parents often think about.

Diseases are common and unlike chickens, specific rabbit medicines are not easily available. Moreover veterinarians (even in Europe and the United States of America) do not usually have much experience in the diagnosis and treatment of rabbit diseases. On the other hand, with good hygiene and common sense, added to information found in this booklet one should not have too many worries about diseases. Most animals get sick once in a while, and a dead rabbit is less of a worry than a dead goat or cow.

There are many aspects to general rabbit husbandry. In this module we describe the most important things you need to know to start keeping rabbits: the different breeds, how to select

breeding stock, mating and kindling, rearing the young, housing, feeding, diseases control and record keeping.

Learning Unit 1 – describe rabbit breeds

LO 1.1 – Identify rabbit breeds

<u>Content/Topic 1:Rabbit breeds identication</u>

A. Introduction

Identification can be made in two ways: by individuals and by cages. The first method is necessary for all producers who intend to select. The second is important for the economic management of the rabbitry.

Rabbits are mammals and fall in the order of lagomorphs (meaning "hare-shaped") with the scientific name *Oryctolagus cuniculus*. This terrestrial herbivore ranges from small to medium in size on the grand scheme of animals. Rabbits are small, furry, mammals with long ears, short fluffy tails, and strong, large hind legs. Using their powerful hind legs, rabbits move by hopping. They have 4 toes on their hind feet that are long and webbed to keep them from spreading apart as they jump. Their front paws have 5 toes each. Rabbits vary in color and size, ranging in weight from 1 to 7 kilograms, depending on breed.

B. Rabbit breeds

- Local rabbit
- Californian
- New Zealand white
- Fauve de Bourgogne
- Angora
- Dutch
- Chinchilla
- Petit russe
- Flemish giant

LO 1.2 – Characterize rabbit breed

• <u>Content/Topic 1: Rabbit breed characterization</u> <u>A. Characteristic of rabbit breeds</u>

A.1. Local rabbit

Color: White with Chocolate, Lilac or Blue points,

Eyes color: black, **conformation**: always looks good.

Potential productivity :5kg; prefer hardiness and temperature is between 17 and 20°C;originated in East Africa countries



A.2.Californian

Weight: 3 and 5kg; conformation: ears are erect, robust and thick;. Head is strong, wide, round, with unhooked snout. The neck is imperceptible. The body is massive, short, compact, fleshy and muscular. It is a breed with thick back, wide shoulders, and with rounded legs with a dorsal line slightly curved. The croup is wide and well rounded, without part at the same height as shoulders. Legs are short and strong. It has a very good conformation

Color: Fur is dense and very bright with hair of 3.5 cm. It is white with black tips (ears and snout); **Eyes color**: red; it is very **prolific**.

Potential productivity: 5 Kg; **Hardiness and environment**: resistant under open shelter. Optimal T°: 17 to 20°C.origin: USA in California.



Figure 2: Californian rabbit breed

A.3. New Zealand white

Conformation: New Zealand Whites have well-rounded bodies; slender and muscular faces with round cheeks; large, long back feet; and small, short front pectoral muscles. They have long perforated **ears** that stand straight up. Unlike the thick, snowy fur on their bodies, their ears have shorter fur that allows the delicate pale pink of their skin to show through; **eyes color**: The most noticeable characteristic of New Zealand White rabbits is their **bright eyes**, which range in shade from pale pink to bright ruby purple. **Potential productivity** :5.5kg **Adaptability**: temperature is between 17 and 20°C;**origin**:New Zealand



Figure 3: New Zealand rabbit

A.4.Fauve de Bourgogne

The Fauve de Bourgogne is a stocky medium sized breed of rabbit which is orange-red in color. This breed is used as meat, fur and skin The Fauve de Bourgogne has excellent commercial meat rabbit traits, body weight: 3.5 - 5 kg, originated from German.



Figure 4:Fauve de Bourgogne rabbit

A.5.Angora

The Angora rabbit is a variety of domestic rabbit bred for its long, soft wool Angoras are bred mainly for their wool, which is silky and soft. Most Angora rabbits are calm and docile, but should be handled carefully. Grooming is necessary to prevent the fiber from matting and felting on the rabbit. These rabbits are shorn every three to four months throughout the year.



Figure 5: Angora rabbit

A.6.Dutch rabbit

The Dutch rabbit, easily identifiable by its characteristic color pattern, was once the most popular of all rabbit. Origin: US, Body weight: (1.6–2.5 kg), short fur and erect ear.



Figure 6: Dutch rabbit

A.7.Chinchilla rabbit

Chinchilla rabbits are a group of three rabbit breeds that have been bred for a coat that resembles that of chinchillas. They are not related to and cannot interbreed with chinchillas, which are a species of rodent, body

weight: (3.9–5.4 kg), short fur and erect ear. Origin UK



Figure 7: Chinchilla rabbit

A.8.Flemish Giant

The Flemish Giant was originally bred in its natural wild (agouti) colouring, the undercoat grey, brown or red, with the tips of the hairs (ticking) black or blue. Potential productivity:7kg and can survive outside the shelter , optimal temperature is between 17 to 20°C.



Figure 8:Flemish Giant rabbit

A.9.Petit russe

It is basically the Himalayan breed.it is originated in northern china and then spread through Russia and Poland. This breed tends to show early maturity and excellent maternal trait that can be utilized in cross breeding programs. Body weight :(2.7–3.6 kg), White with points of black, blue, chocolate, or lilac and erect ear.



Figure 9: Petite russe rabbit

Content/Topic 2: Rabbit breeds according to the production

These breeds can be divided into three for practical purpose without trying to make scientifically correct distinctions:

A. Fancy and Fur breeds

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These are not necessarily good meat producers, they do not have large litters nor are they resistant to diseases. They have nice skins, nice colours, funny ears etc. examples are: angora and Chinchilla

B. Meat breeds

These are also called utility breeds, either by a fast growth rate or large and frequent litters. It is necessary to make a further distinction based on weight. Light breeds (up to 2-3kg adult weight), Medium breeds (3-5kg) and Heavy breeds (>5kg)

Examples of meat breeds are: Local rabbit, Californian, New Zealand white, Fauve de Bourgogne Dutch, Chinchilla, Petit russe and Flemish giant

C. Cross breeds

Cross breeds are a mixture of two types (example: local breeds and angora). These crossed breeds may be reared for the purpose of meat production or fur

Learning Unit 2 – Design and equip rabbit hutches

LO 2.1 – Select the site for rabbit hutches

• <u>Content/Topic 1: Selection criteria of site</u>

A. Introduction

Rabbits cannot be allowed to run free like chickens and goats. Dogs will eat them. Rabbits must be kept in a cage or hutch to protect them from all that could cause them harm. Their cage must protect them from the sun, from wind, and from rain. It must be located in the shade, particularly shaded from the afternoon sun. The rabbit cage must be open to allow air and light to enter freely, yet so designed that driving rains and winds do not cause the rabbits stress.

B.The following criteria has to be considered when designing a rabbit hutch.

B.1.Environment:

Environment a secure living environment large enough for all to exercise and stand up fully on their back legs without ears touching the roof. Rabbits are active, needing opportunities to hop/run/jump/dig/stand fully upright on their back legs/stretch out fully when lying down, to live in safe, secure, hazard-free environments. Any hazards within their environment may injure them.

B.2.Ecological condition:

A large living area and a secure shelter where they can rest feel safe and are protected from predators, extremes of weather and temperature. Ensure all areas are well ventilated, dry and draught-free.

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B.3.Soil structure:

The rabbit is living in draughty/damp/hot/poorly ventilated/dirty environments can cause suffering and illness.).

B.4.Site dimension:

Site dimensions sizes vary with the size of the breed and also the site must large enough for future expansion.

B.5.Distance from Other Farms

The site must be reasonable for preventing rabbit farm.

B.6.Basic infrastructure and services:

Constant access to safe hiding places to escape if feeling afraid. Rabbits need to hide from things that scare them. The buildings must be easier accessible and will not be too far from the human habitation as a safety factor because the monitoring is simplified (to supply feed, cleaning, medicine administration). During implementation of rabbit building, it has to think on market and accessibility of main road to facilitate feed and animal products distribution. Water and power are vital elements for livestock, reason why the infrastructures for water and power supply must be taken in consideration. The water supply should be near the rabbitry, as even if this consists of piped water, in case of an emergency such as a fire, it should not be too far away. Power is used to supply light, communication and processing some feeds stuff (grinder)...

LO 2.2 – Sketch a rabbit hutch

• Content/Topic 1: Type of rabbit hutch

A. Rabbit hutch

The hutch is a cage used to house with her litter and be sufficiently large, airy and raised from the ground. The size of the colony needed will of course have some correlation to the number of rabbits you intend to raise. For whatever reason, rabbits seem to prefer a space which is rectangular versus square. That doesn't mean they can't be happy in a square pen; but their natural instincts to run and hide are easier to fulfill when the space has a long axis.



Figure 10: Sketch of rabbit hutch

B. Type of rabbit hutch

A rabbit hutch is a type of cage used typically for housing domestic rabbits and chickens. Other small animals that can be housed outside, including exotic pets like foxes, can be also housed in rabbit hutches. Most rabbit hutches have a frame constructed of wood, including legs to keep the unit off the ground. The floor may be wood, wire mesh, or some combination of the two. One or more walls of the rabbit hutch are also wire mesh to allow for ventilation. There are basically two types of colonies: outdoor and indoor.

B.1.Outdoors colonies:

Outdoors colonies provide rabbits with fresh air, allowing them to feel almost as if they are living in the wild, and giving them freedom to dig and burrow (which most rabbits love to do). You don't even need to mow inside an outdoor colony if you've got regular grass growing there because the rabbit will love to hide in it as well as benefit from the shade it provides.

B.2.Indoor colonies:

When rabbit colonies are placed inside house, barn or other building you'll feel more secure that they are protected from climate change. But always remember that ventilation and insulation are important for your indoor colony to remain habitable. So if you decide to make an indoor colony for rabbits, make sure to have proper ventilation or an automatic backup generator if your power should go out from time to time. Some people will choose to use an air conditioner and /or heater to control temperature changes.

