

**COURSE  
GUIDE**

**ANP 503  
SWINE AND RABBIT PRODUCTION**

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**NATIONAL OPEN UNIVERSITY OF NIGERIA**

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## **INTRODUCTION**

The course consists of 19 units grouped into four modules. 10 units is dedicated to swine and nine units to rabbit production. In order to learn more about this course, you are expected to make reference to other sources of information like the library and Internet. The course guide tells you all that you need to know about the course, what course material you will be using and more importantly you are encouraged to visit rabbit and pig farms and offer to participate in the management aspect. This will go a long way in enriching your knowledge and developing your skills in handling animals. You will also find self assessment exercises embedded within each unit of the course for you to answer. At the end of each module you will find standard tutor marked assignment questions (TMAQ) for you to answer and give your teacher for assessment.

## **WHAT YOU WILL LEARN IN THE COURSE**

The course consists of two parts which covers basic concept in management of rabbits and pigs. In this course you are going to study the management of breeding stocks, growing of young rabbits and pigs. You will also study their housing, equipment and feeding principles, production and management practices, health management as well as, processing and marketing.

## **COURSE AIMS**

The course aim is to develop and strengthen your understanding of Non-Ruminant Animal Production and to be actively involved in animal management with a view to minimising the protein intake in-balance in Nigeria. The following is the summary of the course aims. At the end of your study of this course, you will be able to:

- explain the term non-ruminants, their brief history, distribution and development
- discuss the advantages and disadvantages of keeping pigs and rabbits
- recognise the problems or constraints of pig and rabbit production in Nigeria
- explain the guidelines on how to improve pig and rabbit production in Nigeria.
- distinguish the different commercial breeds of Rabbits and Pigs and their characteristics

- explain the production systems and methods used in rabbit and pig husbandry
- discuss their nutrition, selection, common diseases, parasites, and their preventive and control measures
- examine the processing and marketing of rabbit and pig products.

## **COURSE OBJECTIVES**

To achieve the aims stated above, each unit has stated objectives at the beginning of the unit.

You should endeavour to read them before working through the course. At the end of each unit, find out from the objectives if you have done what is required of the unit. On successful completion of the course, you will be able to:

- explain with suitable examples, the term non-ruminants, their historical background and distribution around the world
- identify, based, on their physical appearance the different breeds of rabbits and pigs
- explain the procedure of processing and system of marketing rabbit, pig and their products
- take part in the management of rabbits and pigs from day old to the point of disposal or slaughter
- identify the signs, of common diseases and parasites of non-ruminants and the measures necessary for their prevention
- discuss the nutrition of non-ruminants, their requirements, sources and types
- explain the adjustments needed in housing, system of production, with a view to improve the productivity of these animals in Nigeria.

## **WORKING THROUGH THIS COURSE**

This course is very interesting, and requires you to spend some time to read and understand each unit. I would advice frequent visits to nearby rabbit and pig farms, as this will help you understand and better appreciate the course. Where possible try as much as you can to be involved in the management aspects (feeding, cleaning, disinfection, beak trimming, etc.)

## COURSE MATERIALS

Major components of the course are:

1. Course Guide
2. Study Units
3. The References/Further Reading, that will be provided at the end of each unit are necessary supplements to the course material.
4. For further studies on youtube contact the following websites:

<https://www.youtube.com/watch?v=bM7dC93RYNo>

<https://www.youtube.com/watch?v=469HeE4jIfY>

<https://www.youtube.com/watch?v=3MADzpiNt9I>

<https://www.youtube.com/watch?v=2qohs7As9Hg>

<https://www.youtube.com/watch?v=68ZpffSnUE0>

## Modules

The course consists of four modules divided into 19 units. The modules are as follows:

Module 1	Importance, Breeds and Nutrition of Pigs
Module 2	Management, Processing and Record Keeping
Module 3	Importance, Breeds and Management of Rabbits
Module 4	Feeding Disease Control and Products

## TEXTBOOKS

Where applicable the recent editions of these books are recommended for further readings.

Adi, M. A. (1994). *Sheep, Goat and Swine production in Nigeria*.

Fielding, D., Smith, A. J. & Coste, R. (1991). (*Rabbits*) *The Tropical Agriculturalist*. (CTA) Macmillan.

Holness, D.H., Smith, A.J. & Coste, R. (1991). *Pigs: The Tropical Agriculturalist*. (CTA) Macmillan.

McDonald, I. & Low, J. (1985). *Livestock Rearing in the Tropics*. Macmillan Education Ltd.

Williamson, G. & Paye, W. J. A. (1987). *An Introduction to Animal Husbandry in the Tropics*.

## **PRESENTATION SCHEDULE**

The Presentation schedule is included in your course materials and gives you the important dates for the completion of tutor-marked assignments. You are required to submit to your tutor for assessment by the stated dates.

## **ASSESSMENT**

There are two components of assessment for this course. The tutor marked Assignment (TMA), and the end of course examination.

## **TUTOR-MARKED ASSIGNMENT**

There are 19 Tutor Marked Assignment Assignments (TMA) and some Self-Assessment Exercises (SAEs) in this course. You are expected to complete your assignments from the information and material contained in your study units, reference materials interactions with farmers during your visits and the Internet. You are also advised to read as wide as you can to broaden your knowledge.

## **FINAL EXAMINATION AND GRADING**

This is the end of course examination; it is a two-and-half hour duration and concludes the assessment for the course. It constitutes 70% of the whole course; you will be informed of the time for the examination.

## **HOW TO GET THE MOST FROM THIS COURSE**

Review the objectives for each study unit to make sure that you have achieved them. In case of any difficulty you may contact your tutor. You also have self assessment exercise which you are required to answer on your own. Your ability to answer them is an indication of your understanding of the unit concerned. Try as much as you can to answer the questions.

When you are sure that you have achieved a unit's objectives, you can then start on the next unit.

After completing your last unit, review the course and prepare yourself for the final examination.

Check to make sure you have achieved the unit objectives (listed at the beginning of each unit) and the course objectives (listed in the course guide).

## **SUMMARY**

Swine and rabbit production is a course that gives you a good understanding of breeding stocks, growing of young rabbits and pigs. It also teaches their housing, equipment and feeding principles, production and management practices, health management as well as, processing and marketing.

Best wishes.

**MAIN  
COURSE**

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## **MODULE 1      IMPORTANCE, BREEDS AND NUTRITION OF PIGS**

### **UNIT 1   IMPORTANCE OF SWINE**

#### **CONTENTS**

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
  - 3.1 Taxonomy (Biological Classification)
  - 3.2 Advantages of Pig Farming
  - 3.3 Disadvantages of Pig Farming
  - 3.4 Common Terminologies in Pig Husbandry
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor-Marked Assignment
- 7.0 References/Further Reading

#### **1.0 INTRODUCTION**

Pigs are kept in one form or another almost everywhere in the world. In rural areas of many parts of the world, it is still common to find pigs rooting and roaming freely around communities, such pigs are sold or slaughtered as the need arises. Pig-keeping enterprises are also found in and around towns and cities, and they play an important role in feeding the urban population.

#### **2.0 OBJECTIVES**

By the end of this unit, you will be able to:

- outline the taxonomy of pigs
- list the advantages and disadvantages of keeping pigs
- define the common terminologies used in pig husbandry.

#### **3.0 MAIN CONTENT**

##### **3.1 Taxonomy (Biological Classification)**

Below is the taxonomy of the pig:

Kingdom - *Animalia*

Phylum - *Chordata* (Animas with back bones)

Class – *Mammalia* (Warm blooded animals that suckle their young)

Order - *Artiodacty* (Even toed hoof)

Family - *Suidae* (non-ruminant or single stomach system)

Genus – *Sus* (Restricted wild European boars with which domestic pigs are bred from)

Specie – *Sus Scrofa* and *sus Vitatus*

### **3.2 Advantages of Pig Farming**

- i. Pigs are highly prolific: They are capable of producing large litters (young ones) after a relatively short gestation period. They also have a short generation interval and grow fast.
- ii. Their productivity in terms of yield of meat per tonne of live weight of breeding female per year is six times that of cattle.
- iii. Their body size makes them more flexible for marketing and consumption compared to cattle.
- iv. Pig meat is suitable for processing and some of the processed products have a longer shelf life than fresh meat, and can thus be distributed to a wider section of the population.
- v. Pigs convert feed to meat efficiently. They convert feed to meat twice as efficiently as ruminants (i.e. they have high feed efficiency).
- vi. Pig production provides quick turn-over on investment compared to cattle.
- vii. Curative and preventive drugs are available for most swine diseases.
- viii. Pigs also give useful by-product like their faeces can be used as a good source of manure.
- ix. Pigs can be reared almost anywhere given suitable housing and management although their management in extreme temperature can be expensive.
- x. They produce meat without contributing to the deterioration of the natural grazing land. This is important considering the steady desertification, soil erosion and loss of productive land in some areas of the tropics.

### **3.3 Disadvantages of Pig Farming**

- i. There is poor product acceptance in areas where the Islamic religion prevails. In other words, there is strong taboo against the eating of pig product, thereby negatively affecting the market for the products e.g. the Middle East, Pakistan and parts of Africa. Muslims and many Zionist in the Jewish faith are forbidden to eat pork. Meat from pig is referred to as pork.

- ii. While social factors play an important role in their acceptance, pig has historically been considered an unclean animal, wallowing in filth, an object of dislike and a risk to human health.
- iii. The digestive tract of pigs and birds is relatively short compared to other farm animals and can only utilise high quality concentrate feeds (e.g. staple grains and oilseeds). These are also use as feed for human making them to be in direct competition with man.
- iv. They are raised close to human habitations thereby making their waste product a pollution problem.

### 3.4 Common Terminologies in Pig Husbandry

- **Boar:** Mature uncastrated male.
- **Barrow:** Mature castrated male before puberty.
- **Hog:** Castrated male.
- **Stag:** Adult male castrated later in life.
- **Shoat:** Swine of both sex weighing 30-80kg.
- **Gilt:** Young female swine before farrowing.
- **Sow:** Adult or mature female after one or two pregnancies.
- **Barrener:** Sterile female.
- **Farrow:** Giving birth to young ones.
- **Herd:** Group of swine.
- **Litters:** Young ones (piglets).

### SELF -ASSESSMENT EXERCISE

1. What is the taxonomical classification of pig?
2. List the advantages and disadvantages of pig farming.
3. Define the following: Boar, barrow, sow, barrener and farrow.

### 4.0 CONCLUSION

The production of pigs in the tropics contributes significantly towards meeting the demand for animal protein. Pork is consumed by a large group of people even though there is some religious taboo limiting its consumption.

### 5.0 SUMMARY

Advantages of pig farming include: the potential to be highly prolific, body size makes them more flexible for marketing and consumption compared to cattle. Pig meat is suitable for processing and the processed products have a longer shelf life than fresh meat, efficient feed converters, useful by-product etc. While their disadvantages include

poor product acceptance, social and religious factors, pollution etc. Also some common terminologies used in pig production were define.

## **6.0 TUTOR MARKED ASSIGNMENT**

1. Discuss the advantages and disadvantages of pig farming.
2. What do you understand by the following: (a) gilt (b) farrow (c) hog (d) stag (e) boar?

## **7.0 REFERENCES/FURTHER READING**

- Adi, M. A. (1994). *Sheep, Goat and Swine production in Nigeria*.
- Holness, D.H., Smith, A.J. & Coste, R. (1991). *Pigs: The Tropical Agriculturalist*. (CTA) Macmillan.
- McDonald, I. & Low, J. (1985). *Livestock Rearing in the Tropics*. Macmillan Education Ltd.
- Williamson, G. & Paye, W. J. A. (1987). *An introduction to Animal Husbandry in the Tropics*.

## **UNIT 2 BREEDS OF SWINE**

### **CONTENTS**

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
  - 3.1 Indigenous Breeds (Unimproved)
  - 3.2 Exotic Breeds in the Tropics
    - 3.2.1 Duroc
    - 3.2.2 Large White (Yorkshire)
    - 3.2.3 Landrace
    - 3.2.4 Hamshire
    - 3.2.5 Tamworth
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor-Marked Assignment
- 7.0 References/Further Reading

### **1.0 INTRODUCTION**

There are over 90 recognised breeds of pigs in the world. They can be broadly classified into indigenous or unimproved types or the more modern exotic types which have been selected and developed for specific commercial purposes.

### **2.0 OBJECTIVES**

By the end of this unit, you will be able to:

- name and describe the indigenous breeds of pigs
- name and describe the various breeds of pigs.

### **3.1 Indigenous Breeds (Unimproved)**

These are mostly found in developing countries and have evolved a variety of shapes and sizes in order to survive in a range of environments. Generally, they have smaller and shorter leg than the exotic types. Mature weight of females ranges between 40 - 120 kg, with the typical unimproved conformation of a large head, well- developed forequarters and relatively light hindquarters. This renders them more mobile and better able to forage and root for themselves. They mature sexually early and females may show first oestrus as early as three months of age. There are many variations of coat colour, but black and brown are most common and white is infrequent. The degree of hairiness also varies, and both hairless and relatively long –haired types

are found. Bakosi in the Cameroons and the Ashanti Dwarf in Ghana are examples of indigenous breeds. Their characteristics include small body with mature female size of 40-60kg, and are mainly black in colour with prick ears. The unimproved pigs of East, Central and Southern Africa are mostly descended from stock introduced by early European travelers, and therefore not truly indigenous, they are relatively wide spread. The productivity of these unimproved breeds in Africa is influenced by their environment and some typical reproductive performance.

The litter size of the indigenous breeds tends to be smaller than improved breeds, but total live weight of the litter as a proportion of the weight of the sow at farrowing was similar to that of the exotic sows.

## **3.2 Exotic Breeds in the Tropics**

### **3.2.1 Duroc**

This has droopy ears and is deep red or rusty colour. It is a fast growing large breed. The Duroc produces a very good carcass and is said to be an excellent meat producer. Also it has the ability to grow to heavier weights without depositing too much fat. The Duroc is a hardy animal which survives well in tropical climate. It is generally used for cross-breeding.

### **3.2.2 Large White (Yorkshire)**

This breed was first developed in Yorkshire, England. It has erect ears and is white in colour and females are prolific. It is renowned for its strength of leg. The breed can be used for both pork and bacon production. It is a fairly hardy animal but will suffer from sun-burn if it is not kept in a building out of the sun.

### **3.2.3 Landrace**

It is characterized by its forward-pointing lop ears and possesses a long, smooth body with light shoulders and well developed hams. It is white in colour, this swine is good for bacon production, but has a higher level of susceptibility to stress and requires a high level of management.

### **3.2.4 Hampshire**

This swine is black with distinct white saddle which encircles the forequarter. They are prolific, good mothers, and have good milking ability. It has more meat than the large white and landrace. It is probably best kept for cross breeding.

### 3.2.5 Tamworth

This hardy animal is reddish in colour and with erect ears. It is an efficient converter of feed. The breed is relatively slow-maturing. In the past, it has been very popular for cross-breeding purposes in tropical regions.

### SELF- ASSESSMENT EXERCISE

- i. Explain the characteristics of Indigenous Breeds of pigs.
- ii. List and explain the characteristics of the different exotic breeds of pigs.

## 4.0 CONCLUSION

In this unit you have learnt about the (local) indigenous breeds of pigs common to most tropical countries. You have also learnt about the exotic (improved breeds) found mostly in the temperate countries. These breeds have been selected and improved over the years

## 5.0 SUMMARY

There are over 90 recognised breeds and an estimated 230 varieties of pigs in the world. They can be broadly classified into indigenous or unimproved types or the more modern exotic types which have been selected and developed for specific commercial purposes. The basic features of the different breeds are also discussed.

## 6.0 TUTOR-MARKED ASSIGNMENT

- 1) Name six exotic breeds of pigs found in the tropics and describe the features of any three.
- 2) Outline the basic differences between the indigenous and improved breeds of pigs.

## 7.0 REFERENCES/ FURTHER READING

Adi, M. A. (1994). *Sheep, Goat and Swine Production in Nigeria*.

Holness, D.H., Smith, A.J. & Coste, R. (1991). *Pigs the Tropical Agriculturalist*. (CTA) Macmillan.

McDonald, I. & Low, J. (1985). *Livestock Rearing in the Tropics*. Macmillan Education Ltd.

Williamson, G. & Paye, W. J. A. (1987). *An Introduction to Animal Husbandry in the Tropics*.

## **UNIT 3 BREEDING METHODS AND MANAGEMENT OF SWINE**

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- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
  - 3.1 Herd Mating
  - 3.2 Hand Mating
    - 3.2.1 Selection of Boar for Mating
    - 3.2.2 Mating Conditions
    - 3.2.3 Artificial Insemination (A.I)
  - 3.3 Management of Gilts/ Sows
    - 3.3.1 Pigs Breeding Cycle
  - 3.4 Management of Pregnant Sow
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor-Marked Assignment
- 7.0 References/Further Reading

### **1.0 INTRODUCTION**

The success of swine production lies in the ability to reproduce good quality traits which form the basis for selection and breeding to achieve the objectives of production. The male as well as the female are important because each of them provide half of the inherited characteristics of the offspring. Therefore, you as the stockman must accord good care for the breeding stock in farm animals. Swine production is affected by the occurrence of desirable traits in the breeding stock and the management of the animal to sustain such trait in the herd. Improper handling or management may spell doom for such productive enterprise. Therefore, in this unit, we shall study the breeding/mating methods and management of the swine for breeding.

### **2.0 OBJECTIVES**

By the end of this unit, you will be able to:

- enumerate the different breeding methods
- explain the management of swine for breeding.

### **3.0 MAIN CONTENT**

#### **3.1 Herd Mating**

This is a mating system that is uncontrolled and unplanned. All animals both males and females are allowed to mix freely with no restriction and no strict monitoring of the oestrus cycle of the female to dictate heat period.

#### **3.2 Hand Mating**

This is mating system which is controlled and planned. Here the farm manager gets to deliberately take the boar to the sow after selection from records and ensure they mate in an enclosure place. Hand mating has a higher labour requirement.

##### **3.2.1 Selecting Boar for Service**

Boars are selected following performance testing to ensure efficient performance of their offspring. The parameters usually considered include:

- fast growth rate than average
- less back fat than average
- eats less food than average
- high feed utilisation due to low fat production
- two equally sized and firmly suspended testicles and with good sexual libido
- good body conformation, strong straight feet and good temperament.

Young boars that are newly brought to the herd must be properly nurtured to adapt to their new environment. They should be dewormed, sprayed/dipped against ecto-parasites and exercised daily fitness, to enable him get used to his stock man as well as the sights and smells of the piggery. The boar should be fed well for continued growth, but should not be allowed to become fat and sluggish.

##### **3.2.2 Selection of Sows for Breeding**

When selecting the sows to be kept for breeding, the following point should be considered:

- i. They should have at least 12 normal teats. In well-developed farms, they should have 14 teats, preferably seven on each side.

- ii. They should be the largest and the healthiest of the litter.\
- iii. They should have strong legs and walk well.
- iv. Their parents should be good breeding animals, capable of producing good sized litters at regular intervals.

Selecting the best females for breeding and giving them good housing and proper care are the important steps towards improved breeding practice.

### **3.2.3 Mating Conditions**

Recent studies have indicated that boars mating on their own pens displayed lower levels of sexual behaviour than boars mating in the service pen. This resulted in a lower percentage of gilts being mated in the boar pen. This has necessitated the use of a specifically designed service pen. A boar should not start serving until he is over eight months of age; and during the first two months of service, only twice per week. Subsequently, he can be used for up to six services per week. Overworking a boar will reduce the quality of the sperm produced, leading to small litters and increased number of sows returning to service. The standard recommendation is one boar to 20 sows/ gilts. Considerable exercise is necessary to prevent the development of leg weakness. It may be necessary to trim the boar's feet regularly.

### **3.3 Management of Gilts/ Sows**

The major objective of gilt management should be to induce all replacement gilts to reach puberty as soon as possible after selection. This will allow the following objectives to be achieved:

- disposing of gilts which are not showing any breeding activity at an early stage
- access to a pool of young, sexually-active gilts
- gilts will be in their second heat or more at first mating there by increasing the first litter size.

Gilts and sows will tend to get too fat if they are not allowed enough exercise. A fat sow takes longer to come on heat and is more likely to crush her young piglets. Sexual maturity occurs as early as 4 or 5 months, but the first service should not be until 8 months, when the weight should be 10-130 kg. A sow has a productive life of four to five years.

### 3.3.1 Pigs Breeding Cycle

Pigs like other animals will mate only when the female is on heat or during oestrus period. These are physiological changes that take place in the female which allow ovulation or shading of the egg for fertilisation to take place in the presence of the male's sperm. The normal heat period lasts for three to five days; signs of heat are:

- general restlessness
- vulva turns red and swollen
- white mucus discharge
- vulva less red and swollen, slimy mucous discharge
- tendency to mount and be mounted
- sow or gilt will stand still when pressure is applied to her back.

It is important to note that few of the signs above will be seen therefore it is best to put the sow with the boar for a short period every day when the heat is expected. Always take the sow to the boar not the reverse as this is less upsetting for him. It is best to put them together just before feeding. Let the boar serve her twice, with an interval of about 12 hours between services. If the sow does not conceive, she will return to heat in about 3-week time.

### 3.4 Management of Pregnant Sows

The gestation period is 114 days (three months, three weeks and three days). Pregnant sows should not be too crowded in their pens as this can cause abortion. A week before service, give the sow/gilt one kg of feed extra per day (standard is 2.5 kg/day). Continue this for one week after service. During the last month of pregnancy give 0.5-1 kg extra feed per day, but decrease this gradually one week before farrowing, and provide plenty of water to help prevent congested gut during farrowing.

In preparation for farrowing, the farrowing pen should be kept clean and free from draughts. Disinfect the farrowing pen thoroughly and scrub crevices with insecticides to control mange and lice ten days before the commencement of farrowing.

Deworm the sow with dewormers that do not have adverse effect on fetus (that are not contraindicated) during pregnancy two weeks before the expected farrowing. The sow should be moved to the farrowing pen four to seven days before farrowing and her body should be wash with soapy water and weak disinfectant to remove dirt and parasite eggs. Provide plenty of straw, chopped into short lengths of about 10 cm to prevent the piglets being trapped in longer straw and being crushed by their mother. The first three days of life are the most critical for the

piglets. One day before farrowing the sow becomes restless and later milk can be squeezed out of the teats. She will begin to make a nest with straw. Use a well-designed farrowing pen (farrowing crate) to prevent the sow from accidentally crushing the piglets.

During farrowing, the sow/gilt will lie down and grunt. It will lift its hind legs as labour pains increase. Generally, pigs have little difficulty farrowing and will farrow with little interference from the attendant. Farrowing normally takes four to six hours but some sows will take up to 18 hours or more.

When a piglet is born it will sever the naval cord and then walks round the sow's hind legs to find the teats and within 45 minutes start suckling its first colostrum. The after birth (placenta) will either come out as the last piglet is born or immediately after that. The placenta needs to be buried as soon as possible to prevent the sow/gilt from eating it, as this may open her appetite for her own piglets. Farmers should make sure their piglets have taken colostrums 'the first milk' which is rich in various nutrients and antibodies except iron and copper. Young piglets from 10 days onwards should have a high protein diet available to them. This has to be fed in small creep (creep feeding) or area where the mother cannot eat the feed.

Weaning is the separation of young piglet from its mother with the aim of stopping them from suckling milk. This could take place between four to six weeks of their life. At this age, the piglets will eat feeds and fend for themselves. By the eight to nine weeks of age the growing pig is over the stress of weaning, and its digestive system will be competent to deal with a range of protein and energy sources some 80% of the food used in a pig unit is consumed by the growing and finishing pigs, therefore the efficiency of food utilisation during this phase is crucial factor affecting profitability.

### **SELF-ASSESSMENT EXERCISE**

- i. Discuss the following: i) Selection of boar for service ii) Management of sows/gilts iii) Management of pregnant sows
- ii. Distinguish between Hand mating and Herd mating
- iii. Describe the Pig's breeding cycle
- iv. What are the general conditions for mating?

### **4.0 CONCLUSION**

Proper management of each class of pigs on the farm is essential towards the profitability of the farm. The farmer must make every effort to ensure that the well-being and productivity of his animals are achieved.

## 5.0 SUMMARY

Boars are selected following performance testing to ensure efficient performance of their offspring. This include, faster growth rate than average with less back fat than average. It should utilise its feed more efficiently and produce less fat, must have two equally sized and firmly suspended testicles and with good sexual libido. A boar should not start serving until it is over eight months of age; and during the first two months of service, only twice per week. Subsequently, it can be used for up to six services per week. Overworking a boar will reduce the quality of the sperm produced, leading to small litters and increased number of sows returning to service. The standard recommendation is one boar to 20 sows and gilts. Piglets should be provided with warmth in the form of beddings made up of wood shavings or hay. In humid areas they should be put in a well ventilated pen.

## 6.0 TUTOR-MARKED ASSIGNMENT

1. List the criteria used in selecting boar for breeding and explain the care needed for young boars before their first service.
2. Describe the stages in the signs of heat in a sow/gilt and comment on the recommended practices during heat period.
3. What are the common preparations to undertake by the stockman before farrowing?

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## **UNIT 4 FEEDING AND NUTRITION**

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### **1.0 INTRODUCTION**

Pigs, like humans, can eat everything. This means that their feed can be of both animal and vegetable origin. Although they accept most foods, this does not mean that the quality of their food is not important. Pigs will not thrive on grazing and fibrous feed alone. For pigs to be healthy and produce well, they need to get enough good quality feed to eat.

Nutrition and feeding management are very important aspect of swine production. Therefore, it is extremely important that swine producers have a good understanding of the nutrient requirement of swine during each phase of their life cycle, a knowledge of the feed stuff which can be used in swine feeding and an appreciation of the final point of feeding management for economic production of swine. Unfortunately, many swine farmers keep them in rather poor conditions and so are not able to make as much profit as they should. Swine are particularly affected by dirty, drafty housing and quickly becomes sick. They are also affected by poor feeding. The major groups of essential nutrients for pigs are energy, protein, minerals, vitamins and water.

## 2.0 OBJECTIVES

By the end of this unit, you will be able to:

- discuss the importance of proper feeding of pigs
- explain the significance of various classes of nutrients
- feed the correct diets to different classes of pigs.

## 3.0 MAIN CONTENT

### 3.1 Nutritional Requirements of Swine

#### 3.1.1 Water

Water is one of the most important nutrients. Swine of all ages should have free access to fresh and clean water at all times. Drinking water is the first requirement for all animals. Clean and fresh water for drinking should be available all the time. Pigs drink about two to five times as much as they eat, depending on the amount of moisture in the feed. Even if you feed them at will, it is advisable to have extra drinking water available. When an animal is under stress, due to heat or disease, it will stop eating but will need extra water to drink. A lactating sow with 10 piglets needs at least 25 litres of water per day. Clean the drinking pan or trough at least once a day. Modern drinking nipples are a lot cleaner, but should be examined daily to check that they are functioning properly. Although pigs like to wallow in water, to cool down or for fun, this is not necessary and they should not be allowed to lie down in their drinking water. Limiting water intake will result in reduced growth rate and efficiency of gain in pigs and reduce milk production in lactating sows. A severe limitation of drinking water can cause death in pigs. The requirement of water is influenced by many factors including environmental temperature and humidity, composition of the feed and weight of the pig.

The table below shows the water requirement of pigs for each kilo of feed/litre.

Fattening pigs.....	2.5
Lactating sows.....	5.0
Dry sows.....	3.0
Piglets' .....	Ad-libitum (freely as needed)

### 3.1.2 Energy

Apart from water, energy is the most important food requirement of the pig and will most rapidly influence its survival if withdrawn. It is normally measured in heat units, traditionally as calorie, but now the megajoule (MJ) is the most commonly-used unit (where 1 MJ = 0239 MCals).

Nursing pigs derived most of their energy from fat and lactose sugar in milk. Most of the energy for growing pigs is derived from metabolism of starch because of insufficient amylase starch digestive enzyme in the small intestine. For all weight classes of pigs, the metabolisable energy (M.E.) is approximately 96% of the digestible energy requirement. Energy requirement of pigs are influenced by their weight which influences the maintenance requirement by their genetic capacity for growth or milk synthesis and by the environmental temperature in which they are housed. The energy requirement for maintenance is directly related to metabolic body weight and is approximately 110kcal of digestible energy (D.E.) per kilogram body weight. Some examples are maize, rice, sorghum, cassava, sweet potato and cereal grain.

You can assess whether the pigs are getting enough energy by looking at their condition. When there is extra energy available, the animal will store it as body fat. If the pig is very thin, it means that there is a shortage of energy and the pig's productivity will be very low. However, if reproductive sows are too fat, their productivity will decrease.

### 3.1.3 Protein

Protein consists of some 20 basic units known as amino acids. Nine of the amino acids required by the pig cannot be synthesised by its body, and they must be supplied in the diet.

If they are present in insufficient quantities, the pig will not grow and may not even survive.

Swine require 10 essential amino acids in its diet for normal body function. A good quality protein is one that provides the amino acids in the amount and proportion necessary for the particular need of the pig (growth, reproduction and lactation). Protein food are oil seed e.g. cotton seed, soybean groundnuts coconut bean, peas, blood meal, fishmeal, etc. amino acid requirement are influenced mostly by age and weight of the pig. In a daily basis the requirement increase as the pig increases weight.

Protein is necessary for physical development: growth, breeding and milk production. Protein is the most important nutrient in the body, because all organs, muscles and enzymes are made of proteins. In the feed, the protein quality is as important as quantity. It is important that the pig gets the right type of amino acids because it uses these to build its own protein (muscle protein, milk protein etc.). The best quality protein (and the highest protein concentration) is from animal products, like fishmeal, milk or meat meal. Some protein of animal origin should be included if possible, especially for the young animals, which need to grow a lot. (Compare with nutritional needs of children.). By-products from plant oils also have a high protein content, e.g. soybean meal or groundnut cake. However, cereals do not have enough protein and need to be supplemented with protein-rich products.

### **3.1.4 Minerals**

Compared with energy and protein, minerals are required in very small amount. Thirteen minerals are required in the diet. Major minerals include calcium, phosphorus, sodium, magnesium, choline and the trace minerals includes iron, iodine and selenium. The two minerals required in the greatest amount by swine are calcium and phosphorus. Adequate levels of both calcium and phosphorus must be included in the diet for strong skeletal structure.

### **3.1.5 Vitamins**

Vitamins can be defined as organic compounds which function in small amounts (mg or µg) and are essential to the normal functioning of the animal body. They cannot be synthesized in adequate amounts by body tissues and when lacking, provoke deficiency diseases. Fourteen vitamins are required by swine, all in very small amounts. Fat soluble vitamins are A D E and K. while water soluble vitamins are vitamin C and B complex, Riboflavin, Pantothenic acid, Niacin, Vitamin B12, Choline, Pyridoxine, Thiamin, Folic acid and Biotin. Cereal, grains and plant protein supplements are very poor sources of many of the vitamins. From a practical stand point, vitamin premix should be added to swine feed.

## **3.2 Feeding**

Pigs in contrast to cows and other ruminants, prefer feed that does not contain too much fibre. They have difficulty in digesting crude fibre, as unlike ruminants they do not have a composite stomach, in which micro-organisms can break down the fibrous materials. When pigs have to find their own feed, they will consume the succulent parts of the roughage, but they need also to find roots or tubers, and they root up worms and

insects to get the nutrients they need to survive and to reproduce. However, their productivity will depend strongly on what they find. In pig production, the farmer is responsible for supplying feed every day. Pigs should be fed twice a day and always at the same times. The quality of the feed should be good enough to allow the animals to become strong and productive. In terms of the needs of the different pigs, this means that the young piglets require the best quality feed, especially after they are weaned off the very nutritious mothers' milk. At this stage, a lack of protein and minerals/vitamins will really slow down the development of the piglets.

Next in line for the high-quality feed are the lactating sows. They need to produce enough milk for their piglets, and can only do so if they receive enough nutrients themselves. The condition of the sow's body during the lactation period is a good indicator of whether she is getting enough feed. A sow with poor nutrition will only manage to raise a small litter of piglets, and if her condition is so bad that she has lost a lot of weight, she will not be ready for the next reproduction cycle after weaning.

For optimal nutrition, the feeds should be adjusted to the needs of the pig, which means that different kinds of feed are used for the different ages and production stages. A commercial feed factory will produce a minimum of five different feeds.

**Sow feed:** preferably two different ones, because the quality of the sow feed for pregnancy can be lower than the quality of the feed they should get when they are producing milk (lactating). Boars can also be given 'pregnant sow feed'. If only lactation feed is available, add some cheaper ingredients, like rice bran, fruits or vegetables, for the pregnant sows. This reduces costs.

**Creep feed 1:** this is the highest quality feed for the youngest piglets. It should be put in the creep area where the mother cannot reach it. Feeding can start from seven to ten days after birth.

**Creep feed 2:** for the young piglets, starting about two weeks after weaning. By now the piglets no longer need the very best, so they can eat cheaper feed. In some places piglets only get one type of creep feed until they weigh about 20kg.