• Example of outdoor Colonies:

✓ Ground hutch:

The ground was covered with wood chips and various pet carries have been used to provide "den "space.



Figure 11: Ground rabbit hutch

✓ Battery hutch:

There are dividers inside the box to give the does and kits privacy but the bottom of the entire box is closed so clean up is difficult.



Figure 12: Battery rabbit hutch

✓ Cage hutch :

There are dividers inside the box to give the does and kits privacy but the bottom of the entire box is open so clean up is easier and all droppings just go right down to the ground



Figure 13: Cages for rabbit housing

• Example of indoor rabbit hutch:

✓ <u>Wooden</u>

Wooden rabbit cages are usually more pleasing to the eye and you can opt to paint them a variety of colors. They also have a 'homier' look about them and make it look less like a 'cage'. Rabbits have teeth that are growing all the time and they will chew on the wooden bars and edges of the cage so wooden cages don't last as long as wire ones. Wooden rabbit cages are also harder to keep clean as they can't really be disinfected effectively.



Figure 14: wooden rabbit hutch

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✓ <u>Wire mesh</u>

For those rabbit cages with a wire mesh base, a good suggestion would be to add bedding in the form of straw, shredded paper, a board, or provide a section of the pen where you can place a solid floor for them to stand on. Rabbits raised purely on wire mesh cages tend to get 'bumble foot' or sore hocks which are sores on their feet because of the pressure placed on their feet by the wire mesh.



Figure 15 : wire mesh rabbit cage

<u>Content/Topic 2: Rabbit hutch component , specification and planning</u>

A. Introduction

Rabbits need to be provided a cage of adequate size to accommodate species and breed specific behaviour. Available cage space is calculated by multiplying the cage width by length and subtracting the space occupied by the feed and water dishes located on the floor of the cage. Feeders and waters fixed to the side of the cage, not coming in contact with the floor of the cage, need not be subtracted from available cage space.

B. Rabbit hutch specification

B.1.Lactating doe cage

Under intensive production in most cases rabbit does are housed individually. There is a generalization that the cage size of rabbit does is too small, thus it is uncomfortable for the animals moreover rabbit does cannot adequately carry out locomotors behaviour. Different researchers have recommended that the lactating doe cage should have at least the following

size (50 \times 60 \times 30 cm and 100 \times 60 \times 30 cm) and height (50 \times 60 \times 50 cm). This type is bigger than other.

B.2. Grower cage

For the young rabbits who are reared for meat (growers) the space available per animal in grower cages is typically 450 to 600 cm2; this is less than the area of an ordinary A4 sheet of typing paper. A typical cage for an adult doe is 60 to 65 cm long, 40 to 48 cm wide and 30 to 35 cm high. The floor space and height are so restricted that caged rabbits are often unable to move normally and adopt normal postures such as lying stretched out, sitting and standing with their ears erect, rearing up, turning around comfortably and hopping. The lack of opportunity for exercise in caged rabbits can lead to weakened bones.

B.3. Fattening cage

Cages for breeding animals usually have at least a 60 to 70 cm \times 80 to 100 cm floor space and are 50 to 60 cm high. Identical cages are often used for fattening five or six young rabbits (to 2.5 to 2.8 kg).

B.4. Young female rabbit cage

For the young rabbits who are reared for meat, the recommended floor space per animal in cages, as set out in the UK welfare code, is 700cm2 up to 12 weeks of age and 1800cm2 from 12 weeks of age; this is equivalent to around 14 and six animals per square metre respectively. The total area available to growing rabbits will depend on the group size. Opportunities to express natural behaviour are particularly severely restricted where growing rabbits are housed in small groups. The functional space available to grow rabbits housed in small groups in cages is insufficient to allow many normal activities, such as sequences of hops, running and play behaviour.

B.5. buck cage

Due to territorial aggression and associated injury and animal stress, group or pair housing of bucks is not appropriate. Bucks begin to demonstrate sexual behaviour and territoriality with related aggression at approximately 12–14 weeks of age and reach sexual maturity at approximately 20 weeks of age and minimum floor space is 0.46 m²

C. Rabbit component and annexes

<u>C.1.rabbit hutch (floor, walls, roof, forage racks)</u>

C.2. Annexes: - Office, Store of feed, Feed preparation room, Drug store, Compost pit

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D. Rabbit hutch planning

You must also plan for your bucks to live in a separate pen or in cages, isolated from the rest of the herd. Otherwise overpopulation is likely to occur. But generally, if let your buck out into the colony of females for a couple of days to socialize, he will do his best to fertilize all the ladies, and then you just put him away again.

This will allow you to still know which buck has sired new kits without any guesswork. You may also run into complications with does fighting – but generally they all work these things out on their own. If the fighting is incessant, you may need to eliminate the more aggressive doe(s) from the herd – but that's something which you would likely do if they were living in cages as well

LO 2.3 – Select construction materials and equipment of a hutch

• Content/Topic 1:Selection of construction materials

A. Identification of rabbit hutch construction material

The materials used in construction would usually be locally available materials such as interwoven branches, split bamboo, mud, tin, plastic, wooden, metallic. If possible, a fence should be built around outdoor hutches and fitted with a padlock gate.

B. General requirement of rabbit hutch construction materials

Availability and cost are the most important criteria in deciding what to use. A wide range of materials can be used for construction.

B.1.The Roof

For the small rabbitry a thatched roof is appropriate. Although thatch does not last so long as certain other materials, such as corrugated iron, it has much better insulating properties against heat and cold. If the roof is properly made it should keep out the rain for several seasons. The initial work and subsequent maintenance of thatch can become costly in the case of larger buildings and for these it may be better to use galvanised iron.

B.2.The Walls

The use of bricks made locally can help to keep down the cost of the building. In areas where there are forests, off cuts of wood can sometimes be obtained cheaply from 'saw mills' and may be used in place of brick for the walls. Those parts of the building where no solid wall is required may be left open partly covered by a variety of materials. Iron or wooden bars, spaced close enough, or diamond mesh, may deter thieves or larger predators.

B.3.The Door:

This may be constructed from materials which include sawn timber, off cuts, small bush poles, iron sheets, wire netting, bamboo etc.

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B.4. The Floor:

The provision of a concrete floor, while rather costly, has certain advantages in an enclosed or semi-enclosed building. The main advantage lies in being able to clean out and disinfect the building thoroughly. In the simplest designs the floor slopes gently towards the door. If a concrete floor cannot be provided, the earth floor should be rammed hard which will discourage rats from building nests.

• <u>Content/Topic 2:Selection of rabbit hutch tools and equipment</u> <u>A. Identification of rabbit hutch equipment</u>

The rabbit hutch equipment's are:

- Water trough
- Feeder
- Kindling (nest) box
- Forage / Roughage rack
- Wheelbarrow

B. General requirement of rabbit hutch equipment and tools

B.1.Water/Feeding Trough

The materials for water/feeding trough should provide the following;

- it should be impossible to tip over
- Deep enough to discourage scratching out of contents
- It must not cause injury to the rabbit
- It should not be expensive to prevent increase in cost of production

B.2. Roughage / Forage rack (it can be fitted inside or outside of the hutch)

- It must not limit feed intake
- It must contain fresh succulent forage

B.3.Nest boxes

This can be open or closed. An open top 12" x 18" x 10" plywood box works well. This comes in when the animal is about to kindle.

- It should not be placed until the animal is about to kindle
- It should be draught free/ proof
- It should prevent the young rabbits leaving until they are at least 2-3 weeks old.

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B.4.Maintenance of equipment

- Water and feeding trough must be washed regularly (daily)
- Use clean rag (cloth to dry the feeder
- Disinfection of the water and feeding trough at least once in a week with EDTA to remove feed adhered to feeder and prevent disease outbreak.
- Roughage rack and cage must be cleaned once in a week and disinfect when young ones are not there.
- Checking for the development of sharp edges in hutches and on equipment which may cause injury.
- Nest box must be removed after weaning (5-6 weeks), wash and disinfect in preparation for next breeding season.

Learning Unit 3 – Manage rabbit farming

LO 3.1 – Select rabbit breed

<u>Content/Topic 1:Selection criteria of rabbit breed</u>

A. Introduction

A breed is the outcome of the combined impact of artificial and natural selection (environmental adaptation). It is difficult to define exactly what a breed is and what it's back ground. Artificial selection may be based on a number of different criteria, not necessarily all to do with productivity. The breeding conditions may be either artificial or natural; the environment may gradually change and so on.

B. Selection criteria

Selection is defined as the process of allowing certain animals to be parents of future generation. The selection aims at preserving the good traits in animal breeds and eliminating bad ones. This is accomplished by studying the production and reproduction records of the rabbit to be selected

The goal for keeping animals is to produce animal products needed by man in order to provide him with the basic needs of food and shelter. To achieve this goal, every farmer must first have good quality animals, and second, he must feed them well, manage them properly and keep them healthy. Once these conditions are met, then he can to get animal products from his animal.

For selection to be carried out effectively, the farmer should consider the following:

B.1.Productivity of parents:

Select rabbits whose parents are good producers of meat, milk

B.2.Adaptability:

Rabbits chosen should be able to adapt to environmental conditions without losing weight.

B.3. Age:

Select rabbits which are still young but have attained sexual maturity. Avoid old animals as their productivity level decreases with increasing age, young rabbits can stay in production for a long time.

B.4. Physical appearance:

Rabbits chosen should conform to the characteristics of either doe or buck.

B.5. Feed conversion rate:

Chosen rabbits should not have the ability to change food eaten into useful products.

B.6. Health status:

Rabbits chosen should not have health problems. When selecting rabbits avoid those whose parents have inheritable diseases? signs of a healthy animal: Active, alert and sociable, Eats and drinks regularly, Healthy fur and clear eyes Breathing is clear and walks, normally, Communicates by making soft noises

B.7. Resistance against diseases:

Rabbits which show resistance to common diseases should be selected. This enables them to survive in case there is an outbreak.