**Starter feed:** for young pigs over 20 kg (they should be about 10 weeks old) up to a body weight of 35-40 kg.

**Fattener feed:** for pigs heavier than 40 kg that are intended for the slaughterhouse as soon as they reach the marketable weight (about 90-

100 kg). The slaughter weight depends a lot on the market, but the older a fatterer gets, the lower the feed efficiency (feed conversion rate) becomes. The different categories of pigs are discussed separately because, besides the choice of the right type of feed, it is also very important how much to feed during certain periods. For the adult animals, some additional green materials are always beneficial (appetite, vitamins etc.). This does require extra labour, especially because the leftovers have to be cleaned out of the pens.

### **3.2.1 Feeding Pregnant Sows and Gilts**

Until she is first served (usually the 2nd or 3rd time that signs of heat (oestrus) are seen), a gilt needs to mature so she should receive the same feed as a lactating sow. The daily feed allowance should be between 1.5 and 2.5 kg (depending on bodyweight). Feeding an extra 0.5 kg per day during the week before mating might increase the number of embryos (this is called 'flushing'), but this only works when the oestrus period can be predicted.

In the first month of pregnancy the sow should be fed conservatively (1.5-2.5 kg per day). If no oestrus signs have been noticed by 21 days (which means that she is pregnant) feed the sow according to her body condition: 0.5 kg extra if she is too lean, but if she is too fat, nothing extra until the last month of pregnancy. In the last month of pregnancy, when the embryos are growing the most, the sow should receive about 2.5-3.0 kg per day. A few days before farrowing (the mating date must be recorded!) reduce the sow's feed gradually, and on the day of farrowing give her only 1-1.5 kg.

### **3.2.2 Feeding Lactating Sows**

After farrowing it is most important that there is plenty of drinking water available. A sow with 10 piglets needs about 30-35 litres of water per day. The daily amount of feed is gradually increased from 2 kg the day after farrowing, adding 0.5 kg each day for about 10 days after farrowing. The maximum amount of feed for the lactating sow is related to the number of piglets that are suckling: About 1.5 kg for the sow's maintenance and about 0.5 kg extra for every piglet. With 12 piglets, this means that the mother should eat  $1.5 + 6 = 7.5$  kg feed per day. This is a lot of feed and many sows have problems eating enough, especially in high temperatures. Therefore, during the lactating period, the sows feed should be of high quality, so she can obtain enough energy and protein to produce milk. On the day of weaning give the sow only 0-0.5 kg feed to stop the milk flow, and the next day put her on the schedule for empty sows (flushing): 2.5-3 kg day.

### **3.2.3 Feeding Piglets around Weaning**

The piglets should receive the first colostrum from their mother as soon as possible after birth, because it gives them warmth, energy and antibodies against diseases. For the piglets it is best not to wean them before 6 weeks of age. However, to get the sow into the next reproductive cycle as soon as possible, weaning at 4 weeks is better commercially. Sow's milk has one disadvantage: it contains little iron. Commercial pig producers give piglets an iron injection during the first week, but it is also possible to put a shovel of compost in the pen every day, in which the piglets can play and search. This supplies them with the necessary extra iron. Piglets that lack iron have pale, whitish, unhealthy looking skin.

From the third week on, the piglets will benefit from supplementary feed, because this is when the sow's milk production starts to decline. The creep feed must contain animal protein and an easily digestible source of energy like maize, preferably even cooked (porridge) for better digestion. This high-quality feed spoils easily, so the feeder must be cleaned every day and the feed refreshed. It should be kept out of reach of the sow; she will be fine with less expensive feed. If the piglets have diarrhoea (scouring), the creep feed should be removed for a few days. Before the piglets are weaned from the mother, they need to become accustomed to other feed than milk. Otherwise the change will be too big for them and problems might occur. Diarrhoea, caused by colibacteria in the intestines, is a frequently occurring problem in the week after weaning. Affected piglets must be treated with antibiotics, as they can die from an infection. In the period after weaning, give the piglets the same feed for at least 10 days. If there are no problems, you can start to gradually change over to a cheaper piglet feed. Changing to the next feed should take about five days.

### **3. 2.4 Feeding Piglets from Two Weeks after Weaning**

At about six to eight weeks of age the piglets are still very sensitive and require feed that includes animal protein and digestible starch from maize or cassava. As they no longer get sow's milk, an additional supply of vitamins and minerals is very good for them (compare them with weaned children). Very often farmers continue to give the same creep feed until the piglets reach 15-20 kg of body weight. The quality of the available creep feed should be taken into account when deciding when to wean the piglets. If there is no high quality (expensive) creep feed available, the weaning time should be postponed until the piglets are six to eight weeks old. However, we recommend that the piglets be given supplementary feed after about two weeks of age.

### **3.2.5 Feeding Young Pigs (Bodyweight 20-45 Kg)**

By about 10 weeks the young pigs should weigh about 15-20 kg. On an intensive pig farm, they may weigh as much as 25 kg. At this age they are suitable for selling as fatteners or for rearing as replacement for breeding stock. The best ones should be selected for breeding, but the feeding method is the same for both until they reach 50-60 kg body weight. Because this is the starting period for the fatteners, the feed is called starter feed. The pigs' growth will depend on the quality of the feed (energy and protein level), because their feed intake is still limited.

They can eat about 1.0 kg (for a 20 kg pig)-1.8 kg (a 40 kg pig) per day in this period. They should be fed as much as they can eat, but it is important that no rotting leftovers contaminate the feed. It is also possible to feed them a smaller amount twice a day. This makes it easier to check the appetite and health of the pigs. It is important that the pigs finish their feed in about 15-20 minutes. It is good practice generally to keep feed wastage to a minimum.

A small amount of animal protein in the feed will still be very beneficial to the animals at this stage of their lives, so they can continue to grow more efficiently.

### **3.2.6 Feeding Pigs Heavier Than 40 Kilograms**

Older pigs are most suited to lower quality feedstuffs and can tolerate the greatest variety in feed. Again, their growth results are directly related to the quality of feed they consume, but at this stage animal protein is not essential in their diet. The pigs' eating capacity is still increasing with age, but is generally between 2 and 3.5 kg per day. This means that if the market demands lean pork, it might be necessary to restrict the feed intake in the final period, to prevent the fatteners from accumulating too much fat in the carcass. Normally, no feed restriction is necessary until the body weight has reached 70 kg. As long as fatter slaughter pigs do not command lower prices, feed restriction is not recommended because extra feed intake always results in extra body weight.

### **SELF -ASSESSMENT EXERCISE**

- a. Discuss the nutrient requirements of swine with respect to water, energy, protein, minerals and vitamins.
- b. Explain the feeding pattern of the following
  - i.) Sows/Gilts
  - ii.) Lactating Sows
  - iii.) Piglets around weaning
  - iv.) Piglets from two weeks after weaning
  - v.) Young Pigs (Body weight 20-45kg)
  - vi.) Pigs heavier than 40kg

## 4.0 CONCLUSION

Nutrition and feeding management are very important aspect of swine production. Knowledge of the nutrient requirement of swine during each phase of their life cycle is extremely important and swine are affected by poor feeding. The major groups of essential nutrients for pigs are energy, protein, minerals, vitamins and water.

## 5.0 SUMMARY

Swine do not have a rumen. The fibrous component of the diet is not utilise as efficiently as in ruminant animals. pigs are also dependent upon certain essential amino acids present in dietary protein from which they build their own body protein unlike the ruminant animal, swine cannot synthesis the essential amino acids from poor quality protein or from non-protein nitrogen sources. Digestion has been defined simply as the preparation of food for absorption. It may include mechanical forces such as chewing or mastication, muscular contraction of the GIT.

The three swine feed usually available commercially are: Creep feed-16% protein, Sow and Weaner meal 14% and Swine finishing meal 12% for fattening of swine for pork and bacon.

## 6.0 TUTOR-MARKED ASSIGNMENT

- 1) Explain in details the feeding requirements of piglets around weaning and young pigs weighing about 20-45kg.
- 2) Briefly describe the requirement of different classes of pigs for the following nutrients: (i) Water (ii) Energy (iii) Protein (iv) minerals (v) Vitamins.

## 7.0 REFERENCES/FURTHER READING

- Adi, M. A. (1994). *Sheep, Goat and Swine Production in Nigeria*.
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## **UNIT 5      MANAGEMENT PRACTICES IN SWINE PRODUCTION**

### **CONTENTS**

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
  - 3.1 Management Practices
    - 3.1.1 Creep Feeding
    - 3.1.2 Provision of Iron
    - 3.1.3 Needle Teeth Removal
    - 3.1.4 Castration
    - 3.1.5 Tail Docking
    - 3.1.6 Culling of Sows
    - 3.1.7 Marking and Identification
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor-Marked Assignment
- 7.0 References/Further Reading

### **1.0 INTRODUCTION**

In this unit you will learn about the various things you need to do on your farm in order to ensure that your pigs are healthy and your farm is doing well. The activities are referred to as management practices. Different classes of pigs need to be managed in appropriate manner to attain and maintain high productivity and profitability

### **2.0 OBJECTIVES**

By the end of this unit, you will be able to:

- carry out the basic farm management practices required for smooth running of your piggery
- mark and identify the pigs on your farm.

### **3.0 MAIN CONTENT**

#### **3.1 Management Practices**

Various management practices require in a farm are described below.

### **3.1.1 Creep Feeding**

Young piglets from 10 days onwards should have a high protein diet available to them. They have to be fed in small creep area where the mother cannot eat the feed. The feed conversion rate of young piglets is very high thus creep feeding is particularly economical. Creep feeding is very important as the piglets become used to feeding on solid food at an early age; the sows' milk begin to decrease just as the piglets require more feed.

### **3.1.2 Provision of Iron**

It is necessary for piglets to be given iron this can be in the form of an injection of 2ml iron dextran, or as pills or in their creep feed or swab the sow's teats with an appropriate solution that contains iron or copper, like ferrous sulphate, or administer in water daily, for the first five days of life. If piglets are reared on a concrete floor, provide clean soil or earth (sod) which is of up-rooted grass with both roots and earth intact at a corner of the pen as a source of iron and copper. By observing good management and sanitary practices as mentioned above the piglets will double their birth weights within five to eight days. At weaning i.e. between four to six weeks of age they should weigh 10-12 times more than their birth weight. Growth rates in large litters are usually less uniform than smaller ones. Bigger piglets usually prefer the better front teats and so gain more weight and faster than the rest. Piglets usually stick to teats they started with.

### **3.1.3 Needle Teeth Removal**

Piglet needle teeth should be clipped off with a pair of clippers to prevent them from wounding their sow's teat which might make her refuse them suckling.

### **3.1.4 Castration**

Castration is the act of removing the testicles of a male animal to render them ineffective. This operation is carried out on all unwanted males in the herd. This management operation prevents unwanted breeding and improves the carcass quality of the animal. It can be carried out by surgically operation or bloodlessly by the use of a burdizzo or rubber ring elastrator after the animal must have been haltered. Surgical operation is done within the first week of the animal's life while the bloodless one could be done within the first two weeks of life.

### 3.1.5 Tail Docking

The tails of ruminants are cut in a process called docking. This is practiced especially in sheep within one week of life. Long tails in sheep at times do not make for good mating at adult age. An elastrator could be used at times to dock the animal and the wound treated. At this age the pain is minimised.

### 3.1.6 Culling of Sows

To maintain overall productivity in the herd, it is important to have a culling policy so that sows removed at the correct time. The reasons for culling include; Lameness, other injuries, farrowing problems, poor litter-size, poor mothering ability, and low fertility. A sow that regularly produces a good litter will eventually start to decline with age, probably around her tenth litter if she is producing well; a good guide is to allow her to remain in the herd until her performance falls below the average of the gilts in the herd. At the same time, it is important to have a supply of pregnant gilts available to replace sows that need to be culled.

### 3.1.7 Marking and Identification

- (i) **Ear Tagging:** This is done for identification purposes. The animal is haltered and the tag is placed in the applicator then clamped to the pinna of the ear. Caution must be taken not to damage the blood vessels on the pinna. Other operations for identification include: tattooing, ear notching, skin branding, horn branding and the use of neck chains or tags- either plastic or metals.
- (ii) **Tattooing:** This is the art of drawing a design on the body of the animal that is peculiar to the animal and well known by the farm manager.
- (iii) **Ear notching** is cutting the ears in a particular shape and coding the shape. It involves the use of razor or scissors to cut a “V” shape on the tip of the pinna. The positions of the cut indicate numbers. If it is at the top of the pinna it denotes 1, if at the tip, 5 and if under, it is 3. The right ear represents tens while the left represents units. The two are added to give the animal an identification number in the herd.
- (iv) **Skin and horn branding** are very common in our local setting. Hot iron is used to write numbers and at times names of owners of the animal on their skin or horn. This practice is very common with cattle.

## **SELF -ASSESSMENT EXERCISE**

Describe the following management practices:

(i) Creep Feeding ii) Provision of Iron iii) Needle teeth removal iv) Castration v) Marking and Identification.

## **4.0 CONCLUSION**

Appropriate management practices are necessary for good growth and development of pigs on the farm. The husbandry man should therefore have these skills available at his finger tips

## **5.0 SUMMARY**

In this unit you have learnt of management practices such as creep feeding, iron supplementation and their importance to piglets, as well as how to carry out some practices such as castration, animal identification, docking, culling etc. which are very important in a farm.

## **6.0 TUTOR- MARKED ASSIGNMENT**

1. What do you understand by management practices?
2. List the management practices that you know.
3. Describe fully any three.

## **7.0 REFERENCES/FURTHER READING**

Adi, M. A. (1994). *Sheep, Goat and Swine production in Nigeria*.

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## **MODULE 2      MANAGEMENT, PROCESSING      AND RECORD KEEPING**

### **UNIT 1      DISEASES AND THEIR MANAGEMENT**

#### **CONTENTS**

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
  - 3.1 Parasites
    - 3.1.1 External parasites
    - 3.1.2. Internal parasites.
  - 3.2 Infectious Diseases
    - 3.2.1 African Swine Fever (ASF)
    - 3.2.2 Foot and Mouth Disease
    - 3.2.3 Swine Erysipelas.
    - 3.2.4 Anthrax
    - 3.2.5 Enteritis
    - 3.2.6 Tetanus
    - 3.2.7 Mastitis
    - 3.2.8 Brucellosis
    - 3.2.9 Trypanosomiasis
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    - 3.2.11 Weil's Disease
  - 3.3 Feed-Related Diseases
    - 3.3.1 Anemia
    - 3.3.2 Constipation
  - 3.4 Other Problems
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor Marked Assignment
- 7.0 References/Further Reading

#### **1.0 INTRODUCTION**

Once disease affects a pig herd, the impact on the economics of pig production in terms of the cost of control and decreased productivity can be enormous. The first priority must therefore always be to try to prevent the occurrence of disease. Thus many of the management procedures are aimed at disease prevention or at mitigating the effects of those diseases that cannot be prevented. With skilled management, combined with well-designed housing and sound nutrition, an overall strategy to minimise the possibility of disease attack can be formulated.

## 2.0 OBJECTIVES

By the end of this unit, you will be able to:

- define parasites, their causative agents, mode of transmission, signs, and control measures of swine parasites.
- discuss the common bacterial and viral diseases of swine, their causative agents, mode of transmission, signs, and control measures
- give examples of non-specific diseases of swine.

## 3.0 MAIN CONTENT

Local pig breeds are often more resistant to diseases. The most common problem with keeping any sort of pig in free-range or semi-intensive systems is not disease, but controlling infestation by worms or other parasites. In intensive pig-keeping systems, disease is a greater risk because many animals are kept together in a small space. Infectious diseases spread easily and quickly among the animals. In intensive systems commercial breeds are often used and these tend to be less resistant to disease.

Intensive pig production is a financial undertaking. Diseases can lead to production shortfalls (slower growth rates or loss of animals) and a loss of income for the farmer. In these circumstances it is essential to take all necessary measures to prevent diseases and treat the animals if they get sick, as long as the costs of treatment do not exceed the expected loss of income.

In free-range and sometimes in semi-intensive systems, farmers do not generally have money to spend on medical treatment. Also, the pigs are probably not their only source of income. In such cases a drop in production may be considered less important, and farmers may wish to calculate whether the benefits of saving the sick animal and protecting the others justify the cost of treatment.

In terms of prevention, if there is a high risk of an infectious disease occurring, animals can be vaccinated to reduce the risk of losing them all if a disease breaks out. There are no vaccines for all diseases. For example, there is not yet a vaccine against African Swine Fever (ASF). This disease affects local and commercial breeds of pigs equally. In fact, free-range pigs make the disease spread more quickly because they move around more than pigs kept in a limited space.

### **3.1 Parasites**

Parasites are defined as organisms which live on and obtain food from the body of another, known as the host. They may live on the exterior of the pig, when they are known as external parasites or within the internal tissues and organs when they are known as internal parasites. Parasites will seldom result in the death of the host except in the case of massive infestations or if the host is also stressed in other ways.

#### **3.1.1 External Parasites**

These mainly cause irritation to the skin surface, often leading to wounds and an increased susceptibility to other infections. The most common external parasites are mange-mites, ticks, lice, fleas and flies.

**Control:** Regular treatment either dipping or spraying with suitable acaricides/anti mange medication, regular spraying of pigs and their quarters and chronic cases to be culled.

#### **3.1.2. Internal Parasites**

These include round worms, tape worms and lung worms. The control of these parasites includes breaking the life cycle i.e. regularly moving range pigs on to fresh grounds. Frequent removal of faeces in housed pigs. Breeding pigs should be routinely dosed with broad spectrum anti-helminthes and young stock dosed after weaning. Also, preventing pigs access to human faeces is particularly important in controlling tape worms.

### **3.2 Infectious Diseases**

#### **3.2.1 African Swine Fever (ASF)**

This is a viral infection. Prevent direct contact between domestic and wild pigs. No vaccine, no treatment thus far for this disease. There should be strict prevention of movement of pigs, personal and vehicles between pig farms. Do not feed pigs with uncooked garbage from hotel this may contain the virus. In case of outbreak of ASF, bury or burn the carcasses, disinfect house with strong disinfectants. Rest the house for three months.

#### **3.2.2 Foot and Mouth Disease**

Most contagious of all known viral diseases. There is no cure. If outbreak occurs in nearby farms, pigs can be vaccinated. Vaccinate with the right antiviral.

### 3.2.3 Swine Erysipelas

Caused by a bacterium that lies in the soil. Treatment is effective with right antibiotics and should be timely. Excellent vaccines are available. Routine vaccination programme is recommended to prevent infection.

### 3.2.4 Anthrax

An acute, and often fatal bacterial disease which often cause mortality in humans. There is effective vaccine against the disease. If the disease is suspected carcass should not be open as this releases infective spores. Infected carcass should be buried at sufficient depth to prevent transmission of the spores.

### 3.2.5 Enteritis (Inflammation of the Intestine)

This is a condition that can be caused by a variety of micro-organisms or inappropriate feed. It is characterised by some of the following symptoms: loss of energy and interest, high temperature, loss of appetite, diarrhoea (sometimes bloody) and weight loss. If the problem is food-related, starve the animal and give only clean water for one or two days. After that, gradually increase the feed to normal levels. The cause of the problem may be a sudden change in diet, in which case the same procedure should be followed. Common intestinal problems are listed here:

#### ***Clostridium enterotoxaemia:***

This usually occurs in piglets that are one to five days old. There is no good treatment. The sows can be vaccinated, so that the piglets build up antibodies through the sows' milk. The piglets can also be given injections of ampi/amoxicilline.

### 3.2.6 Tetanus

Tetanus bacteria can develop if a deep closed wound is incurred from rusty metal (standing on a rusty nail for example). The animals finally die as a result of severe cramps. There is no treatment.

### 3.2.7 Mastitis

This affects the tissue of the udder and can result in permanent damage, so that breeding pigs can no longer be used. Infection can be avoided to a degree by good hygiene. If mastitis is noticed, the sow must be injected with antibiotics and oxytocin as soon as possible.

### **3.2.8 Brucellosis**

This causes abortion in female animals and infection of the reproductive organs in the male animal. Sterility may result. Although treatment with antibiotics is sometimes possible for females, it is better to dispose of infected animals. The boars should be carefully controlled because the germs from the boar can be transmitted without the boar himself being ill.

### **3.2.9 Trypanosomiasis**

This is transmitted by the tsetse fly. The infected animals are feverish, lack appetite and breathe very fast. Prevention is only possible by eradicating the fly from the region. Pig breeding is therefore almost impossible in tsetse infested areas. Long acting drugs could be used to protect the pigs.

### **3.2.10 Pneumonia**

Pneumonia may be caused by bacteria, viruses (usually by both at the same time) or parasites (lung worms and intestinal worms that have found their way into the lung). The condition is made worse by keeping too many pigs in a small space, low temperatures, draughts, insufficient air humidity, and dusty surroundings. The illness is more common in the rainy season and at this time the pigs should have dry and draught-free conditions. The animals start coughing, especially after exertion and when roused, and they breathe with convulsions. Their growth is retarded. If viruses and bacteria are the cause, treatment is by antibiotics (streptomycin-penicillin, tetracycline). Ripercol R or Ivermectine is used if lung worms are involved.

### **3.2.11 Weil's Disease (Leptospirosis)**

This disease is marked by sudden abortion by a number of sows, usually towards the end of their pregnancy. The piglets are often different in size. Sometimes very weak piglets are born at the normal time. After the abortion there is no loss of fertility in the sows, and the disease dies out of its own accord within a few months. During a leptospirosis epidemic, abortions can be prevented by giving all the pregnant sows two injections of dihydrostreptomycine in doses of 25mg/kg body weight, with an interval of one week in between each injection.

### **3.3 Feed-Related Diseases**

Some diseases are related to nutritional disorders which could be either due to absence or feeding too much of a particular nutrient. Some of these disorders are described below

#### **3.3.1 Anaemia (Iron deficiency)**

This is an important problem, especially for young piglets kept indoors. The piglets become very pale a few weeks after birth and their growth slows down. The cause is an iron deficiency in the mother's milk. This can be prevented by putting iron-rich soil (mud from the ditches, forest soil) in the pen every day, giving the pigs something to root in. This soil should not have been in contact with pigs previously, and it must not carry worms. Give soil from the very first week. Very young pigs (0-3 days old) can be given an injection of iron dextran if it is available. This is commonly done in (semi-) intensive systems. Wood ash may also be put in the pen. Wood ash will not provide iron, but it provides other minerals such as calcium and phosphorus which are important for the growth of the piglets' bones.

#### **3.3.2 Constipation**

Constipated sows should have a 60 g dose of linseed oil in their feed every day. If this does not help, give 60 g of Epsom salts and the sow should be made to take exercise.

### **3.4 Other Problems**

#### **Sunstroke**

This is caused by too much sun. The skin gets burned and pigs feel pain. White skinned pigs are most susceptible to sunstroke, and their skin turns red. To prevent this, make sure there is enough shade available. An effective treatment is to bath its head in cold water. If possible, give it some brandy or whisky with a teaspoon. Make sure it has shade.

#### **Skin or Leg Problems:**

#### **Wounds or Injuries**

The main causes are either housing if there are sharp edges or fighting especially in overcrowded conditions. In order to prevent this happening the housing should be improved, avoid overcrowding and keep different ages of pigs separate. For treatment use antibiotic injections for three to five days, clean/disinfect wound and use ointment.

### **Arthritis (Swollen Joints)**

This is caused by bacteria and the symptoms include one or more leg joints seriously swollen. The pig limps, feels a lot of pain and has fever (often a body temp.  $> 40^{\circ}\text{C}$ ). For prevention, disinfect umbilical cords, smooth floors. Treatment includes the use of antibiotic injections for 5 days.

### **SELF-ASSESSMENT EXERCISE**

- i. What are Parasites?
- ii. Distinguish with three relevant examples external and internal parasites.
- iii. List and discuss six infectious diseases of pigs.
- iv. List and discuss six feed related diseases of pigs.

## **4.0 CONCLUSION**

The impact of a disease in a pig herd, in terms of the cost of control and decreased productivity can be enormous. The first priority must therefore always be to try to prevent the occurrence of disease. Thus many of the management procedures are aimed at disease prevention or at mitigating the effects of those diseases that cannot be prevented.

## **5.0 SUMMARY**

Parasites are defined as organisms which live on and obtain food from the body of another, known as the host. They may live on the exterior of the pig, when they are known as external parasites (ecto-parasites) or within the internal tissues and organs when they are known as internal parasites (endo parasites). Parasites will seldom result in the death of the host except in the case of massive infestations or if the host is also stressed in other ways.

Examples of ecto-parasites include mange mites, ticks, lice, fleas and flies. While examples of endo parasites include round worms and tape worms. Examples of infectious diseases of viral origin include African swine fever and foot-and mouth disease. Examples of infectious diseases of bacterial origin include Swine erysipelas and anthrax disease. Examples of non-infectious diseases include abscesses and gastric ulcers.

## 6.0 TUTOR MARKED ASSIGNMENT

- 1) Discuss mange-mites, round worms, African swine fever, swine erysipelas under the following headings:
  - i) Causative agent and mode of transmission
  - ii) General character and signs
  - iii) Control and prevention

## 7.0 REFERENCES /FURTHER READING

Adi, M. A. (1994) *Sheep, Goat and Swine Production in Nigeria*.

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## **UNIT 2 PIG HOUSE AND ITS EQUIPMENT**

### **CONTENTS**

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
  - 3.1 Reasons for Providing Adequate Housing for Pigs
  - 3.2 General Consideration in Designing a Pig House.
  - 3.3 Recommended Space Requirement for Pigs
  - 3.4 Equipment in a Piggery
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor Marked Assignment
- 7.0 References/Further Reading

### **1.0 INTRODUCTION**

Pigs do better when housed, and their buildings should be of concrete or with stones due to their rooting nature. Pigs productivity are more when they are housed in a thermally neutral environment i.e. when the environmental temperature around the pig is consistently between the pig's lower critical temperature (LCT) and upper critical temperature (UCT). The pig's metabolic heat production is then at minimum, and it is neither using feed energy to keep warm, nor reducing feed intake to keep cool.

### **2.0 OBJECTIVES**

By the end of this unit, you will be able to:

- explain the major reasons why provision of a house is important for pigs
- discuss the factors to consider when designing a pig's house
- highlight the common equipment that should be available in a piggery.

### **3.0 MAIN COTENT**

#### **3.1 Reasons for Providing Adequate Housing for Pigs**

- i. Protection from other climatic extremes such as direct sun, wind and rain.
- ii. Provision of dry conditions which are hygienic and do not predispose the pig to disease as they easily get pneumonia.

- iii. Allowance for natural behavioural pattern of the pig as far as possible and minimising the effect of social dominance.
- iv. Provision of accessible food and clean water.
- v. Providing conditions such that good stockmanship can be practiced.
- vi. The animals conserve energy, as they do not have to seek food and shelter.
- vii. More piglets will survive if they are born in safe, warm and healthy surroundings.
- viii. Housing makes good hygiene maintenance easier and contributes to the health of the pigs.
- ix. Feeding routines can be more carefully controlled, especially when they are adjusted for different categories of pigs.
- x. Weaning, heat control and service management can be done at the right time and in the right way.
- xi. Record keeping and management are easier.
- xii. Manure can be easily collected and used for fertilising land.

### **3.2 General Consideration in Designing a Pig House**

Right design of house is of paramount importance so that investment is justified by improved productivity.

- i. The land has to be well drained, non swampy. If the land is swampy drainage system should be constructed and the building foundation should be laid with stones and concrete and well elevated. In very cold areas, beddings of dry grass or wood shavings could be provided in their sleeping sties to provide warmth and easy cleaning of the sties, this also helps the pigs look cleaner.
- ii. It should be on the outskirts of the settlement away from public utilities like source of drinking water to prevent contamination.
- iii. Adequate ventilation should be provided by having enough windows on the building to allow for cross ventilation. This windows may be open or close depending on the need and situation in the environmental temperature. Most of the breeds of pigs in Nigeria are either exotic or cross breeds they are tolerant to cold. However, if they are taken to the southern humid or hot northern parts of Nigeria the paramount consideration is generally to ameliorate the effects of excess heat by provision of adequate shade and wallows as a means of coolant to prevent heat stress. Alternatively, pigs should be sprinkled with water when there is excessive heat.
- iv. Pigs buildings should be of concrete or with stones due to their rooting nature. They should be placed in their sites according to

their ages and sexes to make for uniform feeding and prevent indiscriminate mating and high in-breeding.

Other important requisites for the pen are as follows:

- i. It should not be draughty.
- ii. Bright sunshine and rain should not be able to enter.
- iii. Temperature inside the pen should not vary too much.
- iv. It should be easy to clean.
- v. The floor must be sloping but not slippery.
- vi. Work and management should be easy
- vii. Provision should be made for storing manure, litter and run-off for later use
- viii. In hot areas the best orientation of the building is east-west.

### 3.3 Recommended Space Requirement for Pigs

Class of Swine.....	Area
Boars.....	9m <sup>2</sup>
Dry sows (in Stalls).....	2 m long x 0.64 m wide
Farrowing accommodation:	
pen including crate.....	6.2m <sup>2</sup>
fattening/farrow on (including creep area).....	10m <sup>2</sup>
Weaners:	
Cages (per pig).....	0.2m <sup>2</sup> lying area
Yards (per pig).....	0.7-0.9m <sup>2</sup>
Porkers (pen, including dunging area).....	0.73m <sup>2</sup>
Baconers (pen including dunging area) .....	0.93m <sup>2</sup>
Heavy pigs:	
Trough space (per pig)	
Fatteners.....	0.2-0.3m <sup>2</sup>
Maiden gilts, sows .....	0.35m <sup>2</sup>

### Equipments in a piggery

The following are tools to work with in a pig farm

- 1) Scalpel blades for incision and castration
- 2) Syringes and needles
- 3) Thermometer for taking temperature
- 4) Antiseptics and Disinfectants for cleaning wounds and disinfecting pen
- 5) Restraining ropes (snare) used in restraining pigs during farm operations.
- 6) Tail docking forceps
- 7) Cotton wool and bandages for dressing and bandaging of wounds

- 8) Protective clothing like boots, laboratory coats, head wear
  - 9) Teeth clippers for cutting piglets, needle teeth.
  - 10) Feeders and drinkers
  - 11) Muzzle for handling mouth during farm operations
  - 12) Ear notches, ear tags and tag applicator for individual identification.
  - 13) Farrowing crate (60x180cm for smaller type breeds and 65x220cm for larger commercial breeds).
1. What are the reasons for housing pigs adequately?
  2. List five general considerations and five equipments when designing a pig house
  3. What are the recommended space requirement for i) Boars ii) Heavy pigs iii) Weaners

#### **4.0 CONCLUSION**

In this unit, you have learnt pigs are housed for some reasons, for designing the houses there are general considerations and equipment to note and based on the class of the pig (boar, dry sow, farrow sow, weaners, heavy pigs etc) there are recommended space requirements.

#### **5.0 SUMMARY**

Pigs do better when housed, and their buildings should be of concrete or with stones due to their rooting nature. Pigs productivity are more when they are housed in a thermally neutral environment i.e. when the environmental temperature around the pig is consistently between the pig's lower critical temperature (LCT) and upper critical temperature (UCT). The pig's metabolic heat production is then at minimum, and it is neither using feed energy to keep warm, nor reducing feed intake to keep cool. Right design of house is of paramount importance so that investment is justified by improved productivity. The land has to be well drained, non swampy and outskirts of the settlement away from public utilities like source of drinking water to prevent contamination. If the land is swampy drainage system should be constructed and the building foundation should be aid with stones and concrete and well elevated. In very cold areas, beddings of dry grass or wood shavings could be provided in their sleeping sties to provide warmth and easy cleaning of the tiles, this also helps the pigs look cleaner.

#### **6.0 TUTOR- MARKED ASSIGNMENT**

1. List the major considerations for designing a pig house.
2. List 10 important equipment in a pig house

## 7.0 REFERENCES /FURTHER READING

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## **UNIT 3      PROCESSING OF PIG PRODUCTS AND RECORD   KEEPING**

### **CONTENTS**

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
  - 3.1 Transportation of Pigs to Markets
  - 3.2 Lairage
  - 3.3 Slaughter Procedure
  - 3.4 Bleeding
  - 3.5 Scalding and De-Hairing
  - 3.6 Evisceration
  - 3.7 Meat Hygiene
  - 3.8 Marketing
  - 3.9 Uses of Pig Meat
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor Marked Assignment
- 7.0 References/Further Reading

### **1.0 INTRODUCTION**

Pig processing start by transporting them to the slaughter house. The method, by which they are restrained, transported and the stress to which they are subjected becomes very important.

The final phase of pig production is the sale and disposal of the end product. The pig is extremely versatile in terms of the number of product which can be derived from pig meat.

### **2.0 OBJECTIVES**

By the end of this unit, you will be able to:

- transport your pigs without much stress
- slaughter and dress a pig carcass
- identify and process pork into various products and market it.

### **3.0 MAIN CONTENT**

#### **3.1 Transportation of Pigs to Markets**

The stress of transporting pigs to the slaughterhouse can result in pigs dying in transit, dying in lairage, at the slaughterhouse, or reduced meat quality in the carcass. The stresses which confront the pig are the handling at loading and unloading, the new surroundings, mixing with strange pigs, the physical discomfort of the journey, and most importantly under tropical conditions, heat stress.