B.8. Productivity

It is defined as the number of young per doe per unit of time, depends on: the interval between successive kindling; litter size at birth; and the survival rate of the young.

B.9. Maturity period

Select rabbit animals which have a high growth rate. This means that they can reach the production or breeding stage quickly. This will contribute to an increase in the number of animals on the farm.

B.10. Fecundity

Rabbit chosen should calve down easily and regularly.

• Fecundity rate = $\frac{number of newborns}{number of mated female inherd}$

B.11. Temperament

Rabbits are quiet, friendly, playful pets if treated correctly. They are social, but not all rabbits enjoy being handled. Before housing rabbits together, they should be carefully assessed for compatibility. Rabbits are most active at dawn and dusk.

• <u>Content/Topic 2:Method of selection</u>

Before selection is carried out effectively, one should consider the effects of genes on inheritance and environmental influence on the characteristics of individual animals. This greatly determines the methods of selection to be use.

A. Method of selection

A.1. Mass selection

Selection based on gene influence, for example: skin color/color coat, other than environmental is carried out using mass selection method. Mass selection is the choosing of individual purely on the basis of their external appearance and allowing them to mate randomly. This is the most reliable and efficient method when considering inheritable characteristics.

A.2.Selection on descent with pedigree/Pedigree selection

This method is based on performance of the parents (ancestors). This requires presence of well-kept records. It is a useful method when the animal to assess is too young or the traits under investigation are sex-linked.

A.3.Selection on offspring/Progeny testing

This is the same as performance testing. An animal is evaluated on the performance of its offspring after which it is selected or rejected. It is common when selecting breeding bulls. It is valuable when considering traits/ characteristics like milk production which cannot see in buck.

A.4.Collateral relative selection

This method of selection is based on the performance of many animals that are closely related. It should be used traits/ characteristics that are highly inherited and when there is limited interval between generations (very close animal).

LO 3.2 – Apply rabbit rearing techniques

<u>Content/Topic 1:General conditions for rabbit rearing and rearing system</u>

The way breeding and husbandry methods have evolved in different countries shows that any method can have both positive and negative consequences. Age at weaning is undoubtedly the most important variable. Intensified production has led some breeders to opt for a highly accelerated mating calendar for moving the females very often. Raising rabbits in groups, as is done in the big European producer countries, considerably modifies rabbit pathology.

A. General conditions for rabbit rearing

A.1. Temperature:

Like any other warm-blooded animal, temperature plays a critical role in survival. The normal body temperature of a rabbit is slightly elevated to that of a human, ranging from 102-103°F. But because of their furry coats and inability to sweat, they prefer cooler temperatures in the mid to low sixties to really feel most comfortable and thrive. Rabbits are warm-blooded animals.

A.2. Ventilation

The rabbitry must have a certain minimum of ventilation to evacuate the harmful gases given off by the rabbits (CO₂), to renew the oxygen and get rid of excess humidity (evaporation, exhalation) and excess heat given off by the rabbits.

A.3.Noise and vibration

Animal building must not be built in the areas dominated by too heavy noise for example machines and other noising activities.

A.4.Light

The direction the building will face towards or away from sunlight (the hot rays of the sun should not come into the house) at different times of the day and during different seasons.

A.5.Orientation

In choosing the site for building it is necessary to consider the direction of prevailing wind. The back wall should face the wind unless special ventilation is required. It ensures the circulation fresh air in room. The ventilation play important role in thermal regulation. The ventilation can be natural or artificial.

B. Rearing system

B.1. Intensive production

In intensive where weaning takes place at one month, the fattening period is seven weeks. The rabbits weigh 2.3 to 2.4 kg (live weight) when they are ready for the market. Some African breeding units where weaning takes place at two months are reported to need a four-month

fattening period, because balanced feeds are not available. European and North American countries which market rabbits at live weights of 1.7 to 1.8 kg use a different system.

B.2. Semi-intensive system

The does are first presented to the buck at four and a half months. They are then mated 10 to 12 days after the birth of each litter. Weaning takes place at 30 to 35, or even 37 to 38 days. Many European breeders (France, Italy, and Spain) used to practise the intensive system: mating does within 48 hours of kindling and weaning the young at 26 to 28 days.

B.3.Extensive systems

In extensive system are characterized by a long delay between kindling and mating, and perhaps even until weaning. For example, the young may be weaned at 56 days and the doe mated after weaning. At weaning the young are separated from the doe. The duration of fattening varies, depending on the carcass weight required and the growth rate possible in the feeding and production conditions of the rabbit.

<u>Content/Topic 2: Rabbit handling, sexing and identification techniques</u>

A. Rabbit handling methods

Rabbits should be handled gently. They should be lifted by their ears as little as possible. Several techniques can be used to pick them up and hold them. A rabbit can always be picked up by the skin of the back. For animals weighing less than one kilogram, one method is to pick them up and carry them by the saddle just above the hindquarters, using thumb and index finger. If the animals are heavier it is best to take them by the skin of the back, but if they have to be transported or shifted for more than five or ten seconds they must either be supported with the other hand or be carried on the fore arm with the head in the bend of the elbow.

Correct way to pick up a rabbit



Figure 16: correct way to pick up a rabbit



The animal is grasped by the back at the hounches.

Figure 17: Holding a young rabbit head down

B. Rabbit sexing

The sexing of very young animals is not so easy. The older males have two big testes. If only one testis shows do not use him for breeding even though he is fertile, because it is a hereditary defect. If you are still not sure, which is often the case with young rabbits, hold the rabbit on its back, put one finger on the tail side of the genital apparatus and one on the abdominal side.

Press down gently and stretch the organ; if it is a doe a long slit will appear, if it is a buck a small curved penis will show. Do not confuse two small glands about the size of a pinhead on either side of the sexual organ with the testes. Buying rabbits, sexing and judging their quality can only be learned by making mistakes first and thereby gathering experience. However, it is by no means an impossible or difficult task.

Kits are best sexed at birth or at weaning (5-8 weeks of age). In between those times it can be difficult to exteriorize the genitalia. Sexing is performed by gentle pressure on the genital orifice which shows the penis or vulva. The male has a cylindrical organ with a rounded to oval-shaped urethral opening. The female vulva has a leaf-like appearance with a slit-like opening. In

the male the testicles descend at around 12-14 weeks of age and can be palpated, although they can be retracted into the abdomen if the rabbit is stressed



Rabbit Genitalia: A: Young Buck, B: Adult Buck, C: Young Doe, D: Adult Doe (Photos: Wayne Niles)

Figure 18: Rabbit sexing

C. Identification methods

Proper identification of rabbit is essential for the maintenance of systematic farm records, feeding of required quantity of nutrients, better management practices and individual care of the rabbit. It is also an essential requirement for the registration of pure-bred animals and to make selections of breeding stock and sale rabbit. The common identification methods used in rabbit are ear tags, ear notching and tattooing.

C.1. Ear tag

Breeders have the habit of marking their animals with tags or rings. A ring is used and pushed along the hind limb of a rabbit, when it is still young. In some countries, it is also permitted to use tags that are "punched" though the ear of the rabbit. Ear tags must also be removed from the ear, as they can tear out the ear when the rabbit scratches itself or after it gets caught between the bars of a cage.

C.2. Tattooing

If you use blackboard paint you can use regular chalk, which later can be cleaned and used again once you have shifted the data to the special book. Every time you move the rabbit to another hutch, the identification tag accompanies him or her, with the risk of getting confused! The best system is to use a tattoo with which numbers are punched in the ear. This number can also be written on the tag outside the door. If you don't have too many rabbits it is easy enough to identify them individually especially if you have spotted animals. A simple drawing of each animal can help you to identify them.



Figure 19: Rabbit ear tattooing

C.3. Ear notching

Ear notching is done on new born baby rabbit for the purpose of identification. The rabbit's right ear is used for the litter number. All rabbits in the same litter should have the same ear notch in the right ear. The rabbit's left ear is used to show individual identification for each rabbit in the litter. Every rabbit in the litter will have a different notch number in the left ear. Ear notches are read with the litter number (right ear) first followed by the individual identification number (left ear) read second.

The following are some of the reasons for ear notching:

- ✓ A permanent ID system
- ✓ Individual identity for all animals
- ✓ Inexpensive means of identification
- ✓ Enables producers to keep an accurate set of records
- Equipment needed for ear notching:
 - ✓ Notchers
 - ✓ Disinfectant



Figure 21: Ear notchers

LO 3.3 – Perform rabbit feeding

<u>Content/Topic 1:Rabbit digestion particularity and Rabbit feed stuffs distribution</u>

A. Introduction

Just like people, bunnies enjoy a good meal. A nice mix of hay, vegetables, pellets, as well as fresh water will make your rabbit healthy and happy. Fresh hay should make up the bulk of



Figure 20: Ear notching

your rabbit's diet and needs to be readily available at all times. Adult rabbits can eat timothy, grass, and oat hays, while younger rabbits should be fed alfalfa. Alfalfa should not be given to adult rabbits because of the higher protein and sugar content. A varied assortment of vegetables should be a part of your rabbit's daily diet. When choosing vegetables look for something fresh and free of pesticides. Do not feed rabbits the leaves from houseplants as many are poisonous to rabbits.

B. Particularity of rabbit digestion



Figure 22: Rabbit digestive system

As total herbivores, rabbits have an extremely long digestive tract in order to process their food in the most efficient way. The whole of a rabbit anatomy has evolved to survive on a very poor diet, the digestive tract especially. A special feature of the process, known as **caecotrophy**, is a remarkable way the rabbit 'recycles' waste faecal matter in order to extract any nutrients that may have been missed on the first, second or even third time round in the digestion system.

Caecotrophy, commonly known as **coprophagy**, is a specialized digestive strategy common in the Mammalian order Lagomorpha (rabbits, hares and pikas) and some species of rodents. Caecotrophy plays a central role in digestive physiology and consequently well-defined rhythmical patterns of feeding and excretion have been shown to occur. It is the ingestion of specially produced soft faecal pellets, which are usually produced at night in the domestic rabbit. It is thus advisable to include a minimum of roughage in the feed, enabling the rabbit's digestive process to be completed fairly rapidly. In theory, roughage is provided by the crude-fibre content of the feed, as this is normally rather hard to digest. However, certain fibre sources (beetroot pulp, fruit pulp in general) are highly digestible (digestibility of crude fibre varies from 60 to 80 per cent).