Measures taken to minimise these stress include:

- i. Ensure that the loading ramp is properly designed with solid walls and is at the correct height for the cart, truck or trailer.
- ii. Handle the pigs quietly and gently at all times. Avoid the use of sticks and prodders.
- iii. Do not feed pigs for 12 hours before loading.
- iv. Avoid loading and traveling during the heat of the day.
- v. Spray the pigs with cold water before loading and again in the truck.
- vi. Provide cover on the truck, good ventilation, adequate bedding and ensure the floors are not slippery. Make sure the sides of the truck are high enough to prevent the pigs jumping out. If possible, subdivide animals into groups of 10 or fewer, and never mix pigs of different weight.
- vii. Do not stop en route to the slaughterhouse.

#### **3.2 Lairage**

It is important to pen the pigs waiting to be slaughtered under shade and in small groups and sprayed with water, and feed only if there are long delays before slaughter. Pigs should be handled and driven quietly and gently at all times and supervised to prevent fighting. As far as possible, avoid fear, they should be penned away from the sights and smells of the slaughtering process. All the potential profits which have been achieved during the growing period can be nullified by deaths or damage at this stage.

#### **3.3 Slaughter Procedure**

For reasons of animal welfare, pigs should always be stunned before they are bled. Effective stunning ensures prompt and more complete bleeding and also minimises intensive muscle contraction. The main methods of stunning are:

- Mechanical: A captive-bolt pistol or other implement is used to stunned the animal.
- Electrical: A pair of tongs is used to apply an electrical charge to the pig's head. A current of 1.25 amps and 300 to 600 volts renders the pig unconscious within one second.
- Gas: pigs can be led into a tunnel containing 70 to 80 percent carbon dioxide, when they will lose consciousness within two seconds.

### **3.4 Bleeding**

Immediately after stunning the animal should be suspended by its hind legs and the blood vessels of the neck completely severed to ensure thorough and complete bleeding. The blood should be collected in clean vessels.

### **3.5 Scalding and De-Hairing**

By immersing the carcass in water at 65 to 75 C, the hair is loose and can be removed by scraping. Any excess hair can be burnt off by a flame. For small scale farmers who are slaughtering on the farm, a drum of water over fire is adequate for scalding purposes. Or alternatively where water is scarce, and if the skins are not used, de-hairing can be achieved by covering the carcass with a 5cm deep layer of straw or dry grass and burning it. The skin can then be scraped to remove the carbonised surface and any remaining hair.

### **3.6 Evisceration**

A long cut is made down the belly from the breast to the hams. To prevent the meat being contaminated, the entire length of the gut should be removed intact. Other internal organs can be separated, and the gut emptied and cleaned away from the rest of the meat.

### **3.7 Meat Hygiene**

The freshly killed carcass is an ideal breeding ground for bacteria and hygienic conditions are of paramount importance to prevent infections. Ideally carcass should be chilled immediately after slaughter, and the meat should remain chilled until it is cooked. Where refrigerator is not available, carcasses should be hung in a cool room, protected from flies by gauze, and then sold and eaten as soon as possible. At any slaughterhouse, all carcasses should be examined by a qualified meat inspector. He examines the carcass and offal critically for signs of parasites infections (e.g. mealy pork, 'milk-spot' livers, damaged lungs, etc.). Meat that does not pass inspection is condemned and should be

burnt. The carcass slaughtered from pigs on the farm should also be examined critically so that the transmission of disease and parasites from pigs to humans can be avoided.

### **3.8 Marketing**

The main systems of marketing pigs are:

- i. **Private sales:** This is the most common method in the tropics among small scale producers. One, or a number of pigs are sold to local consumers, other producers, butchers or middlemen. The pigs are sold live and the price is generally subject to negotiation this system has the advantage of being the simplest, but in rural areas individuals who are not aware of current prices can be taken advantage of by speculators and dealers. Due to this problem, marketing co-operative have been formed in some rural areas to ensure adequate prices for producer members.
- ii. **Public sales:** This involve taking the pigs to a central market place, where they are sold by auction on a live basis to the highest bidder.
- iii. **Direct sale to an abattoir or butcher:** This is more applicable to a larger- scale producer. The big disadvantage of direct sales is the effect of the 'pig cycle'. This is the notorious fluctuation in price which occurs in most countries. When pigs are in short supply, prices rise, but this in turn stimulates increased production among producers, and consequently prices fall. As it takes approximately a year for a producer to react to price changes, the cycle will occur every 12 to 18 months. This leads to lack of stability with producers going in and out of pig production.
- iv. **Contact sales by entering into a contract with an abattoir to supply a certain number of pigs over a period at a set price,** the producer is largely protected from the effects of the pig cycle. In turn, this allows him to plan his production output over a longer time.

### **3.9 Uses of Pig Meat**

Pig meats are marketed in the form of:

- **Fresh meat:** This is the most important product in the tropics in general, as processing facilities are limited. Pig destined for the fresh meat trade are usually slaughtered at younger ages and lower weights (porkers) than those used for processing. If sold in the commercial markets, the carcass can be butchered into a number of whole sale cuts which can be cooked and eaten in a number of different ways.

- Cured products: These include the various bacons and hams which are cured in brine and can also be flavoured by hanging in smoke to increase the shelf life of the product compared with fresh meat. Bacon and ham are derived from the baconer category of pig, which is heavier than the porker.

## **Records Keeping and Monitoring**

For those who intend to keep a number of pigs for breeding purposes it is essential to have a good system of record-keeping. This will help to keep track of developments, make comparisons and take decisions on the management of the herd. It will also have a direct positive impact on daily management. Good record-keeping means noting down simply and clearly all important details and events. It can also be used to provide and record information for future activities. It is important for example to calculate and note the next date for checking whether a sow is in heat or the date when she should farrow. Such information should be marked on a card, in a notebook or on a calendar, so that any necessary preparation can start well in advance (for example preparing the farrowing pen for the sow). For a farm of up to 3 sows, a system of record-keeping requires no more than a notebook or exercise book. Use a few pages for each sow, and note down all the important events. For bigger farms it is good to use a separate farrowing card for each farrowing of a sow, and a sow card giving the details of all the litters of one sow. Relevant information to record includes:

### **For a breeding sow:**

- i. The name/number of the sow
- ii. The month and year of her birth
- iii. Her parents' names or numbers and breed

### **Important events:**

- i. Date of 1st heat
- ii. Date of 2nd heat
- iii. Date of 3rd heat
- iv. Date of mating, and name of the boar
- v. Result of the heat check three weeks after mating (did she come in heat again?)
- vi. Anticipated date of farrowing – mark this on a calendar!
- vii. The date for putting the sow in a farrowing pen (one or two weeks before farrowing). Mark this on the calendar too!
- viii. Actual date of farrowing

- ix. Size of the litter, number of healthy piglets, number of still-born
- x. piglets and, if possible, the weight of the piglets.
- Number and weight of piglets that have survived and have been successfully weaned (this gives an idea of the sow's mothering qualities).

**Other information to note:**

- i. Dates of illness, nature of the problem and the treatment and/or medicines administered.
- ii. Vaccination information.
- iii. If a piglet is selected for further breeding, information should be transferred to the new page of records opened for that piglet in its new role as a breeding sow or boar.
- iv. It is important to record the boar's activity and the results obtained, so that his performance can be assessed. The fertility of the boar is indicated by the size of the litters he produces and the percentage of sow's in-pig after a first service (insemination rate).

**SELF -ASSESSMENT EXERCISE**

- i. Mention the measures to take to reduce stress when transporting a pig.
- ii. Describe the steps taken in process a life pig to meat.
- iii. Discuss meat hygiene and the different marketing systems of pigs.
- iv. List the uses of pig meat.
- v. What are the relevant records and information to take note of when breeding a sow?

**4.0 CONCLUSION**

In this unit you have learnt about the factors that have to be considered when pigs are to be transported in order to avoid stressing the animal. You have also learnt the procedures to follow during slaughter as well as the process pig meat into various products and market it.

**5.0 SUMMARY**

Pigs should be transported with as little stress as possible. This will ensure that they get to slaughter in good condition. Slaughter should be carried out without exposing the pigs to unnecessary fear and the carcass properly bled and processed as this process affects the quality of meat obtained and therefore the income that could be generated. Different

methods of stunning exist the farmer should choose the method that best suits him. Marketing is an important aspect production and should be taken into consideration when planning the pig enterprise. Records of activities on the farm should be properly kept as they assist in providing information that is used in taking management decisions.

## **6.0 TUTOR-MARKED ASSIGNMENT**

1. List the conditions that have to be met before a pig can be transported to avoid stress.
2. What are the procedures to follow when slaughtering pigs?
3. Why is record keeping important in a farm?

## **7.0 REFERENCES/ FURTHER READING**

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## **MODULE 3      IMPORTANCE,      BREEDS      AND MANAGEMENT OF RABBITS**

Unit 1	Rabbit and its Characteristics
Unit 2	Breeds of Rabbits
Unit 3	Breeding Methods in Rabbit Reproduction
Unit 4	Management Practices in Rabbit Husbandry
Unit 5	Housing and its Equipment

### **UNIT 1      THE RABBIT AND ITS CHARACTERISTICS**

#### **CONTENTS**

1.0	Introduction
2.0	Objectives
3.0	Main Content
3.1	Taxonomy of the Rabbit
3.2	Advantages of Keeping Rabbits
3.3	Biology of the Rabbit
3.4	Feed Digestion in Rabbits
4.0	Conclusion
5.0	Summary
6.0	Tutor-Marked Assignment
7.0	References/Further Reading

#### **1.0      INTRODUCTION**

Rabbit are used for meat, for vocational projects, as laboratory animals, as teaching tool, as animal research models and for pets. Because of their use in a wide range of enterprises, it is necessary to have a good knowledge of the different aspect of their management and nutrition. A rabbit is a swift moving small herbivorous mammal, with big ears, large muscular hindlegs, large front teeth and a short tale. Their powerful hindlegs are built for running, jumping, and digging out burrows. They have an excellent sense of smell, hearing, and eyesight. But their eyesight at night is actually worse than a human's. This is because they are crepuscular, chiefly active at twilight, the time between day and night. Rabbits vary in size from one to two feet (30 to 60 cm) long. Often people include hares in the term rabbit but these are two different genera. The main differences are, that hares have longer ears, bigger feet, do not live in burrows, and give birth to young that are not blind and naked from birth (precocial).

## 2.0 OBJECTIVES

By the end of this unit, you will be able to:

- classify the domestic rabbit
- state the advantages of keeping rabbits
- describe the biology of the domestic rabbit.

## 3.0 MAIN CONTENT

### 3.1 Taxonomy of Rabbits

The rabbit belongs to the Phylum *Chordate*

Sub-phylum *Vertebrata*

Class *Mammalia*

Order *legomorpha*

Family *Leporidae*

Genus *Oryctolagus*

Specie *Oryctolagus cuniculus*

The domestic rabbit descended from wild rabbit found in the Mediterranean countries and was introduced into England in the late 11th and early 12th century. The different breeds of modern domestic rabbit have evolved as far back as the 18th century. In early 1960, United State Department of Agriculture (USDA) was involved in introducing more rabbit to Western Nigeria.

### 3.2 Advantages of Rabbit Keeping

- i. Rabbit can be quickly grown.
- ii. They are a cheap source of protein. China, on the other hand, is the world's leader in rabbit meat production with 31%.
- iii. They can be reared for consumption or commercial undertaking.
- iv. In the United States rabbits are raised mainly for nonfood purposes such as pets, medical and cosmetic research, and some high-quality rabbit skins. Rabbits are altricial, which means their young are born blind and naked, and require parental care. In the wild, a rabbit will live about a year. In comparison, a well-cared for house rabbits are expected to live 8 to 12 years in Europe and Asia.
- v. The meat of rabbit is fine grained white meat, which is high in protein, low in fat. The World Health Organisation has recognised rabbit meat as the leanest and healthiest meat in the world.
- vi. Rabbit meat is low in cholesterol.

- vii. Rabbits are territorial but live in a loosely organised society.
- viii. A rabbit carcass is only 20% bone and its meat can be easily substituted for poultry in many recipes. In fact, the lack of fat in rabbit meat is what leads to a condition called "rabbit starvation."

This condition occurs because the simplest way for your body to generate energy is to convert carbohydrates into glucose. But if carbohydrates are not available to your body, it can convert fat into glucose; if fat is not available, it can convert protein into glucose. This process is called gluconeogenesis, and it takes place in the liver. Today's high fat diet now welcomes the same lean qualities that were lethal to our ancestors.

### **3.3 Biology of the Domestic Rabbit**

Rabbits have large eyes located on the upper part of the sides of their head that have a 36<sup>0o</sup> field of view, except for a blind spot at the tip of their nose. Their eyes are limited in terms of depth perception and close-up vision. Instead, the rabbit's vision system is designed to pick up any kind of movement at a far distance. Rabbits are crepuscular, meaning they are most active at dawn and dusk. This is part of their survival strategy since at twilight it is too bright for the nocturnal predators to see well, and too dark for the diurnal predators. They may also be active at night and during the day, but bright light restricts the aperture of the pupils, decreasing visual acuity. Intense light can actually blind a rabbit. Their eyes are composed of a double retinal system of rods and cones that are especially sensitive to the blues and greens present at twilight. Rabbits have a third eyelid called a nictitating membrane. It moves across the surface of the eye, offering protection and lubrication.

As with other herbivores, rabbits spend a great deal of time either feeding in the open or re-ingesting caecal pellets under safe cover. Rabbits will usually graze close to their burrow. Their teeth grow continuously, as they are "open rooted". The modified incisors act like a chisel cutting instrument, clipping off vegetation before it is passed to the back of the mouth for grinding. Their teeth grow at a rate of 3.9 to 4.7 inches (10 to 12 cm) per year. The anterior side (the side you see) of the incisors has a layer of enamel which causes it to wear more slowly than the posterior side, which has no enamel. During the course of wear this forms a natural chisel profile, keeping the teeth sharp. The lower teeth grow faster than the upper teeth. As they feed, they drop fecal pellets which fertilise the plants they eat. Rabbits are territorial but live in a loosely organised society. The female hierarchy within the warren is separate from the male hierarchy. While fighting is used to establish the

hierarchy's order, it is rare in an established colony. Exceptions to this rule are fights over receptive females, and empty burrows.

Rabbit behaviour is not flamboyant and overt, but quiet and heavily reliant on scent. They are born with this sense of smell and it allows them to find their mother's nipples so they can feed. 100 million sent cells form a nasal membrane with movable folds that assist in the detection of scent. They twitch their nose up and down to help identify a scent. This is called "nose blinking." They use this highly developed sense of smell to identify predators and other rabbits. Rabbits mark their territory with droppings that are given an individual scent from glands in the anus. They also use scent glands under the chin, either side of the perineum (inguinal glands,) and at the anus (anal glands) to demonstrate ownership of property such as burrow entrances. Inguinal glands are large pouch-like glands that usually contain a yellow/brown oily deposit. Does are often more territorial than bucks, and can get aggressive towards other rabbits that enter their territory.

Aboveground sentry rabbits will sit upright on their haunches, allowing them to see further. When a possible predator threatens, the sentry rabbits will thump the ground loudly with his hind legs. When the other rabbits out in the open hear the warning, they will either flatten themselves on the ground and hide, or run for cover or the safety of the burrow. On occasion, in defense of their burrow or nest, rabbits have been known to fight tooth and nail. Both bucks and does will kick, bite, and spray urine as a defensive gesture when threatened. A rabbit running from a predator will only run in a straight line for a short distance before bouncing to the side. When pursued for longer distances, rabbits will run in wide circles. The desert cottontail, for instance, will run in a circle that is approximately an acre in size. As a rabbit runs, it emits scent from between its toes. The scent becomes weaker as the rabbit tires, which can actually be sensed by some well trained hunting dogs. Pregnant females have very little scent as a form of natural protection from predators. A good time to look for rabbits is on the first warm day after a cold snap. They often will be sitting out in the open, soaking up the sunlight. On cold and windy days, they will either be in their burrows or in thick tangles of vines, briars, and any other cover that protects the rabbit from the elements.

### **3.4 Feed Digestion in Rabbits**

Rabbits are hind-gut fermenters, designed to digest low quality, high fiber food such as grass. Unlike other fermenters, rabbits have a high rate of flow through their digestive tract. This minimises the need to store and carry food that is being processed, and results in a small, lightweight, and fast moving animal. But their digestive system is also

highly efficient, discarding large particles and collecting small particles for fermentation and nutrient extraction. This efficiency minimises the time that rabbits must spend above ground exposed to danger while feeding. Rabbits will eat almost any vegetation they find, including leaves, shoots, herbs, grasses, grains, leaf buds, bark, stems, branches, and vegetables such as lettuce, beets, carrots, and of course cabbage. North American rabbits do not dig burrows as European rabbits do. Instead, they have shallow fur-lined nests on the surface of the ground called "forms". These rabbit forms are well concealed in dense vegetation. European wild rabbits, on the other hand, live in a series of underground tunnels called a warren.