B.1.The Benefits of Caecotrophy:

Caecotrophy in small herbivorous mammals is considered an adaptation to the metabolic disadvantage of small body size, especially when feeding on low quality diets. The rapid metabolic rate of small herbivores requires that energy has to be extracted rapidly and food should not be retained in the gastrointestinal tract for long periods.

C. Rabbit feed stuffs distribution

Proper feeding will influence the rabbit's growth, fertility and health. Some feedstuffs contain a lot of protein (especially fresh greens), some are sources of energy (like rice bran, tubers, etc.). Both protein and energy, as well as minerals are of importance.

C.1.Protein level

The protein level of the feed is very important for growing and body building.

C.2.Carbohydrates and Fats

Carbohydrate and fats provide energy. Rabbit needs energy for contraction of muscles which enable the rabbit to move. It is also used to join substance together to build up the rabbit's body and to make products such as hair and milk. Rabbit adjusts their food intake to satisfy their energy requirements.

C.3.Minerals

Most of the minerals in the rabbit's body are in the bones and teeth which contain large amounts of the two minerals; Calcium (Ca) and Phosphorus (P). These minerals help to give the bones their hardness. They are also involved in maintaining the acid-alkaline balance in the blood. Phosphorus also involves in energy transfer within the body cells. Ca, P and Vitamin D are often considered together because they interact with each other. Other minerals are Mg, Na, K and Cl (major minerals). Examples of trace minerals are Fe, Cu, S, Co, Zn, etc.

C.4.Vitamins

Vitamins are chemical that are require in very small amount to speed up chemical reactions within the rabbit body. The most important vitamins are vitamins A and D and the B vitamins, choline and Thiamine.

D.To feed properly the rabbit, it is better to start with:

D.1.Green grass

- Appetite fodder and forage:
- Vegetables such as carrots, sugar beet, manger beet, parsnip, swede, turnip, potato and other root vegetables
- Green leaves
- The waste skins or tops of vegetables from the kitchen
- Dry sunflower heads (the rabbit will eat the seed)
- Young branches from trees such as acacia
- Galisonga parviflora (kimali)
- Bidens pilosa (inyabarasanya)
- Bontrioclina ouagandandensis (igicumucumu)
- Grassocepharus bumbese (igifuraninda)
- Rubex bequaertii (igishikashike)

D.2.Toxic and poisonous plants are:

Table 1: Toxic and poisonous plant

Vernacular names	Scientific names
Ikibonobono	Ricinus communis
Umukoni	Sdynodenium umbellatum
Umuyenzi	Euphorbia tirucalii
Isogo	Solanum nigrum
Rwizilinga	Datura stramonium
Umwishywa	Memordia foetida

D.3.Cereals

- Grains such as oats, wheat, barley and maize
- Dry bread

• Bran mash (bran is produced from the milling of wheat or rice)

D.4.Kitchen waste

D.5.Agro-industrial by products

• Content/Topic 2: Feeding practices, watering and Teeth overgrowth control

A. Feeding practices

In modern production systems, which account for most of the output, the animals are given balanced pelleted feeds conforming to the standards already described. A single feed type is generally used for all categories, corresponding to the mixed feed. In intensive-reproduction rabbitries, all rabbits except bucks are fed ad libitum. Under less intensive regimes, does receive the same feed ration from the weaning of one litter to the birth of the next. The ration is normally 3 to 35 g DM per kg of live weight per day.

The amount of feed to give a rabbit depends very much on the state of production. A lactating mother needs a lot of concentrate feed (grain, tubers) besides greens, to maintain her bodyweight and produce milk for her young. Young rabbits also need some concentrated feed for growing, as we have seen recently in a simple experiment. We had four groups of six animals each that were just weaned. One group received grass only (of doubtful quality) and all the rabbits died.

Breeders calculate the quantities of feed for total daily consumption for all animals as follows:

- young fattening rabbits (four to 11 weeks): 110 to 130 g
- lactating does with litters (weaning at four weeks): 350 to 380 g
- adult (maintenance) rabbits: 120 g;
- for the rabbitry as a whole: 1 to 1.4 kg of feed per mother cage per day

Table 2: Recommended chemical composition of feeds for intensively reared rabbit ofdifferent categories

Components of feed, assumed to	Young rabbit (4	Lactating	Peri-	Mixed (maternity
contain 89 per cent dry matter	to 12 weeks)	doe	weaning	+ fattening)
Crude proteins (%)	16	18	15	17
Digestible proteins (%)	11.5	13.3	10.8	12.4
Amino acids				

Methionine + cystine(%)	0.60	0.60	0.55	0.60
Lysine (%)	0.70	0.90	0.65	0.70
Tryptophane(%)	0.13	0.20	0.12	0.13
Energy and bulk				
Digestible energy (kcal/kg)	2500	2650	2400	2550
Metabolizable energy (kcal/kg)	2380	2520	2280	2420
Fats (%)	3-5	4-5	3	3-4
Indigestible crude fibre (%)	12	10	14	12
Ratio digestible proteins/digestible energy (g/1000 kcal)	45	51	46	48
Minerals		·	·	
Calcium (%)	0.40	1.20	1.00	1.10
Phosphorus (%)	0.30	0.50	0.50	0.60
Sodium (%)	0.30	0.30	0.30	0.30
Chlorine (%)	0.30	0.30	0.30	0.30

B. Watering of rabbit

A supply of drinking water is necessary at all times. A suitable water drinker can be made from any plastic bottle. Make one or two holes in the bottom of the cleaned bottle, fill it with water and screw on the top. Place this in a shallow container. This could be used for water for chickens too.

Water for rabbits



Figure 23: Watering of rabbit

C. Overgrown nails and teeth

- **Nails**: the rabbit's nails grow continuously and can sometimes become overgrown. They can be clipped back using nail clippers or pliers. Do not cut too close to the foot.
- **Teeth**: rabbits have four front teeth in the upper jaw and two in the lower jaw. The teeth grow continuously but as the animal eats they are worn down. Sometimes the lower and upper teeth do not meet when the mouth is shut. The teeth in this case do not wear down. You will need to cut them with a wire cutter or pair of pliers. The upper and lower incisors work like that of chisel.
- Wood sticks, concrete bricks can be also used to prevent teeth overgrowth. These can grow 10-12 centimeters per year and rabbits must be given twigs to gnaw on so that they can wear these teeth down. Eating problems and health issues may arise when the teeth don't align.



Figure 24: Checking teeth and clipping nails

Content/Topic 3: Feeding record keeping

Feeding record should include the type and the amount of feed being given to each animal. The record should also track the overall feed costs of the rabbitry. For rabbit farmers who wish to prepare their own rabbit feed pellets, the following formula is suggested:

✓ Greens and grasses 70%

- ✓ Carbohydrate 15%
- ✓ Protein or fish meal 10%
- ✓ Other ingredients including minerals 5%

Table 3: Feeding record card

Barn no Breed

Month.....

Daily feed	Other feed item	production	Other information
ration			
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Days	1 ^s	2 nd	3 rd	hay	succule	salt	Miner	Other	Beddin	rabb	fiber	Anima	health	not
	t				nt		al	feed	g	it		 name		e
									nesting			name		
1														
2														
3														
30														
s/tota														
1														

Total weight	
Total feed	

Other notes

Adı	ult		Kits	Total		
Male	Female	Male	Female	Male	Female	

LO 3.4. Manage rabbit reproduction

• Content/Topic 1:Selecting buck and doe for breeding

Rabbit breeds of medium size are sexually mature at 4–4.5 months, giant breeds at 6–9 months, and small breeds (e.g., the Polish Dwarf and Dutch) at 3.5–4 months of age. The rabbit is an induced ovulates and, contrary to popular belief, has a cycle of mating receptivity; rabbits are receptive to mating 14 of every 16 days.

A. Selecting buck and doe for breeding

The male rabbit is known as the buck. The penis has a rounded penile sheath and urethra. It can be easily extruded in rabbits over 2 months of age. The rabbit has two testes that descend at approximately 12 weeks of age. These testes are large with epididymal fat pads. In the adult male they lie in two almost hairless scrotal sacs which are cranial to the penis (in the majority

of placental mammals they lie caudal to the penis). The inguinal canal remains open throughout life.

The sexing of very young animals is not so easy. The older males have two big testes. If only one testis shows do not use him for breeding even though he is fertile, because it is a hereditary defect. If you are still not sure, which is often the case with young rabbits, hold the rabbit on its back, put one finger on the tail side of the genital apparatus and one on the abdominal side. Press down gently and stretch the organ; if it is a doe a long slit will appear, if it is a buck a small curved penis will show. Do not confuse two small glands about the Size of a pinhead.

B.The selection criteria for breeding does and bucks are:

- ✓ Good health
- ✓ Average litter size (8 or more)
- ✓ Death rate (not over 5%)
- ✓ Per cent conception (90% or better)
- ✓ Dressing percentage (55-60% including heart, liver and kidneys)
- ✓ Select rabbit based on the feeding style/system.
- ✓ Number of teats Live weight of rabbit(She should have at least eight teats)
- ✓ High feed conversion ratio(2.5 kg body weight)
- ✓ Easy to handle
- ✓ Mating age (7-9 months)
- ✓ For male number testicles(presence of two visible and developed testicles)
- <u>Content/Topic 2: management of buck, doe and young females, pregnant rabbit and</u> kindles

A. Management of buck

A.1.Puberty time:

Rabbit breeds of medium size are sexually mature at 4–4.5 months, giant breeds at 6–9 months, and small breeds (e.g., the Polish Dwarf and Dutch) at 3.5–4 months of age.

A.2. Mating:

A buck develops its breeding capabilities at the age of 8 months. A young buck may be allowed to mate one doe at an interval of 3 to 4 days. But, from 12 months of age onwards it may mate 4-6 does in 7 days.

A.3. Mating ratio:

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Young males should not be mated too frequently One suggested schedule when first breeding young males is to use them once a day up to 2-3 times per week. An older male can be used 5 - 7 times per day, after which a 5 - 7 day rest period must follow in order for the rabbit to rest and be able to successfully mate in the future.

A ratio of 1 buck to 10 does is common practice, but many commercial growers find that 1 buck to 20–25 does is more economical.

A.4. Culling:

The male rabbit is known as buck. A buck develops its breeding capabilities at the age of 8 months. An ideal buck should continue to maintain its reproductive ability at least for 2 to 3 years. A buck beyond 6 years of age should be culled since semen quality declines.

Cause of mating problem: more frequent use of buck, mating in hottest time, to take buck in doe's cage (Always bring the doe to the buck and not the other way round. If you put the buck in the hutch of the doe she is liable to defend her territory and fighting can start), Do not leave the doe with the buck overnight or for a few days. You will not know then whether mating actually took place, fighting might injure either the doe or the buck and stress will be the result. Instead keep watching the mating without disturbing it.

B. Management of doe and young female

B.1.Puberty and Sexual Maturity

The age of sexual maturity varies with breed:

- Small breeds mature at ~5 months
- Larger breeds mature as late at as 8 months.

B.2.Mating:

Servicing is always done in the buck's cage. The breeder checks the doe's health at this time to make sure she has no respiratory disorder, sore hocks, etc., or that she is not too thin. A red vulva is a promising but not infallible sign (80 to 90 percent chance of mating success). A buck can fertilize a doe with a white vulva, but the success rate is only 10 to 20 percent. When the doe has accepted mounting and the buck has serviced her, the breeder removes the doe and puts her back in her own cage. All together this should not take more than five minutes.

Always bring the doe to the buck and not the other way round. If you put the buck in the hutch of the doe she is liable to defend her territory and fighting can start.

B.3.Kindling interval

It is interval between two kindling,2 months (it may be as short as one month if bred immediately following kindling

B.4.Culling time

A doe can be used for breeding up to the age of 3 years and culling should be made afterwards and this also can be done before this time because of disease, death, lack of milk, bad behavior.

B.5.Rabbit reproduction cycle

Polyestrous, a female rabbit appears to have no definite estrus cycle although a certain rhythm exists in their sexual receptivity. Cycle lasts for about 12 days of which 4 are infertile.

B.6.Heat induction methods

Ovulation occurs 10-13 hours after copulation - reflex

ovulation.it is simply to mate doe with male for inducing heat or Ovulation can also be induced through mechanical stimulation of vagina.

B.7.Heat detection

Congested, purple and moist vulva, restlessness, rubbing the chin on the sides of the cage, lying in mating posture and lifting the tail.

Signs of successful mating: If the does is ready to be mated she will stand still within a few seconds, stretch out and slightly raise her hindquarter so as to allow the buck to mount and mate. Successful mating is signaled by the buck thrusting forward and literally falling off the doe. Often the buck makes a characteristics cry of pain or joy. If the buck slides backwards off the doe and does not fall the mating has not taken place.

<u>Content/Topic 4:Management of pregnant rabbit and kindles</u>

A. Gestation

The gestation (pregnancy) period in rabbit ranges from 28-32 days (approximately 30 days). The nest box is to be kept within the cage to facilitate the doe for preparing bedding for the new born. The nest is to be provided at least 5-6 days before parturition. The nest box should contain nesting materials like straw, grass, wood savings etc. Saw dust should not be used as bedding material. A doe may pull out some of her own hairs to make nest for litters. Adequate measures should be taken concerning feeding and management during pregnancy period. Quantity of feed should be increased for 10 to 15 days of pregnancy. Plenty of fresh water should be provided. Environmental stresses should be avoided as far as possible.

B. Pregnancy can be detected by various methods:

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- Through palpation of abdomen by which embryos can be felt by hand. This is best done at about two weeks after mating. This technique can be perfectly done through experience.
- Placing the buck near the doe for mating. A buck may not mate the pregnant one.
- Uterine swelling-uterus may swell up to 12 mm at 9 days after mating. It may reach 20 mm at 13 days. Only experienced keeper may be able to predict the changes accurately.
- Changes in body weight-There are significant change in body weight from mating up to 30 days. Average gain of around 300-400 gm has been suggested from mating to 30 days in large sized rabbit.

B.1. Pseudo-Pregnancy Test

False pregnancy occurs as a result of sterile mating or more commonly from stimulation of one doe riding another. It happens more frequently with does that have not kindled their first litter. Always separate does at least a month prior to breeding. Does must be separated at least 18-20 days before mating. The doe may pull fur and attempt to make a nest but she will not keep it clean.

C. Kindling and mother care

Process of giving birth of new baby of rabbit is known as kindling. It is a natural physiological phenomenon. The parturition very often takes place at late night or early morning. It may not require any interference by the keeper. The process usually completes within 7-30 minutes. Sometime all the litters may not be born on succession. Some may born after several hours or a day

When the doe is almost ready for kindling (about 4 weeks after mating) you can put a nest box in the maternity cage. Kindling can then take place in this nest box. The nests should be checked as soon as possible after kindling. This operation is easy and there is no risk to the young. It can be performed right after kindling, provided the mother is removed. The breeder should remove any dead animals and any foetal sacs the doe has not eaten

Following parturition the does used to lick the young and may eat the placenta. The baby rabbits will try to suckle the mother. If the number of litter is eight, all may be able to suckle since doe has eight teats. The baby rabbits those will be unable to suckle may turn weak and susceptible to diseases. Many of them may even die prematurely. The does should not be disturbed during this time and be fed ad libitum. Adequate food and water should be provided so that optimum amount of milk is available to the baby rabbits. Rabbit used to nurse her young usually at night or early morning only for once. 6-12 baby kids may be barn from a single kindling.



Figure 25: Kindling and mother care

D. Fostering

- Fostering means getting a doe to accept rabbit(s) from another litter.
 - Guidelines for carrying out fostering are as follows:
 - ✓ Mate does on the same day
 - \checkmark The litters involved should be born within 3-4 days of each other.
 - ✓ Only foster rabbits that are less than five days old.
 - ✓ Remove both the foster doe and the donor doe from their hutches.
 - Carefully remove the rabbits to be fostered from their nest with the minimum of disturbance and without touching any of the rabbis that are not being fostered; return the donor doe.
 - ✓ Introduce the rabbits to be fostered, disturbing the foster nest as little as possible.
 - Leave the newly mixed rabbits for a few hours so that they all take on the same smell
 - Return the recipient doe to the hutch while at the same time giving her some food which you know she likes.

E. Weaning

• Immediately following birth baby rabbits are solely dependent on their mother.

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- They are born naked. But at about 7 days, there is growth of hair and vitality of them.
- The eyes used to open after 10 days.
- The baby rabbits can lead their lives without mothers' milk at about 21 days of age.
- The young should be removed from their mother not before 4th week.
- The doe should be removed from the cage.
- Foods like concentrates and grasses should be provided.
- The baby rabbits can chew and eat after 3 weeks of age.
- The does can be rebred provided the physical conditions of them are satisfactory in nature after one week of kindling.

F. Castration

The male animal castration is one of the means used in different species to improve meat qualities (beef, pork...). In most species, this removal causes a mass increase of the fatty tissues, the quantity of intramuscular lipids and, to the final, the meat tenderness and the juiciness. The meat of rabbit is sometimes judged too dry by consumers also the increase of the quantity of intramuscular lipids is one of the criteria searched.

F.1. Castration techniques and constraints:

- Surgery can be as safe on rabbits as on any animal. Unfortunately, the vast majority of veterinarians aren't experienced with safe rabbit surgery techniques.
- ✓ Females can be spayed as soon as they sexually mature, usually around 4 months of age, but many veterinarians prefer to wait until they are 6 months old, as surgery is riskier on a younger rabbit.
- Males can be neutered as soon as the testicles descend, usually around 3-1/2 months of age.

<u>Content/Topic 5:Rabbit genetic improvement</u>

A. Cross-breeding

Cross breeding makes possible the optimum use of the nicking ability of the breeds or populations crossed. Nicking ability concerns the two groups of characters from the mother and her young which contribute to the quantity of rabbit meat produced by the doe. In crossbreeding this ability is aimed at bringing together either the overall characters relative to the mother and the offspring, or a favorable combination of additive effects on the components of an overall character **Heterosis** may be defined as better breeding performances of crossed rabbit than that obtainable with the average of the two pure parent breeds. Heterosis may apply to the young rabbit (its viability, for example), the crossed doe (fertility, milk production) or the crossed buck (vigour, sexual urge, fertility). Characters subject to dominance, such as reproduction characters, are those most likely to benefit from Heterosis.

Heterosis may occur where the populations crossed differ genetically, which is not always revealed by a phenotypic study of the pure breeds or populations. The crossed rabbit are always more heterotic than the animals of the two parent populations and this implies greater adaptability to variable and difficult environmental conditions. Crossing can therefore be useful in improving rabbit breeding in developing countries, but crossing trials must be planned. Where local populations exist their use is recommended.

A.1. Crossbreeding systems

- Simple or 2-breed crossing. Females of a local population, or breed A. will be crossed with males of breed C to improve the growth and muscular development of young meat rabbits and for a heterotic effect on the numerical productivity of does(up grading). Using this system the breeder can cross the pure breed A with part of his stock (perhaps 20 per cent) for self-renewal of the female stock. The other females will be terminally crossed with C males. This can be obtained from another breeder. All the progeny of this cross are destined for the butcher.
- **Two-stage or 3-breed crossing**. Breeding animals of 2 populations (A and B) will be crossed to get an AB crossed female for terminal crossing with males of breed C. The first crossing might be between B males of a good breed for size. Fertility and maternal performance with females of a local A population. Using this system the breeder must rely on breeders or multipliers for female AB breeding animals and C sires which demands careful timing and organization.

The system can be elaborated by the use of C sires which have themselves been crossed according to a system widely used in poultry breeding.