### **SELF -ASSESSMENT EXERCISE**

- i. What is the taxonomical classification of the rabbit?
- ii. List five uses of rabbits
- iii. Discuss the biology of the domesticated rabbit.
- iv. Describe the digestion of rabbits.

## **4.0 CONCLUSION**

There are a lot of advantages in raising rabbits (*Oryctolagus cuniculus*). Because of their small size they also fit into the farming system common to the tropics. The meat of rabbits is healthy with very low cholesterol compared to chicken. The rabbit being a hindgut fermenter can digest fibrous feed materials but for high productivity some form of supplementation is necessary.

## **5.0 SUMMARY**

In this unit you have learnt about the origin of the domestic rabbit, the advantages of raising rabbits as well as the high quality of rabbit meat. The biological characteristics of rabbits have also been highlighted. The unit also describes the digestion process in rabbits with its peculiarity.

## **6.0 TUTOR -MARKED ASSIGNMENT**

1. Briefly state the advantages of rabbit keeping.
2. Describe how rabbits are able to handle fibrous feed materials.

## **7.0 REFERENCES/FURTHER READING**

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## **UNIT 2 BREEDS OF RABBITS**

### **CONTENTS**

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
  - 3.1 Classification of Rabbits
  - 3.2 Major Breeds of Rabbits
    - 3.2.1 California Breed
    - 3.2.2 New Zealand White
    - 3.2.3 American Chinchila
    - 3.2.4 Dutch
    - 3.2.5 Flemish Giant
    - 3.2.6 New Zealand Red
    - 3.2.7 English Spot
    - 3.2.8 Lop
    - 3.2.9 Dwarf
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor Marked Assignment
- 7.0 References/Further Reading

### **1.0 INTRODUCTION**

Rabbits are classified into small, medium large or giant breeds based on their body weight. There are also different breeds that fall within these broad classifications. Some of these breeds are described in this unit so that you can identify them and be able to choose the one that best meet your production objectives.

### **2.0 OBJECTIVES**

By the end of this unit, you will be able to:

- classify rabbits based on their body size
- describe the various breeds of rabbits.

### **3.0 MAIN CONTENT**

#### **3.1 Classification of Rabbits**

Based on body size, rabbits have been classified as follows:

Small - 0.9-2.7 kg

Medium - 2.7-4.1 kg

Large - 4.1-5 kg

Giant - 5 kg

## **3.2 Major Breeds of Rabbits**

### **3.2.1 California Breed**

This is the second most popular breed for meat production. The colour is all white but with black tipping on the nose, ears, feet and tail. The weight range for the mature Californian is 3-4.5 kg.

### **3.2.2 New Zealand White**

This breed is the one used most widely throughout the world for meat production. It is all white in colour and usually weighs three to five kilograms when mature.

### **3.2.3 American Chinchilla**

This breed is blue-grey in colour with a white belly. It has a characteristic ruff or dewlap. This is a thick fold of skin around the front of the chest which is very obvious when the rabbit is in good condition and sitting in a resting position. The weight range for the mature Chinchilla is 3-4.5 kg.

### **3.2.4 Dutch**

The Dutch is a small breed with a mature live weight of 2.5-3.5 kg. It has a wide white band of fur around its body at the shoulders as well as a white stripe down the middle of its face. Its front feet fall within the white and the tips of its back feet are also white.

### **3.2.5 Flemish Giant**

This is a giant breed which at maturity can weigh well over 6 kg. It is usually light grey in colour but may also be sandy blue or white. This is not a suitable breed for the beginner.

### **3.2.6 New Zealand Red**

This breed is essentially a red New Zealand white type which has not been as intensively selected for growth rate. Mature live weight is lower than the white type, at 3-4.5 kg.

### **3.2.7 English Spot**

Mature weight 2.3 – 3.6kg. colour shades; Black, Blue, Chocolate, Gold, Gray, Lilac, Tortoise. This breed is mostly white, with a butterfly mark on the nose, colored ears, and eye circles that usually have a little "fling" on the side but rarely have a perfect circle, and chains of colored spots along its sides including a herringbone stripe down its back.

### **3.2.8 Lops**

Lops are known for their distinctive ear length, width and shape. Ears are floppy. Five types generally accepted in USA are: French Lop, English Lop, Mini Lop, American Fuzzy Lop and the Holland Lop. French ears shorter than English. Weighs about 5-5.5kg at maturity.

### **3.2.9 Dwarf**

These are very small breeds. The average litter size is two to four, as opposed to the larger breeds which have 6 - 12 bunnies. Dwarf rabbits are more susceptible to coccidiosis, an intestinal parasite that many times proves lethal to the young rabbits between three and ten weeks of age.

## **SELF-EXERCISE EXERCISE**

- i. What is the classification of rabbits based on body size?
- ii. List and describe five major breeds of rabbits.

## **4.0 CONCLUSION**

You have learnt about the different classifications of rabbits. You have also been able to know some of the different breeds that exist as well as the features that define each of the breeds. There is no one best breed but breeders choose the breeds that best fit their production objectives

## **5.0 SUMMARY**

There are four main classes of rabbits. All the breeds described above fall under these classes. The breeds are distinct and have evolve over years of selection and adaptation to their environment.

## **6.0 TUTOR-MARKED ASSIGNMENT**

1. List the classes of rabbits you know.
2. Describe fully any four breeds of rabbits that you know.

## **7.0 REFERENCE/FURTHER READING**

Briggs, H. M. & Briggs D. M. (1980). *Modern Breeds of Livestock*. (4th ed.). Macmillian Publishing Co.

## **UNIT 3 BREEDING METHODS IN RABBIT KEEPING**

### **CONTENTS**

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
  - 3.1 Selection for Breeding
  - 3.2 Mating
  - 3.3 Care of Does During Pregnancy
  - 3.4 Gestation Period
  - 3.5 Kindling
  - 3.6 Weaning
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor Marked Assignments
- 7.0 References/Further Reading

### **1.0 INTRODUCTION**

Reproduction is a process of giving birth, is a complex process controlled by many substances called hormones which are produced in endocrine glands in the body, and in other parts of the body like the ovaries. Hormones are produced in very small amounts. They are transported to the organ they controlled (target organ) by the blood circulation system. Different hormones act on different parts of the reproductive system at different times to ensure successful reproduction.

### **2.0 OBJECTIVES**

By the end of this unit, you will be able to:

- select a doe for breeding purposes based on certain quality characteristics
- confirm pregnancy from certain characteristic behaviour of a pregnant doe
- differentiate the male from the female in young rabbits
- discuss the need for special care during weaning of young rabbits.

## **3.0 MAIN CONTENT**

### **3.1 Selection for Breeding**

Breeding stock should be selected from does who are good mothers and who have good body size and shape. Also to be considered is the live weight of the rabbits, select the heaviest but take account of any differences in age if selecting from more than one litter. In the size of the litter of which the rabbit is a member, give selection preference to rabbits from the largest litters if there are enough litters to give a choice. Select rabbits free of any signs of ill-health. Males should be checked to confirm that each has two testicles in its scrotum.

### **3.2 Mating**

On forage based systems, does are normally ready for mating at about 8-10 months. At this age their growth will be slowing and they will be able to direct a larger portion of available food to reproduction. The weight at mating varies according to breed. Effort should be made to determine the optimum weight for mating for any breed in question. The same applies to bucks as to does, but bucks can usually be used for mating from six to eight months, depending on the condition. The ratio of does to bucks should not exceed 10:1. However, for safety, it may be sensible to have two bucks for more than six does and three for more than twelve. Experience has shown that early morning or evening mating is best. It is advisable to avoid the hottest periods of the day.

For mating, the doe should be taken to the buck's hutch if it is done the other way round the doe may attack the buck and cause injury. If the doe is ready to be mated she will stand still within a few seconds, stretch out and slightly raise her hind quarters 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. This is very easy to see. If the buck slides backwards off the doe and does not fall, then mating has not taken place. Once mating has taken place the doe is removed from the buck's hutch. The doe may be returned after an hour or so for a second mating. This is a good practice for new keepers to follow.

### **3.1 Care of Does During Pregnancy**

Pregnant does will often accept the buck during pregnancy, so refusal to mate cannot be used to confirm pregnancy. The first real confirmation of pregnancy can be obtained at about 14 days after mating. The doe should be relaxed and sitting naturally. If fingers are then gently run along the abdomen, between the back legs small bead-like lumps can be felt if the doe is pregnant these are developing fetuses. Inexperienced keepers

should practice detecting pregnancy in does that are 20 days pregnant, at which stage the fetuses are easy to identify. By around 28 days the mammary gland will have developed significantly and this can be regarded as final confirmation of pregnancy. At around 29 days the doe will begin to remove fur from her abdomen to make a nest. Pregnancy or gestation is the time from fertilisation to the time of kindling or parturition which takes 31 or 32 days. On the average, pregnancy period lasts 30 days in the common commercial breed. During this period the doe should be well fed and protected from stresses such as dogs and general noise.

### **3.4 Gestation Period**

This is the time from fertilisation to the time of kindling or parturition which takes 31 or 32 days. On the average, pregnancy period lasts 30 days in the common commercial breed. About four to five days before kindling a nesting box should be brought in with some wood shaving of fine straw placed on the floor of the box. It will soon be found that the doe begins to remove hair from her abdomen and sides and place them in the box to prepare a warm cushion for the young ones soon to be born. The young ones of rabbit are born naked and blind. Their mother uses the hairs in the box to cover them to keep warm.

### **3.5 Kindling**

The doe usually kindles or gives birth, at night. Once kindling has finished the doe will pluck more fur from her abdomen and cover the young rabbits. It is best to leave her undisturbed for two to three days after kindling unless there are obvious problems. It is a good practice to have some cotton wool ready to cover the litter if the doe has not done this properly herself.

### **3.6 Weaning**

Weaning is the separation of the doe and the young. It should be done around six to eight weeks after kindling. The best method of weaning is to take the doe away from the litter. To do it the other way round will put too much stress on the litter. The period after weaning is another critical time for the young rabbits and it is a time for feeding some concentrates if available. Small amounts of concentrate at this time will have a big effect on growth rate. As the rabbit grow they may be gradually taken off concentrates but their growth rate will slow as a result. The litter will soon require extra hutch space. After weaning, the doe should be allowed time to recover her body condition before re-mating. Weekly weighing is the only sure method of checking that she is

regaining her body reserves. Does can continue breeding until they are three to four years old.

### **SELF- ASSESSMENT EXERCISE**

Discuss the following

- i) Selection for breeding
- ii) Care of does during pregnancy
- iii) Gestation period
- iv) Kindling
- v) Weaning

### **4.0 CONCLUSION**

Reproduction is a complex process controlled by substances called hormones. Breeding stock should be selected from does who are good mothers and who have good body size and shape to ensure healthy offspring.

### **5.0 SUMMARY**

Reproduction is a complex process controlled by substances called hormones which are produced in endocrine glands in the body, and in other parts of the body like the ovaries. Hormones are transported to the organ they controlled (target organ) by the blood circulatory system. The female reproductive system consists of the ovaries (2), oviducts or fallopian tubes (2), uteri (2), cervix, vagina, vulva and Mammary glands (8-10). While the male reproductive system consists of: the testicles (2), *vas deferens* (2), Penis and associated glands.

Breeding stock should be selected from does who are good mothers and who have good body size and shape. The ratio of does to bucks should not exceed 10:1. First real confirmation of pregnancy can be obtained at about 14 days after mating. The doe should be relaxed and sitting naturally. If fingers are then gently run along the abdomen, between the back legs small bead-like lumps can be felt if the doe is pregnant, these are developing fetuses. The doe usually kindles or gives birth, at night. Sexing of rabbit can be done any time as from the moment of weaning. Weaning is the separation of the doe and the young. It should be done around 6-8 weeks after kindling.

### **6.0 TUTOR MARKED ASSIGNMENT**

- 1
  - a) How will you manage a pregnant doe?
  - b) Explain the criteria used in selecting does for breeding.

## 7.0 REFERENCES/FURTHER READING

I. McDonald, J. L. (1985). *Livestock Rearing in the Tropics*. Macmillan Education Ltd.

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## **UNIT 4            MANAGEMENT PRACTICES IN RABBIT                          HUSBANDRY**

### **CONTENTS**

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
  - 3.1 Husbandry Skills
    - 3.1.1 Observation
    - 3.1.2 Rabbit Examination
    - 3.1.3 Weighing
    - 3.1.4 Nail Trimming
    - 3.1.5 Identification
  - 3.2 First Aid
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor Marked Assignment
- 7.0 References/Further Reading

### **1.0 INTRODUCTION**

Many skills are needed if rabbit farming is to be successful. Observation, examination, record keeping, hutch design, building and siting, food identification, selection, production and storage, good management practices etc. are all part of the skills needed for a successful operation.

### **2.0 OBJECTIVES**

By the end of this unit, you will be able to:

- appreciate the significance of routine management practices
- discuss the different methods of rabbit identification
- recognise the importance of record keeping in rabbit farming.

### **3.0 MAIN CONTENT**

#### **3.1 Husbandry Skills**

##### **3.1.1 Observation**

This means not only looking but bearing in mind. It is an important ability for all animal keepers. It depends on the rabbit keeper having real curiosity and compassion for the rabbits. It is a talent that comes with

practice but can be developed with the help of questions to be used each time you visit the rabbit unit. Questions like is everything the same as the last time I came? Are the hutches as normal? Is there any food left? Are there any signs of blood? Is the fence wire coming loose? Is there lots of hair in the hutch, suggesting moulting? These questions are only a guide; you may ask yourself as many questions as you can with the aim of identifying any anomaly or problems.

### **3.1.2 Rabbit Examination**

Rabbit examination is required after a new rabbit is being bought or rabbits are being checked prior to selection for breeding. Examine for the following: Does it look healthy? Is its head on one side? Is it isolating itself from the other rabbits? Are there scabs on the skin? Are the nostrils clear or running with other fluid? Are the hard faeces normal? Are there any sores in the ears? Is the gait normal? How is the weight compared with the age?

### **3.1.3 Weighing**

This is done to check on their growth and their general condition. Rabbits can be weighed by two methods: either by the use of a pan-scale or a spring balance.

### **3.1.4 Nail Trimming**

Rabbit's nails need to be trimmed from time to time because rabbits in hutches do not wear down the nails on their feet by burrowing or running about. The nails can scratch the keeper, and can injure the rabbit too. A pair of sharp scissors or human nail clipper can be used to trim the nails.

### **3.1.5 Identification**

This is a way and means of recognizing one's animals (rabbits) and differentiating between one's animals (rabbits) from another farmer's own and differentiating between individual animals (rabbits). There are several methods employed to achieve this.

- Writing in the ear
- Labels
- Ear-notching

## Writing in the Ear

For rabbits that has light-coloured skin in its ear, a coloured or indelible pen can be used to write a number inside the ear. This will last a week and will have to be renewed regularly.

## Labels

With care labels or leg bands can be fitted around the back leg of a rabbit for identification. These labels are hand made from in or plastic. Care should be taken to avoid injury or cutting.

## Ear-Notching

This means clipping little pieces out of the rabbit's ears at different places, to indicate different numbers. Notching is a permanent and effective method but requires a special notching instrument a livestock officer will assist the rabbit keeper.

## 3.2 First Aid

Occasionally rabbits may suffer from injuries caused by fighting or by sharp edges on wire floors or on feeders. It is important to treat these injuries as soon as possible, to prevent them from becoming more serious. First aid involves several steps as follows:

- cleaning the injury with antiseptic solution;
- drying;
- treating with antiseptic cream;
- Protecting from further injury and infection.

It can be helpful to have a first aid box. This could include the following items:

- a bowl for holding antiseptic solution
- a clean cloth
- antiseptic concentrate
- antiseptic cream
- cotton wool
- scissor or razor blade
- bandage
- a syringe for dosing medicine

## **SELF -ASSESSMENT EXERCISE**

- i. List and explain six important rabbit husbandry skills.
- ii. What are the first aid steps to take in rabbit injury?
- iii. list seven items in a first aid box.

## **4.0 CONCLUSION**

Skills needed for a successful rabbit operation therefore include observation, examination, record keeping, hutch design, building and siting, food identification, selection, production and storage, and good management.

## **5.0 SUMMARY**

Observation is a skill that comes with practice but can be developed with the help of questions to be used each time you visit the rabbit unit. Rabbit examination is required after a new rabbit is being bought or rabbits are being checked prior to selection for breeding. Weighing is done to check on their growth and their general condition. Rabbits nails need to be trimmed from time to time.

## **6.0 TUTOR -MARKED ASSIGNMENT**

- 1a) Discuss in detailed the skills needed for a successful rabbit production.
- b) Give an account of the types of records available in a rabbit farm.
- c) List all the components of a first aid box and explain why it is needed in a rabbit farm.