• Rotating and alternative crossbreeding. Using several breeds and local populations for improvement, such as A, B and C, the breeder can apply the following system:

The advantage of this system is that it offers both Heterosis and nicking ability, and the breeder can himself produce his female replacement stock; only the male breeding animals need to he acquired elsewhere. When this system is used with only 2 breeds it is called alternative crossbreeding. Systems 1 and 3, in which the breeder acquires male breeding animals for stock improvement but can select females from his own rabbitry, are well adapted to small-scale production.

• Synthetic strains

The A B crossing produces an F. generation, which is crossed F. x F. to produce F2, followed by F. and so on. A synthetic strain can thus be constituted which enjoys the nicking ability of the two A and B populations and half the initial heterosis. A synthetic strain can also be established from more than 2 breeds. This system is recommended for improving local populations.

B. Selection

A selection unit must be effective on two levels: breeding and production. The extra costs entailed in the technical side of the selection work should be borne by the group of breeders benefiting from the genetic improvement. There are several conceivable types of organization. The object of selection is to upgrade performance by enhancing an animal's genetic value where husbandry and feeding techniques permit expression of genetic value. In fact, breeding and feeding techniques must be improved at the same time as the genetic value. Crossbreeding should increase the annual output per doe and speed the growth rate for earlier slaughter and better carcass and meat quality.

<u>Content/Topic 6:Reproduction record keeping</u>

A. Why record keeping in rabbit farming?

The only way you can know how well you are doing in the rabbit business is to keep good records. If you keep good records then you can make sound management and business decisions. Good records let you know if you are making a profit, and they are necessary for income tax purposes.

Keep only necessary records. You can easily overburden yourself with record keeping. Decide what records you need and then keep them daily.

B. Listed below are some basic records you need to keep

- Breeding records date bred and buck used
- Kindling dates and number born, dead and alive
- Number and weight of weaned rabbits
- Average weight at market time and age of fryers at that weight
- Expenditures (including utilities)
- Sales

You should design your own record cards to meet your needs.

C. Sample Records

C.1.Buck Breeding Record

Table 4: Buck breeding record

Ear#							Sire
Born							Dam
Sire Pe	erformance	5					
				Fertility		Mortality	Litter Growth
							Total Liter
Dee	C	Data	C	NL	NL select		
Doe	Cage	Date	Conception	Number	Number	Number of Kits	Weight at
Doe	Location	of	Score*	Born	Born	That Died from	Weight at 56 Days of
Doe	Location	of Service	Conception Score*	Born	Number Born Alive	That Died from 1 to 56 Days	Weight at 56 Days of Age
Doe	Location	of Service	Score*	Born	Born Alive	That Died from 1 to 56 Days	Weight at 56 Days of Age
Doe	Location	of Service	Score*	Born	Number Born Alive	Number of Kits That Died from 1 to 56 Days	Weight at 56 Days of Age

*Conception score: 0 = Infertile mating: 1 = fertile mating.

An example of a buck performance record sheet.

C.2. Doe Breeding Record

Table 5: Doe breeding record

Ear#			Cage Loc	ation		Sire					
Born						Dam					
Dam F	Dam Performance										
		Fertility				Litter Growth					
Buck	Service	Conception	ption Date Litter Litte			21-Day Litter	56-Day Litter				
	Date	Score*	Kindled	Size Born	Born Alive	Milk Weight	Market Weight				

*Conception score: 0 = infertile mating; 1 = fertile mating.

Table 6: Doe performance record sheet

RABBIT CAGE RECORD CARD												
NAME OR EAR NO. BORN				3ORN CAGE I			NO.					
SIRE						DAM						
SERVED BY	DATE	TESTED	KINDLED	NUMBER OF YOUNG					JRS. SAV	/ED	WEIGHT	REMARKS
				BORN	LEFT	AD	DEDRAISED	DIED	BUCKS	DOES		

Table 7: Rabbit cage record card

RABBIT CAGE RECORD CARD											
EAR NO								CAGE NO.			
BORN			SIRE	SIRE DAM WEIG			WEIGHT 2	HT 2 MOS.			
DOE	DATE	LITTER	WEIGHT	JRS. SA	VED	DOE	DATE	LITTER	WEIGHT	JRS. SA	VED
SERVED		SIZE				SERVED		SIZE			
				Bucks	Does					Bucks	Does

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Learning Unit 4 – Perform rabbit health and diseases control

LO 4.1 – Identify specific rabbit diseases

Content/Topic 1Specific infectious, parasitic diseases of rabbit

Disease is almost always the result of poor husbandry and environment coupled with the onslaught of a pathogenic agent - microbe, virus or parasite. The most common diseases of rabbits include digestive system problems, respiratory infections, and skin disorders.

A. Common parasitic and infectious rabbit diseases

✓ COMMThe following table summarises the common parasitic and infectious rabbit diseases.

Health	Symptoms	Cause	Treatment/control
problem			
Pasteurellosis	It appears in a number of	Bacteria :	Antibiotic, sanitation, isolated
	forms, including snuffles,	Pasteurella multocida	and keep dogs, cats, birds and
	pneumonia, pyometra,		rodents out of rabbitry
	orchitis, otitis media,		
	conjunctivitis,		
	subcutaneous abscesses		
	and septicemia		
Enteritis	Bloating and diarrhea,	No specific cause has been	Reducing stress and feeding an
	dead loss is often high	identified but stress combined	adequate amount of fiber in the
		with exposure to fecal-	diet helps prevent the
		contaminated feed and	condition.
		bedding contribute to	Antibiotics
		transmission of this disease	
Coccidiosis,	Diarrhea containing blood,	Coccidian-protozoan	Treat with coccidiostat.
intestinal	slow or no weight gain, or	Parasite infects intestinal tract	Practice good sanitation.
	loss of weight. may be	(Eimeria magna and E.irresidua	Prevent contamination of feed
	potbellied after recovery)	and water by faeces

Table 8: Common parasitic and infectious disease of rabbit

Coccidiosis,	Diarrhea, loss of appetite,	Coccidian-protozoan	Treat with coccidiostat.
liver	weight loss, and pot belly	Parasite infects liver (Eimeria	Practice good sanitation.
	may develop. Death may	steidae)	Prevent contamination of feed
	occur, with nodules on the		and water by faeces
	liver		
Ear mange	Scratching ears, shaking	Rabbit, goat, and cat ear mite	Swab ear with medication.
(canker)	head. Scabs at base of		Isolation. Treat entire herd with
	inner ear		medication once a month
Skin mange	Dry, scaly, irritated skin,	Mange mites (rabbit fur mite	Treat with miticides, isolate
	scratching, loss of fur on	and scabies or itch mite)	herd control rodents
	head, eras and heck		
Heat	Respiration rate becomes	High temperature often	Put animal affected in cool
prostration	rapid. Moisture around	accompanied by high humidity	place, keep animal cool with
	mouth and nose may		proper ventilation in buildings
	contain blood. Ears and		
	mouth become blue-		
	tinged. Prostration		
	followed by death		
Mastisis	Breasts become swollen,	Infection of beasts by bacteria	Treat with antibiotic. Sanitation
(blue breast)	feverish, turn black and	(usually staphylococcus or	and less concentrate in the diet
	purple. Abscesses may	streptococcus)	helps prevent
	form. Animal has fever		
Tapeworm	Mild cases: non symptoms	Larvae from cat or dog	No practical treatment. Prevent
larvae	Severe cases: diarrhea and	tapeworm. Infestation occurs	by keeping cats and dogs out of
	loss of weight.	when rabbit ingests feed or	rabbitry
		water contaminated by eggs or	
		tapeworm segments	

B. Nutritional diseases

B.1.Pregnancy toxemia

Also known as "ketosis," this disease is a toxemia of pregnancy that is most common in first-litter females. Signs of ketosis are dullness of the eyes, sluggishness, respiratory distress, prostration, and death after 1 to 4 days. The disease occurs in the last week of pregnancy and is

much more prevalent in obese animals. The probable major cause is starvation with subsequent metabolic effects on the doe and young. For some reason, there is a loss of appetite and failure to eat. This may be the result of minor digestive upset (hairballs in the stomach are common), an abrupt reduction in exercise, or a ration containing too little digestible carbohydrate. When carbohydrate energy declines, body fat is mobilized for energy, and ketone bodies are produced and enter the bloodstream. The liver becomes fatty and appears brown and soft. Birth of the litter or abortion is apt to be curative if either occurs shortly after the onset of signs. Injections of fluids containing glucose may reverse the breakdown of body fats and halt production of ketones. Junior does should not be too fat when bred for the first litter.

B.2.Vitamin A deficiency

Low-grade vitamin A deficiency adversely affects the reproductive performance of females, often before other signs are noted. Premature degeneration of the ovum and reduced numbers of fertilized ova result. Resorption of the fetus or abortion during late gestation also is noted. Rabbits born to females fed a diet deficient in vitamin A may be hydrocephalic at birth. Hydrocephalus, or "water on the brain," is characterized by distention of the portion of the skull that covers the brain. Cases may not be apparent because the young die soon after birth or are born dead. Animals that live show signs of nervous system involvement. Wryneck, loss of equilibrium, and incoordination persist for several days or weeks. Impaired coordination may pre-vent animals from eating, and eventually they die of starvation. Enlargement of the head is caused by increased pressure within the brain. On cut section, the ventricles (cavities) of the brain are greatly enlarged and filled with a clear, colourless fluid. Hydrocephalus is caused by low maternal blood levels of vitamin A throughout the gestation period. When maternal blood levels fall below 20 micro- grams (ug) per 100 ml serum, hydrocephalus appears in a large percentage of the young. Commercial diets, in general, supply adequate levels of vitamin A; however, the vitamin does deteriorate after prolonged storage of alfalfa hay. Low fertility, abortions, resorption, and hydrocephalus were seen in does given excessive vita- min A in the diet. Excess vitamin A may be a problem if a vitamin premix is added to rabbit diets containing high levels of alfalfa.

B.3.Vitamin E deficiency

Infant mortality, characterized by death of entire litters at 3 to 10 days of age without clinical signs prior to death, has been associated with vitamin E deficiency. Affected infants do not reveal any gross lesions of diagnostic significance. Producing females become less fertile as the Page **49** of **62**

deficiency progresses. The problem can be treated because adequate supplementation of vitamin E will stop infant mortality and correct infertility. Alfalfa hay is a suitable source of vitamin E in commercial rations, and 8–9 mg/100 grams (g) feed is adequate.

B.4.Colibacillosis

Dietary fibre is again an important factor. Colibacillosis develops when there is a deficiency in dietary fibre and the gut pH is altered. It consists of mild to severe yellow diarrhea, anorexia and fever. Colibacillosis is a form of enteritis caused when E. coli multiply in the altered gut environment. Colibacillosis is often seen with intestinal coccidiosis and the two pathogens produce a virulent synergy and are more lethal together than alone.

B.5.Cecal Impaction

Normal functioning of the rabbit cecum is dependent on dietary fibre. Without sufficient dietary fibre, the proximal colon absorbs too much liquid and this prevents digesta particles refluxing back to the cecum. This results in a loss of nourishment for the normal bacteria in the cecum and allows growth of opportunistic pathogens. Cecal impaction results when a decrease in dietary fibre increases retention time and there is a digesta build-up in cecum. The accumulated digesta is retained and a prolonged fermentation results that produces tympany (bloat). The pH of the cecum is also altered and destroys symbiotic bacteria and allows the growth of opportunistic pathogens like Clostridium spiriforme (Clostridium spiriforme proliferation) that result in enterotoxemia (carbohydrate overload of the hindgut or starch overload theory). Obese rabbits, often on high carbohydrate diets, often develop enterotoxemia because the excess carbohydrates in the cecum change the normal acidic pH (1 to 2) to an alkaline pH (6+) favourable to the development of Clostridia sp. and E. coli. Research indicates that adding probiotics to the rabbits drinking water may prevent the development of enterotoxemia

LO 4.2 – Apply hygiene and biosecurity measures

<u>Content/Topic 1: General rabbit hutch hygienic measures and Sanitization of rabbit</u> <u>hutch</u>

A. General rabbit hutch hygienic measures

After weaning, if straw litter is used, it should be kept clean and dry. The more animals per cage, the more difficult this is. In every type of production system weaning demands scrupulously clean, disinfected, dry cages. Weaning is one of the crucial moments in rabbit

production. Transporting the animals, mixing up litters and using questionable cages should be avoided. Successful production depends on the following details:

Cage and nest hygiene is particularly important while the does are nursing. In wire-mesh hutches the cage must be removed and cleaned after each kindling. In farm rabbitries the straw litter must be renewed often. After kindling, any stillborn young should be removed from the nest and the nest remade if necessary. Contrary to widespread belief, a doe will not abandon her young if they have been touched. It is only necessary to keep the doe out of the nest during the cleaning operation.

Disinfecting the rabbitry should be a routine matter, following some simple rules regarding cleanliness, dryness and disinfection. Dirty equipment cannot be disinfected. It must be washed first or, if water is short, carefully scraped and brushed. It must then be thoroughly dried as a first step towards disinfecting equipment.

B. Sanitization of rabbit hutch

No matter what precautions are taken, after one, two or three years health problems will become less and less easy to control. Imperceptibly, productivity will decrease despite an increase in hygiene and care and in the experience of the breeder. This has to do with the buildup of bacterial contamination in the rabbitry, coupled with the irreversible presence of harmful micro-flora and micro fauna in the animals.

Sanitary isolation becomes essential at this point. All rabbits in the affected section of the rabbitry must be culled. All equipment must be cleaned, repaired and disinfected. After this is done the area must be left vacant for some time (one or two weeks) before introducing new rabbits. Some small farm rabbitries have two premises which they alternate every year. This is a kind of one-year sanitary isolation which has proved very effective.

The common cause for spread of disease in rabbit is ascribed to improper sanitation. It is often noticed that the rabbit farmers ignore the basic principal of hygiene and sanitation. Adopting hygienic measure will not only minimize to the influences that deteriorates health but also ensures production of good quality rabbit:

Proper lighting and adequate ventilation: Sunlight is a priceless disinfectant if the surfaces are exposed to certain duration. The disinfectant property is due to ultraviolet rays. Therefore, a welllighted rabbit house is of great importance. Air circulation is vital which will prevent accumulation of moisture on wall and ceiling. Ammonia, carbon-di-oxide, hydrogen sulphide, methane and other harmful gases produced due to bacterial action in urine and excreta of pig is harmful to the health of both rabbit and the farmers. Proper ventilation with adequate air circulation will dilute the concentration of these gases.

B.1. Adequate drainage:

The rabbit manure, feed waste and other excreta should be disposed twice daily. A smooth and a wide gutter to hold the accumulated faecal matter is imperative for effective disposal. The floor must be made slop to facilitate drainage of liquid excreta. The feeding and watering trough should be so constructed that they may be easily cleaned and disinfected. However, it is important to fence the pit to prevent accidental fall of people and animals.

Proper cleaning: the wall of the rabbit sty should be smooth and corners rounded which will facilitate cleaning and disinfection. Sweep and scrub all feed trough and passages prior to application of disinfectant. All sweeping and scrubs should be burned. The walls and partition of the rabbits should be white washed containing a reliable disinfectant (0.5 kg of lime in one gallon of water plus the disinfectant). Abundant provision of clean water is essential for easy and effective cleaning. Cleaning should be followed by disinfectant all over the surfaces. Few readily available disinfectants are listed in the table.

B.2.Proper disposal of dead animals

Of all methods of disposal of dead animal, burial is most practicable for small operations. Burial site should be at least 100 m from any source of water used for domestic purpose. Mortalities must be covered with a minimum one meter (3 ft) of soil. Rabbit died of disease should be buried putting sufficient lime or washing soda. Disposal pits can also be easily built with solid walls and top but permeable base so carcasses can be added continually.

<u>Content/Topic 2: Biosecurity measures</u>

A. Biosecurity

Biosecurity refers to measures used to protect against the introduction and spread of diseases. Biosecurity is based on 2 main concepts: keeping disease out of the herd (exclusion) and preventing disease from spreading within the herd or to other herds (containment).

B. Elements of a comprehensive biosecurity protocol include:

- ensuring strict hygiene and sanitation procedures for all individuals who are in contact with rabbits
- wearing clean gloves or washing hands before handling rabbits
- changing, covering, or disinfecting footwear upon entering any facility housing rabbits
- allowing only necessary personnel in the rabbitry

- work flow and handling from the youngest to the oldest rabbits, and from the healthiest to the least healthy rabbits
- changing clothing when moving between sick and healthy animals
- minimizing movement of equipment between buildings
- avoiding contact with rabbits and personnel on other farms
- proper manure handling and storage
- excluding pets and pests from the barn
- separating rabbits from other farm animals on the farm
- sourcing rabbits from suppliers with herds of known health status
- Separating newly arrived or returning rabbits from the herd (to confirm the health of new arrivals prior to their introduction).
- Purchasing breeding rabbits from another farm brings a risk of introducing disease into the home herd.

C. Recommended practices

 develop and follow a biosecurity protocol in consultation with a veterinarian or other biosecurity expert

When acquiring replacement rabbits from another farm:

- source from a limited number of reputable farms
- source from farms that adhere to strict biosecurity and sanitation protocols and that have a similar health status as your farm (e.g. discuss health records, diseases present on the farm, and overall health management)
- Separate newly acquired rabbits from the herd for at least 14 days.

LO 4.3 – Apply Bio-chemical prevention measures

<u>Content/Topic 1: Selection of Bio-chemical prevention products</u>

The most extreme and safest way to prevent an infectious disease is by eradication of the pathogenic microbe. The use of antimicrobials is usually considered the method of choice to combat and decrease the number of pathogens. However, the associated risks and problems due to antibiotic resistance have highlighted the need for a change in attitude.

A. Bio-chemical prevention products selection

A.1.Vaccination

Rabbits need vaccinations to prevent/protect against myxomatosis and Rabbit (Viral) Haemorrhagic Disease which cause intense suffering to rabbits. We strongly recommend vaccinating all rabbits. Single vaccines against myxomatosis cannot be given simultaneously.

We routinely vaccinate rabbits once a year against myxomatosis and viral Haemorrhagic disease. These vaccinations used to be given separately, but there is now a combination vaccination available which only needs to be given once a year. We recommend a health check every 6 months for your rabbit, which is especially helpful for detecting dental disease early on. Vaccination is very successful; it can be done from 12-14 weeks of age. The vaccination is also safe for pregnant rabbits. A booster needs to be given every 12 months to ensure continued protection.

A.2.Antibiotic

There are plenty of antibiotics that rabbits are more likely to tolerate. Commonly prescribed antibiotics include enrofloxacin (brand name Baytril), trimethoprim sulfamethoxazole, c hloramphenicol, and metronidazole. Other safe oral antibiotics like doxycycline, azithromycin, or ciprofloxacin are sometimes given.

Vaccines: There are some nasty viruses out there that threaten pet rabbits; these include myxomatosis and both strains of rabbit haemorrhagic disease 1 & 2 (RHD1 & RHD2).

<u>Content/Topic 2: Establishment of prophylactic plan</u>

The word prevention has been constantly repeated throughout this chapter as essential for successful rabbit production. Careful hygiene is usually enough to prevent major disease crises. Preventive medicines (vaccinations, anticoccidiosis treatments, etc.) have been described. They are not widely used in rabbit production. The basic rules of preventive hygiene are now set down in detail.

A. Location and design of the rabbitry

It has been emphasized from the outset that rabbits must have an environment in which they do not constantly have to withstand external disturbances and aggression. The rabbitry should be located whenever possible far from such nuisances as noise and dust (dust carries microbes), sheltered from the prevailing winds and, in hot countries, shaded from the sun.

A.1.Constant hygiene

• Preventive hygiene

The rabbit's excitability is a contributing factor in illness. Casual visitors such as feed suppliers, rabbit buyers and other breeders (who are vectors of diseases from other rabbitries) should be barred. Rabbits should be protected against dogs, cats and small wild carnivores.