## **7.0 REFERENCES/ FURTHER READING**

Fielding, D., Smith, A. J. & Coste, R. (1991). *Rabbits the Tropical Agriculturalist*. (CTA) Macmillan.

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## **UNIT 5     HOUSING AND ITS EQUIPMENT**

### **CONTENTS**

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
  - 3.1 Housing
    - 3.1.1 Housing Requirements
    - 3.1.2 Space
    - 3.1.3 Protection
    - 3.1.4 Convenience to the Rabbit Keeping
  - 3.2 Types of Housing
    - 3.2.1 Indoor Hutch
    - 3.2.2 Outdoor Hutch
    - 3.2.3 Floor Method
  - 3.3 Hutch Equipment
    - 3.3.1 Equipment Required
    - 3.3.2 Maintenance of Hutches and Equipment
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor -Marked Assignment
- 7.0 References/Further Reading

### **1.0 INTRODUCTION**

Rabbit housing (hutches and cages) and equipment differ from country to country. Factors governing their design include climate, availability and cost of raw materials, scale and system of production and the expertise of the rabbit keeper. There are, however, some basic requirements which all hutches and equipment should satisfy and any new or existing hutches and equipment should be assessed against these requirements.

### **2.0 OBJECTIVES**

By the end of this unit, you will be able to:

- discuss the basic requirements of a rabbit house in terms of, space needed, protection, convenience and ease of management
- explain indoor and outdoor hutches, their advantages and disadvantages
- examine the idea of floor system of keeping rabbits, its requirements and problems
- explain hutch equipment, their requirements, types, uses and maintenance.

### **3.0 MAIN CONTENT**

#### **3.1 Housing**

##### **3.1.1 Housing Requirements**

Any rabbit hutch should provide adequate space and protection for the rabbit and also convenience to the rabbit keeper.

##### **3.1.2 Space**

Since the rabbit is going to be in the hutch for life there is need to provide enough space to minimise restriction of movement. For the rabbit to be able to stretch itself and carry out its normal activities then horizontal and vertical space are all important. Space is also critical for good ventilation and temperature regulation within the hutch. These are necessary to maintain good health and prevent diseases.

##### **3.1.3 Protection**

For the farmer to be successful, it is necessary to provide adequate protection to his rabbits. This protection is against injury within the hutch, from direct sunlight, rain, direct and indirect wind, sudden noises, predators like dogs, cats, rats, snakes, safari ants and human thieves.

##### **3.1.4 Convenience to the Rabbit Keeper**

For a successful operation on the farm, the house should be designed in such away to assist the keeper to carry out routine practices like observation, examination, handling, feeding, mating the rabbits, cleaning and disinfection. Also there should be room for expansion when the number multiplies.

#### **3.2 Types of Housing**

Basically there are two types of housing these are:

- 1. Outdoor hutches:** These are kept outside all the time.
- 2. Indoor hutches:** These are kept inside a house or open shed.

##### **Outdoor hutches and indoor hutches**

The requirements of space, protection and ease of management can be achieved through appropriate design, construction and siting  
Typical hutch dimensions for a general purpose hutch are as follows:

- 1 m above the ground approximately
- height of hutch: 60 cm at the front, 50 cm at the back
- width: 50-60 cm
- length: 90-120 cm

### **3.2.1 Indoor Hutches**

The hutches within the house can be much simpler than outdoor hutches and simple boxes made from wired frames can be used. These can be hung in a number of ways. Indoor hutches are appropriate for the established keeper with good markets to justify the expenses in setting them up. Indoor hutches provide good conditions for the Rabbits and the rabbit keeper. Also rabbits are more easily observed. Individual hutches are easier to keep clean and use particularly useful where many rabbits are kept. It is easier to protect rabbits from predators. Requires a major initial investment which makes it too costly for the beginner.

### **3.2.2 Outdoor Rabbit Hutch**

The outdoor rabbit hutch is relatively cheap to set up. It is appropriate when starting production but impossible to meet all the protection requirements all the time e.g. in storms. However, outdoor hutches are often difficult to clean and keep dry and does not allow you to easily increase the number of hutches quickly.

### **3.2.3 Floor Methods of Housing**

This method involves keeping the rabbits on the ground, in a fenced area provided with simple boxes for shelter. In this system several does are kept in the same area. This method is particularly suited to very dry areas and or where producers cannot obtain or afford the materials to build proper hutches. In this method one of the most important requirements is to keep the floor dry. An alternative method is to make a deep layer of dried straw, rice husks or wood shavings. Mud or wooden shelters that can be secured at night can be constructed to provide protection from predators. Rabbits may be allowed to burrow in floor system and may rear their young in these burrows, but kindling boxes are preferable. Bucks should be kept separate from the does and young rabbits unless there is plenty of space. To avoid fighting between does provide enough space at least 1m<sup>2</sup> per doe. For floor methods to be successful, observe strict hygiene and avoid overcrowding. This method of rabbit keeping is not widely practiced and need a lot of management attention to be successful.

### 3.3 Hutch Equipment

Hutch equipment consist of four items.

1. Water trough
2. Food trough
3. Roughage rack
4. Kindling box

In addition, there may be need for a transport box and a storage facility for food and other items.

#### 3.3.1 Equipment Requirements

For water and food troughs, the requirements are:

- i. It should be impossible to tilt over.
- ii. It should have adequate size and depth.
- iii. It should discourage scratching out of contents.
- iv. It must not cause injury to the rabbit.
- v. It should be cheap and can be constructed locally.

#### Forage racks

It should be fitted inside the hutch and allow the rabbit full access and not limit food intake.

#### Kindling boxes should:

- i. Provide a secure, draught proof dry container in which the doe can kindle.
- ii. Prevent the young rabbits from leaving until they are at least 2-3 weeks old.

#### 3.3.2 Maintenance of Hutches and Equipment

Hutches need proper maintenance. Regardless of the type of housing method and the equipment used the following requirements on housing and equipment have to be met.

- i. Clean the hutch and equipment every two to three days.
- ii. Complete cleaning between litters using soap and water and if possible disinfectants. This should be followed by complete drying and disinfection in direct sunlight.
- iii. Checking and repairing loose boards, tins or wires which may allow the rabbits to escape or drop through or predators to enter.

- iv. Checking for the development of sharp edges in hutches and on equipment which may cause injury.

### **SELF-ASSESSMENT EXERCISE**

- i. What are the requirements for designing a rabbit house/hutch?
- ii. Describe the different types of rabbit houses.
- iii. List five hutch equipment with relevant requirements.
- iv. Discuss the maintenance of hutches and equipment.

## **4.0 CONCLUSION**

In this unit you have learnt the requirements for designing a rabbit house, the different types of house, equipment needed and their requirements and you have learnt the maintenance of hutches and equipment used.

## **5.0 SUMMARY**

You have learnt that any rabbit hutch should provide adequate space and protection for the rabbit and also convenience to the rabbit keeper. Basically there are two types of housing these are outdoor hutches and indoor hutches. Hutch equipment consist of four items, water trough; food trough; roughage rack; kindling box. Maintenance of hutches and equipment include cleaning of hutch and equipment every two to three days; complete cleaning between litters using soap and water and if possible disinfectants. This should be followed by complete drying and disinfection in direct sunlight, checking and repairing loose boards, tins or wires which may allow the rabbits to escape or drop through o predators to enter; checking for the development of sharp edges in hutches and on equipment which may cause injury.

## **6.0 TUTOR-MARKED ASSIGNMENT**

1. In a tabular form compare the outdoor and indoor type of hutches.
2. Discuss the housing requirements of rabbits.

## **7.0 REFERENCE/ FURTHER READING**

Fielding, D., Smith, A. J. & Coste, R. (1991). *Rabbits the Tropical Agriculturalist*. (CTA) Macmillan.

McDonald, I. & Low, J. (1985). *Livestock Rearing in the Tropics*. Macmillan Education Ltd.

## **MODULE 4      FEEDING, DISEASE CONTROL AND PRODUCTS**

Unit 1	Feeds and Feeding
Unit 2	Record Keeping
Unit 3	Rabbit Diseases and Their Management
Unit 4	Processing of Rabbit Products

### **UNIT 1      FEEDS AND FEEDING**

#### **CONTENTS**

1.0	Introduction
2.0	Objectives
3.0	Main Content
3.1	Nutrient Requirement of Rabbits
3.1.1	Water
3.1.2	Protein
3.1.3	Energy
3.1.4	Fat
3.1.5	Carbohydrate
3.1.6	Fibre
3.1.7	Mineral
3.1.8	Vitamin
3.2	Caecotrophy
3.3	Feeding
4.0	Conclusion
5.0	Summary
6.0	Tutor Marked Assignment
7.0	References/Further Reading

#### **1.0      INTRODUCTION**

The domestic rabbit will eat most types of green vegetables, grain, tuber and root. Therefore, the ration may consist almost entirely of ingredients from plant sources.

#### **2.0      OBJECTIVES**

By the end of this unit, you will be able to:

- identify different nutrients required by rabbits

- Explain how to feed rabbits correctly for maximum production.

### **3.0 MAIN CONTENT**

#### **3.1 Nutrient Requirement of Rabbits**

Kitchen wastes such as uncooked vegetables, cereals and remain of meals can be fed to rabbits provided certain rules are followed:

1. The waste must be fed when fresh and unsoured.
2. It must be removed after a few hours if it is not eaten.
3. It should represent less than half of the rabbit's daily ration.

##### **3.1.1 Water**

Water should be supplied *ad libitum*. Rabbits have high requirements for water in relation to their body. Water is necessary for maintenance, production and lactation because dry matter intake is related to water intake. Any restriction in water intake causes a decline in dry matter consumption. However, if feeding is restricted, water intake may increase. Water should be clear, fresh and free from biological and chemical contaminants.

##### **3.1.2 Protein**

The quality and quantity of protein are not critical in rabbit as in poultry because rabbit can adapt to poor and low protein situation but production will not be optimum. With high and good protein quality, however, optimum production can be achieved. Crude protein is an approximate measure of the total amount of amino-acids. For rabbits the recommended crude protein level in the dry matter of the ration is:

- Over 18% for newly weaned rabbits.
- 16-18% for rabbits from 12 to 24 weeks.
- 15-17% for a breeding doe.
- 12-14% for all other stocks.

##### **3.1.3 Energy**

The energy requirement of rabbit is made from fibrous components of the feeds. Energy requirement is between 2390 and 2500kcal of digestive energy. This energy can be supplied from fats, grains like maize, cereal bran and fibrous feeds.

### **3.1.4 Fats**

Rabbit can handle up to 20-25% fat in the diet depending on their age. Fat provide energy as well as supplying essentially fatty acids. Fat also provide palatability and reduce dustiness in feed.

### **3.1.5 Carbohydrates**

Grains are the readily available carbohydrates.

### **3.1.6 Fibre**

Rabbit eliminate fibre and digest non-fibrous component of the feed. Anti peristalsis wave on the proximal colon in conjunction with normal contraction in the caecum are responsible for the separation and excretion of fibre. The digestion of cellulose is low.

### **3.1.7 Minerals**

Calcium is the bone constituent which is involved in blood clotting controlling excitability of nerve and muscles and in maintenance of acid base equilibrium. Phosphorus is a component of cellular constituent such as adenosine tri phosphate (ATP) and deoxyribonucleic acid (DNA), ribonucleic acid (RNA) and phospholipids. Phosphorus is also a component of the bone. Calcium absorption is experience by its level in the feed. Dietary phosphorus and vitamin D factors have not been critically studied in rabbit. Calcium level in the serum (sera) of rabbit is higher than what is obtained in other species, this is because other species maintained a regulated constant level of calcium through a process called homeostasis, since this homeostasis is absent in the rabbit dietary calcium level is directly reflected in the blood unregulated.

### **3.1.8 Vitamins**

Vitamins are chemicals that are required in very small amounts to speed up chemical reactions within the rabbit's body. The most important vitamins are the vitamins A and D, and the B vitamins choline and thiamin.

## **3.2 Caecotrophy**

One aspect of rabbit nutrition that is particularly interesting, it is sometimes called refection. Caecotrophy is the eating of faecal-like pellets produced in the caecum. The rabbit produces two kinds of faeces which are: (1) hard faeces (2) soft faeces or caecotropus. The rabbit has

a specialised mechanism that retain ingestion in the proximal colon and caecum for microbial utilisation of nutrient and also to allow the formation of the two types of faeces. The faeces suitable for consumption are the soft faeces. It originates from the caecum (cecotropus) while the other which the rabbit don't eat is called the hard faeces.

### 3.3 Feeding

Rabbits kept in hutches or colonies are totally dependent on the keeper for their food. They can eat only what the keeper provides. Wild rabbits pick and choose their own food. They have instinctive wisdom which helps them to select a good balanced diet. The rabbit keeper does not have this instinctive wisdom and must therefore think carefully about what is the best food for the rabbits.

### SELF -ASSESSMENT EXERCISE

- i. What are the requirements of rabbits with respect to the following nutrients: water, protein, energy, minerals and vitamins?
- ii. Explain caecotrophy
- iii. Discuss the feeding of rabbits

### 4.0 CONCLUSION

It is obvious that rabbit nutrition is most important aspect of their production without which the rabbit will not resist any disease attack and environmental stress.

### 5.0 SUMMARY

In this unit we have studied that the domestic rabbit will eat most type of green vegetables, grains, tubers and roots. Kitchen wastes such as uncooked vegetables, cereals and remain of meals can be fed to rabbits provided certain rules are followed: Water should be supplied *ad libitum*. For rabbits the recommended crude protein level in the dry matter of the ration is over 18% for newly weaned rabbits; 16-18% for rabbits from 12 to 24 weeks; 15-17% for breeding does; 12-14% for all other stocks. Energy requirement is between 2390 and 2500 kcal of digestive energy. Rabbit can handle up to 20-25% fat in the diet depending on their age. The digestion of cellulose is low. Caecotrophy is the eating of faecal –like pellets produced in the caecum. There are three possible feeding systems in the rabbit these are Extensive system which is total dependence on forages and kitchen wastes. Intensive system is total dependence on prepared concentrate foods from the feed mill,

while Semi-intensive system is the use of forages supplemented with prepared concentrate foods.

## **6.0 TUTOR -MARKED ASSIGNMENT**

1. List the major nutrient required in a rabbit diet
2. What do you understand by caecotrophy and what is its relevance in rabbit nutrition?

## **7.0 REFERENCES /FURTHER READING**

Fielding, D., Smith, A. J. & Coste, R. (1991). *Rabbits the Tropical Agriculturalist*. (CTA) Macmillan.

McDonald, P., Edward, R. A., Greenhalgh, J. F. D. & Morgan, C. A. (1998). *Animal Nutrition*. (5th ed.).

McDonald, I. & Low, J. (1985). *Livestock Rearing in the Tropics*. Macmillan Education Ltd.

## **UNIT 2 RECORD KEEPING**

### **CONTENTS**

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
  - 3.1 Types of Record
    - 3.1.1 Financial Record
    - 3.1.2 Animal Record
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor Marked Assignment
- 7.0 References/Further Reading

### **1.0 INTRODUCTION**

A rabbit keeper with one or two rabbits recording may seem unnecessary, but it is necessary to keep records as the number increases.

### **2.0 OBJECTIVES**

By the end of this unit, you will be able to:

- explain the importance of record keeping in rabbit production
- identify types of records to be kept.

### **3.0 MAIN CONTENT**

#### **3.1 Types of Record**

Two types of records are required.

1. Financial records
2. Animal records

##### **3.1.1 Financial Records**

Financial records can be kept in a small notebook. With label on one page 'Expenditure' and another page 'Income'. All the money spent on the rabbit is to be entered under expenditure and all the money earned from them under income. If you eat a rabbit, then enter the equivalent of its cost in the market under income but be honest.

### 3.1.2 Animal Record

Table 1: An example of a doe record card

Doe name-----	date of birth-----
-----	
Date mated-----	
Buck used -----	
Date kindled-----	
No. born alive/dead -----	
Date weaned -----	
Number weaned-----	
Notes-----	

The column for 'notes' is for recoding any health and husbandry details e.g. total litter weight at weaning. Other animal record can be constructed for growing litters to monitor their live weight gain, or how often they have been used for mating etc.

### SELF -ASSESSMENT EXERCISE

Discuss the financial and animal record in details.

## 4.0 CONCLUSION

In this unit, you have learnt the importance of record keeping and types of records to be kept.

## 5.0 SUMMARY

It is necessary to keep records as the number increases. Two types of records are required: Financial records and Animal records.

## 6.0 TUTOR- MARKED ASSIGNMENT

- 1) Discuss in detailed the importance of record keeping
- 2) Give an account of the types of records available in a rabbit farm.

## 7.0 REFERENCES AND FURTHER READING

Fielding, D., Smith, A. J. & Coste, R. (1991). *Rabbits the Tropical Agriculturist*. (CTA) Macmillan.