• Feed and water hygiene

Feed and water hygiene is basic as both can carry numerous agents of rabbit diseases (e.g. coccidiosis and worms). Feed should be stored out of the reach of domestic animals.

• Cage and nest hygiene

Cage and nest hygiene is particularly important while the does are nursing. In wire-mesh hutches the cage must be removed and cleaned after each kindling. In farm rabbitries the straw litter must be renewed often.

• Disinfecting

The literature covers this topic extensively, so the following will be brief. Disinfecting the rabbitry should be a routine matter, following some simple rules regarding cleanliness, dryness and disinfection. Dirty equipment cannot be disinfected. It must be washed first or, if water is short, carefully scraped and brushed. It must then be thoroughly dried as a first step towards disinfecting equipment.

• Occasional measure: sanitary isolation

No matter what precautions are taken, after one, two or three years health problems will become less and less easy to control. Imperceptibly, productivity will decrease despite an increase in hygiene and care and in the experience of the breeder. This has to do with the buildup of bacterial contamination in the rabbitry, coupled with the irreversible presence of harmful micro-flora and micro fauna in the animals.

<u>Content/Topic 2: Administration technics of bio-chemical prevention product</u>

A. Giving medicines to your rabbit

Effective administration of medicine is a key part of most veterinary treatments. In many cases Veterinary Nurses are responsible for administration of medicines to hospitalised patients. It is also important to ensure that you are able to continue medicine administration once your rabbit has been discharged from hospital. Veterinary Nurses may be able to demonstrate administration techniques to you when your rabbit is discharged.

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Figure 26: Administration of medicine

Medicine administration

To be most effective treatments have to be given regularly and for a sufficient length of time. If medicines are not given correctly active ingredients may be lost, or poorly absorbed, which reduces the dose that the patient receives. Always dispose of unused medications and consult your veterinary surgeon before giving your pet any new treatments.

A.1. There is two elements to medicine administration:

- ✓ Ensuring effective administration of treatment
- ✓ Ensuring safety of both the patient and the personnel involved in the procedure.

In almost all cases it is far easier to administer treatment effectively if there are 2 people to help one to restrain the rabbit and the other to give the treatment. However, it is possible for experienced owners to give medication by most routes to a reasonably co-operative patient.

B. Oral administration

Many medicines are designed to be given by mouth largely because this is a convenient route for owners to administer at home. Oral medicines can be given as tablets, capsules, liquids and pastes. Most medicines given by mouth enter the stomach but pass through into the intestine before they are absorbed into the blood. The presence of food in the stomach helps absorption of some drugs but prevents others from entering the body. The timing of administration of oral medication in relation to feeding can be critical. Oral administration of medication obviously involves dealing with the animal's mouth. This may be a real problem in aggressive patients and alternative routes of medicine administration should be used if there is a significant safety risk.

B.1. Tablets and capsules

Tablets are made from compacted, powdered drug (usually mixed with something like chalk to make the tablet the right size, and often with a flavour to make it more palatable). Capsules contain powdered drug inside a gelatine case once inside the gastrointestinal tract the gelatine dissolves to release the drug. Some tablets have special coatings to protect the drug from the action of stomach acids the coating is dissolved in the stomach and the drug released once the tablet is in the intestine.

Tablets are often put into food, but often the rabbit simply refuses to eat the food containing the tablet. The tablet can be hidden in a tasty morsel (or specially designed treat) and given to the animal to eat. This can work quite well but if an animal bites into the tablet they are likely to spit it out and will be reluctant to be fooled by the same trick again. It is far more effective to give the tablet by hand (see section Administration of tablets below) so that you can be sure the rabbit is receiving its medication regularly. It is becoming a less popular route of administration – most treatments are now available in liquid form.

B.2. Pastes

Drugs mixed into pastes can be particularly useful for use in rabbits. The sticky paste is smeared onto the tongue and the rabbit is unable to spit it out so has no alternative but to swallow. Some of these medications can be smeared onto an area of fur for the rabbit to lick off while grooming.

B.3. Liquid formulation

Liquids can be very tricky to administer effectively to rabbits unless they can be mixed with food. If they are mixed with food it is important to ensure that the medicine is thoroughly mixed in and that the patient eats all the food containing the medication. The best way to achieve this is by adding the medication to a small amount of food to ensure it is eaten and then give the rest of the diet but as rabbits are all-day browsers you cannot easily assess when they are hungry and will eat at times the medication is needed. Some liquid medications taste unpleasant so need to be mixed with quite a large volume of strongly flavoured food to disguise them. Powdered or canned fruit flavoured baby food can be used but always consult your veterinary surgeon before doing so. Animals will often refuse to eat contaminated food or eat around bits of food containing the drug if it has not been mixed in well.

Liquid medications are usually administered directly into the mouth using a syringe. It is very easy for rabbits to refuse to swallow liquid medications and to dribble it from their mouths. When giving liquids by mouth, great care must be taken, to ensure that the patient swallows the medication and does not breathe it in. Oily medications, e.g. liquid paraffin in the lungs, can cause severe pneumonia.

C. Topical administration

Topical application of medicine can be used to treat specific areas or as a simple way of applying medication which will then be absorbed through the skin to affect the whole animal. A lot of drugs are readily absorbed through the skin and if given frequently, or for prolonged periods, can build up in the body causing side effects, e.g. corticosteroids put onto the skin can cause signs of Cushing disease.

Most animals, particularly rabbits, will lick off any topically applied medication they can reach. This should be prevented by the use of dressings, Elizabethan collars or other protective devices.

C.1.Topical treatment for local effect

Ocular treatment

Eye conditions are not uncommon in domestic pets and are often most effectively treated by application of topical therapy. Eye treatments come as drops or creams/ointments. Drops can be easy to apply to the eye (see section Ocular administration of treatment below) but are washed out quickly and may need to be given many times daily. Ointments and creams persist in the eye for longer and some only need to be given once daily.

Aural (ear) treatment

The inside surface of the ear canal is just modified skin. However, this skin is very sensitive, so only treatments specially made for use in this area should be put into the ear canal. Drops or creams can be used effectively (see section Aural administration of treatment below).

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Before giving medicines into the ear it is important to check that the tympanic membrane (ear drum) is intact as many drugs can damage the middle ear if they are able to cross this barrier. This should be confirmed through consultation with your veterinary surgeon.

• <u>Skin treatment</u>

To be effective, a topical treatment must come into contact with the skin. If necessary, hair should be removed from the area to which the treatment is applied. The skin surface should be cleaned to remove grease, previously applied medication and any build-up of crusting or secretions.

Medication for topical application can be mixed with oily or water-based carriers to produce gels, ointments or creams. Creams or ointments are massaged gently over the skin surface until they are absorbed into the skin.

Alternatively, application may be means of washes or shampoos. Remember when treating skin lesions that the area being treated may be sore to touch, so be gentle and ensure that the patient is adequately restrained, also the owner should wear gloves and clean their hands so not to introduce infection to open skin and wounds. In many cases a combination of topical and systemic treatment is used. E.g. shampoos and antibiotic tablets.

C.2. Topical treatment for systemic effect

The advantage of administering medicines by this route is that they do not have to pass through the gastrointestinal tract and so this method is effective for drugs that would be destroyed in the gut.

• Flea treatment

Some of the topically applied flea treatments are absorbed through the skin and then enter the blood stream. Spot-on treatments are dropped onto an area of the coat that the rabbit cannot reach when it grooms – the hair is parted to reveal the skin on the back of the neck and the flea treatment dropped onto the skin. It is best to do this just before the rabbit is to be left alone for a few hours as any petting of the fur will remove some of the medication onto the handler's hands and therefore potentially medicating the handler as well. The active ingredient is absorbed through the skin and enters the blood; fleas ingest the drug when they next bite.

• Pain relief

Sticky patches containing some forms of analgesics (pain killers) are now available. These can be applied to hairless areas of skin in the recovery from anaesthesia and slowly release small doses of the drug over several hours. This gives the patient a pain free recovery from surgery, without the need to keep re-administering medication. Remember that drugs can be absorbed even more easily through human skin so gloves should always be worn when handling topical treatments

D. Injections

There are three types of injections:

D.1. Intramuscular (IM)-in the muscle

IM injection should be given in the quadriceps, thigh or lumbar muscle. The needle should be inserted into the muscle with a quick thrust. Care should take to make sure the needle is inserted in the muscle, not just under skin. You should pull back on the plunger to make sure needle has not been inserted into blood vessel, as evidenced by blood appearing in the syringe.

D.2. Intravenous (IV)-in the vein

Sometimes IV injections are necessary to get medicine directly into blood stream for a quick response. These are given in the jugular vein. Most people rely on veterinarian for this type of injections.

D.3.Subcutaneous (SQ)-under skin

This injection should be given in the back of the neck. A SQ injection is given by marking a "tent" with the skin and injecting the solution under skin, parallel with the muscle. The medicine should be slowly injected.1 inch needle should be used.

<u>Content/Topic 3:Sanitary record keeping</u>

A. Sanitary Record

Records are an important part of raising rabbits. Records represent the "backbone" of your rabbitry. With any business record keeping is what makes the success or failure of the enterprise. Health record should include any symptoms or possible signs of disease and the date they were observed in each animal .if the animal receives any medication the amount and the date must be recorded. If the medication is given to a market animal the withdrawal time must be adhered to.

A.1.Technical sheet

Rabbit's nameAddress	
Blood	
Date of birth	
Sex	
Description Date of micro	o clipping
Owner's name	Micro clipping date

A.2. Record of vaccination

Table 9: Vaccination record

Date	Types of vaccination	Signature and details	Next vaccination date

This form must be filled for every vaccination carried out in the rabbitry

A.3.Medication record

Medication records include: drug used, dosage, period of treatment, disease treated as shown in the following table

Table 10: Medication record

Barn no.....

breed.....

Date	Rabbit name/no	Disease treated	Drug used	dosage	Veterinary name and signature	Notes

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