McDonald, I. & Low, J. (1985). *Livestock Rearing in the Tropics*. Macmillan Education Ltd.

## **UNIT 3 RABBIT DISEASES AND THEIR MANAGEMENT**

### **CONTENTS**

- 1.0 Introduction
- 2.0 Objectives
- 3.0 Main Content
  - 3.1 Signs of a Healthy Rabbit
  - 3.2 Conditions That Make a Rabbit Susceptible to Disease
  - 3.3 Preventive Measures for Common Diseases
  - 3.4 Internal Parasites
  - 3.5 External Parasites
  - 3.6 Other Diseases
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor Marked Assignment
- 7.0 References/Further Reading

### **1.0 INTRODUCTION**

The healthy rabbit may become unhealthy and diseased if exposed to stress and disease organism. It is the responsibility of the rabbit keeper to maintain a healthy rabbit that is not stressed and in whose environment there are as few disease organisms as possible.

### **2.0 OBJECTIVES**

By the end of this unit, you will be able to:

- explain the signs of a healthy rabbit
- Identify a diseased rabbit
- highlight conditions that favour disease development in rabbits
- discuss how to reduce stress in rabbit farming
- list some common diseases of rabbits
- Give advice on disease prevention and control measures in rabbit farming.

### **3.0 MAIN CONTENT**

#### **3.1 Signs of a Healthy Rabbit**

To identify a diseased rabbit, you should know a healthy one very well through the signs of a healthy rabbit and this include:

1. Normal eating and drinking.
2. Self –grooming.
3. Alertness, interest and curiosity.
4. Shiny, smooth, lean fur especially on the front paws and around the anus.
5. A normal temperature of 37°C-39.5°C.
6. Normal silent breathing; 40-65 breath per minute.
7. Clear bright eyes without discharge.
8. Clear nostrils without discharge.
9. Normal caecotrophy, no soft faeces on the hutch floor.
10. Gaining weight or, if an adult maintaining its weight.

#### **3.2 Conditions That Make a Rabbit Susceptible to Disease**

1. Insufficient water.
2. Insufficient food.
3. Toxic or poisonous food.
4. An unbalanced diet deficient in energy, protein, minerals or vitamins.
5. High fibre-only foods that can cause the rabbit to ‘blow-up’ like a ball;
6. Sour dirty foods that cause diarrhea.
7. Dirty hutches and badly ventilated hutches that promote an increase in the number of disease organisms.

#### **3.3 Preventive Measures for Common Diseases**

Cleanness is very important in rabbit keeping. Waterers, feeders Should be washed and dry in the sun every few days. Wash and disinfect cages when they become empty, separate any sick animal from the healthy ones.

### 3.4 Internal Parasites

#### Coccidiosis

This is caused by a protozoan called coccidia and it affects both liver and intestine. It occurs in overcrowded and dirty condition. Rabbits have swollen stomach and diarrhea leading to dehydration, lack of appetite and dullness. Coccidia are commonly found in the intestine without causing any obvious effects, but a period of stress, such as weaning or bad weather may result in them multiplying rapidly. The ensuing diarrhea dirties all the fur around and below the anus. If action is not taken flies may lay their eggs in the matted fur and the resulting maggots can eat away the flesh of the rabbit leading invariably to death. Young rabbits are most frequently affected with coccidiosis just after weaning. The disease can develop very quickly and high mortalities are common. In older rabbits, there may be chronic coccidiosis resulting in dullness and poor growth.

**Control:** Coccidiostats may be added to the drinking water to prevent coccidiosis occurring or to cure it as required. Hutch cleanliness is an important preventive measure. Avoid contamination of feed and water.

### 3.5 External Parasites

#### Ear Mange or Skin Mange

This is caused by external parasites such as mites. This causes a variety of skin and ear conditions. With ear mange the entire ear may become filled with crusty scabs, without proper attention it can spread onto and over the face. Rabbits with ear mange may shake their heads a great deal.

**Control:** This is done by using acaricide drops and creams. These are usually expensive. In many cases we used flowers of sulphur lightly powdered into the ear on a daily basis. Body mange can be cured by dipping the rabbit in an appropriate acaricide solution as recommended by a veterinarian.

### 3.6 Other Diseases

#### Snuffles

Is a bacterial infection of the respiratory system, similar to a cold in humans. Outbreaks are more common where there is lack of ventilation, over-crowding and a buildup of ammonia from accumulated urine. The

signs are sneezing, noisy breathing, a runny nose and wet and matted fur on the face and inside of the front legs, as a result of the rabbit using its front legs to wipe its nose and face. Affected rabbits should be isolated from other rabbits. Treatment with antibiotics may appear to be effective but mortality is usually high and those rabbits that recover are often affected again if exposed to some new stress.

### **Myxomatosis**

This is a viral infection and the signs include swelling of the eyes and convulsions. The disease spreads rapidly and is usually carried from rabbit to rabbit by fleas. There is no treatment and mortality is very high. It is possible to vaccinate rabbits against myxomatosis if the disease is reported in the area.

### **Dental Malocclusion/Buck Teeth**

Non infectious and could be inherited or through injury. If by hereditary, it could be prevented by culling infected lines and breeds. This disease is manifested by inappropriate growth of the teeth. The incisors are not worn away as fast as they grow as in a normal rabbit where the incisors grind against each other. The upper incisors grow very long and curl back into the mouth while the two lower incisors protrude.

### **Sore Hock**

It is non-infectious and caused by rabbits stomping their feet on sharp objects or rough floors. The rabbits try to rock forwards on their front feet and the hind feet shows sores on the hock. They may lose the fur pad on the sole of the feet with scales and irritation in this area. If allowed to progress, the foot bleeds or becomes spongy with pus exudates. Soak the affected part in warm soapy water to remove the crusts. Rinse properly and dry. Apply ointment (zinc ointment, carbolated vasline or sulphathiazole ointment) or sulphanamide powder and penicillin injection.

### **Ear Canker**

It is a parasitic disease caused by mites such as *Psoroptes communis* var *cuniculi* or *Chorioptes cuniculi*. The mites burrow under the skin and cause irritation in the ear. Excess moisture and crusts on the inner surface of the ear is present. The rabbit also often shakes its head or scratches at the ears with the feet. If not properly treated, it can lead to wry neck; a situation where the animal holds the head to one side or falls

and rolls over due to the destruction of centers of balance in the inner ear.

### **Pneumonia**

It is a bacterial disease caused by damp unsanitary hutches especially without adequate bedding. The animal goes off feed and has elevated temperatures. It can be treated with antibiotics such as oxytetracycline, penicillin.

### **Conjunctivitis**

A bacterial disease. Also called weepy eyes. Affected rabbit rubs their eyes with front feet. Exudates are also present. Ophthalmic ointments containing sulphanamide and antibiotics can be used for treatment.

### **SELF –ASSESSMENT EXERCISE**

- i. List the signs of a healthy rabbit.
- ii. What conditions make a rabbit susceptible to diseases?
- iii. Discuss the preventive measures to take against common diseases.
- iv. Distinguish between internal and external parasites with relevant examples.
- v. List three other diseases you know.

## **4.0 CONCLUSION**

There are several bacterial, viral and parasitic diseases that can affect rabbits. It is the responsibility of the rabbit keeper to maintain a healthy rabbit that is not stressed and in whose environment there are as few disease organisms as possible.

## **5.0 SUMMARY**

Signs of a healthy rabbit are normal eating and drinking, self –grooming, alertness, interest and curiosity, shiny, smooth, lean fur, specially on the front paws and around the anus, a normal temperature of 37°C-39.5°C, normal silent breathing; 40-65 breath per minute, clear bright eyes without discharge, clear nostrils without discharge, normal caecotrophy, no soft faeces on the hutch floor, gaining weight or, if an adult maintaining its weight. Conditions that make a rabbit susceptible to disease are Insufficient water, insufficient food, toxic or poisonous food, an unbalanced diet deficient in energy, protein, minerals or vitamins, high fibre-only foods that can cause the rabbit to ‘blow-up’ like a ball, sour dirty foods that cause diarrhea, dirty hutches and badly ventilated hutches that promote an increase in the number of disease organisms.

Preventive measures for common diseases include sanitation of waterers, feeders every few days. Wash and disinfect cages when they become empty, separate any sick animal from the healthy ones. There are several bacterial, viral and parasitic diseases that can affect rabbits. It is the responsibility of the rabbit keeper to maintain a healthy rabbit that is not stressed and in whose environment there are as few disease organisms as possible.

## **6.0 TUTOR -MARKED ASSIGNMENT**

1. How would you prevent disease incidence in your rabbit farm?
2. What are the signs of a healthy rabbit?
3. Give one example of the following diseases that affect rabbits and explain any two:
  - (i) External parasite
  - (ii) Internal parasite,
  - (iii) Bacterial disease
  - (iv) Viral disease

## **7.0 REFERENCES/ FURTHER READING**

Fielding, D., Smith, A. J. & Coste, R. (1991). *(Rabbits) The Tropical Agriculturalist*. (CTA) Macmillan.

McDonald, I. & Low, J. (1985). *Livestock Rearing in the Tropics*. Macmillan Education Ltd.

## **UNIT4      PROCESSING AND HANDLING OF RABBIT PRODUCTS**

### **CONTENTS**

- 1.0 Introduction
- 2.0 Objective
- 3.0 Main Content
  - 3.1 Requirement for Slaughter and Processing
  - 3.2 Slaughter Procedure
    - 3.2.1 Neck Breaking
    - 3.2.2 Stunning Method
    - 3.2.3 Skinning
    - 3.2.4 Cleaning
  - 3.3 Cooking
  - 3.4 Rabbit Products and By-Products
- 4.0 Conclusion
- 5.0 Summary
- 6.0 Tutor- Marked Assignments
- 7.0 References/Further Reading

### **1.0 INTRODUCTION**

Rabbits are to be slaughtered regardless of the circumstances that are involved (party, family reunion, other celebrations etc.). Rabbits that are on forage feeding reach table weight around 6-7 months of age. Regular weighing is the best way to determine when this point has been reached.

### **2.0 OBJECTIVES**

By the end of this unit, you will be able to:

- discuss the necessary preparation and requirement for slaughtering and processing rabbits
- explain the killing methods and their procedure
- apply the modern way of skinning and cleaning of rabbits after slaughter
- compare the chemical composition of rabbit meat with that of other livestock.

### **3.0 MAIN CONTENT**

#### **3.1 Requirement for Slaughter and Processing**

- i. A generally clean place away from any obvious source of flies or dogs.
- ii. Something from which to hang the rabbit whilst cleaning it e.g. a branch or a specially placed pole or set of hooks.
- iii. A sharp knife.
- iv. A bowl or source of clean water.
- v. A container for the blood and guts and anything that is being kept separate from the meat.
- vi. A clean container with cover for the rabbit carcass.
- vii. Some string or thin wire.
- viii. A skin drying frame.
- ix. A stick the thickness of a pencil smoothly rounded at one end.

#### **3.2 Slaughter Procedure**

Rabbit should receive water but no food in the 12-hour period before killing. This will help in partly emptying the digestive system and will reduce the risk of it breaking during cleaning of the carcass. If it breaks there is the possibility that the meat will be dirtied by the contents of the digestive tract. This in turn may lead to food poisoning in the people that consume the meat. Killing should be carried out as quickly as possible and as efficiently as possible, with the minimum pain to the rabbit. There are two methods of killing rabbits. Both involve making the rabbit unconscious and then removing the head to allow bleeding.

##### **3.2.1 Neck Breaking**

In this method the rabbit's neck is broken in the same way as that used for killing hens in some areas. For a right-handed person, both the rabbit's back legs are held in the right hand.

The rabbit's neck is then held from above between the first and second fingers- or the thumb and first finger – of the left hand. The rabbit is stretched over the upper part to the left leg and the rabbit's neck is pushed down, whilst at the same time its head is bent back.

With moderate force the neck will suddenly give way indicating that the neck has been broken by dislocation. The rabbit should be immediately hung upside-down by its back legs the head is then removed to allow the blood to drain out of the body. This method requires more skill, alternatively, the first step is to make an incision into the side of the

neck and then followed by cutting the jugular vein and allow blood to drain away.

### **3.2.2 Stunning Method**

The neck-breaking method requires a little strength. Those without the necessary strength may prefer to use the stunning method. For a right-handed person, the rabbit should be held upside-down by its back legs with the left hand. It should be held so that the ears fall forward exposing the back of the head. The point at the base of the ears should then be hit sharply with a good-sized piece of wood or metal, this will stun the rabbit and make it unconscious.

The rabbit should then be immediately hung up and its head should be cut off to allow bleeding. It should be noted that these methods of killings have a limitation for the fact that they are not acceptable by some believes, example Islam advocate the use of a sharp knife in cutting the throat and the jugular veins as swiftly as possible with minimum pain inflicted to the animal.

### **3.2.3 Skinning**

Skinning is done easily when the rabbit is hanging by its back legs at shoulder height. Cut off the front legs at their midpoint, and then the tail. Next, cut the skin around each hock below where the string is tied. Cut from the inside of one hock down, around the anus and tail area and similarly down the inside of the other leg from the hock. Now, using the round stick and with care gently work the skin downwards and off the body. The stick is used to separate the skin from the body without cutting it as would occur if a knife were used. Place the skin over the skin drying frame. It can be cleaned later.

### **3.2.4 Cleaning**

The body is cut open and care is taken not to cut the intestines. The rabbit gut can now be pulled out. The heart, kidneys and liver can be separated together with other parts required for eating. It can then be taken down from the hanging position and tidied up, ready for passing to the cook. Once this is done the skin on the drying frame can be scraped clean, taking care not to cut it in the process.

### **3.3 Cooking**

Rabbit meat is relatively soft meat which needs little cooking. It is ideal for cooking in a dry heat or frying. It can be used in stews but it should not be overcooked as it may disintegrate. It is ideal for people who have digestive upsets and for those with few teeth. Smoking can be used to preserve rabbit meat in the same way that it is used to preserve other meats.

### **3.4 Rabbit Products and by Products**

A product is anything produced by a natural process or manufacture whereas a by-product is anything produced incidentally in manufacturing something else. However, the product or by-product is determined by the main objective of raising the animals as well as the processing method employed. In Nigeria, only the blood and gut contents are considered as by-products. In Europe and USA, the skin is a by-product in addition to the head, feet, blood and gut contents.

Rabbit meat is outstanding both for its dietetic effect and its chemical composition. It is high in protein and low in fat, cholesterol and sodium compared to meat from other animals. The meat is high in polyunsaturated fats. Polyunsaturated fats are preferred to saturated fats since PUF are not associated with coronary and hypertensive diseases. The meat to bone ratio has been found to be higher than other animals. Meat does not have intrinsic odour.

### **SELF -ASSESSMENT EXERCISE**

- i. Mention the basic requirements for rabbit slaughter and processing.
- ii. List and describe the procedure for rabbit slaughter.
- iii. Discuss cooking of the rabbit meat and the rabbit products and by-products.

### **4.0 CONCLUSION**

Rabbits are to be slaughtered regardless of the circumstances that are involve (party, family reunion, other celebrations etc.). This process therefore should be carried out under some laid down procedure and all sanitary measures taken to avoid food poisoning to those eating the meat.

## 5.0 SUMMARY

Rabbits that are on forage feeding reach table weight around 6-7 months of age. Regular weighing is the best way to determine when this point has been reached. Requirement for slaughter and processing include a clean place away from any obvious source of flies or dogs, something from which to hang the rabbit whilst cleaning it, a sharp knife, a bowl or source of clean water. Others are a container for the blood and guts and anything that is being kept separate from the meat, a clean container with cover for the rabbit carcass, some string or thin wire, a skin drying frame, a stick the thickness of a pencil smoothly rounded at one end. Killing should be carried out as quickly as possible and as efficiently as possible, with minimum pain to the rabbit. There are two methods of killing rabbits. Both involve making the rabbit unconscious and then removing the head to allow bleeding. The methods are neck breaking and stunning methods. For easy skinning of rabbits, cut off the front legs at their midpoint, and then the tail. Next, cut the skin around each hock below where the string is tied. Cut from the inside of one hock down, around the anus and tail area and similarly down the inside of the other leg from the hock. Now, using the round stick and with care gently work the skin downwards and off the body.

## 6.0 TUTOR -MARKED ASSIGNMENT

- (1) What are the requirements to be fulfilled before slaughtering and processing of rabbits?
- (2) Explain the methods used in slaughtering rabbits and their limitations.

## 7.0 REFERENCES/FURTHER READING

Fielding, D., Smith, A. J. & Coste, R. (1991). (*Rabbits*) *The Tropical Agriculturalist*. (CTA) Macmillan

McDonald, I. and Low, J. (1985) *Livestock Rearing in the Tropics*. Macmillan Education Ltd.