COURSE GUIDE

**AEM 723**
**NON RUMINANT ANIMAL PRODUCTION**
**(2 UNITS)**

**Course Team:**


Dr. Clement E. Isidahomen – AAU, Ekpoma (Course Writer)
Prof. Isaac S.R. Butswat – NOUN (Programme Leader)
Dr. Ahmed A. Njidda - NOUN (Course Editor)
Dr. Ahmed A. Njidda – NOUN (Course Coordinator)



**NATIONAL OPEN UNIVERSITY OF NIGERIA**

## Introduction

The course (AEM 723), Management of Non-Ruminant Animals is a three (3) credit unit course designed for postgraduate students pursuing a degree in Agricultural Science. The course is expected to provide a good knowledge base for the future manpower for animal towards a sustainable production of livestock. It explains the rudimentary of the importance of Non-Ruminants –Poultry, piggery and rabbitary in Nigeria. Origin and domestication, breeds and management of poultry; the origin and distribution, feeding and management of pigs; the history of domestication of rabbits. Diseases and their control in poultry, diseases and parasites of pigs and rabbits. The housing and equipments of poultry, pigs and rabbits; processing, marketing and storage of poultry, pig and rabbit products.

The course will provide a basic foundation for students intending to take up Animal production as a Career in the future. The course is divided into three (3) modules with unit one to eleven units. Each unit begins with a clear introduction and statement of objectives followed by the main content. The conclusion, summary and references (for further reading) were also provided for each unit. Tutor marked assignments were provided for each unit to enable you attempt some questions on the topics treated for onward submission to your tutor. The Course Guide provides you with access to brief information and overview of the course content, course duration, what you are expected to know in each unit, what course material you need to use and how you can systematically go through the course materials.. Thus, we intend to achieve the above through the following broad aim and other specific objectives.

### Course Aim

Management of Non-Ruminant Animals Farm Animals is designed to provide you with the knowledge of different types of farm animals, management, breed/ type, systems of production and disease control methods. It also enlightens the students on the different types of animals and their productive features.

### Course Objectives

On successful completion of the course, you should be able to:

- Explain the origin, domestication and distribution of non-ruminant animals
- The different breeds and management practice of Non-ruminant animals
- Explain the different production systems of non-ruminant animals
- Explain disease and processing and marketing methods of non-ruminant of farm animals.
- Mention the different equipment and housing of non-ruminant animals.

**Working through this Course**

You are expected to study and understand the content of this course. Each unit must be properly studied for good comprehension of the contents. By the end of each unit, you are expected to answer the questions therein and submit as appropriate when directed by the administration of the University. These questions are like continuous assessment. You are expected to sit for an examination on completion of the course. The course duration shall take some weeks of learning. Therefore, you must be able to organize your time to achieve this successfully. Tutorial session will be available and it is advisable for you to attend in order to be able to assess and compared yourself with your peers and clarify any area that you do not properly understand.

**The Course Material**

Major components of the course material are:

- The Course Guide
- Study Units
- The References/Further Reading, that will be provided at the end of each unit are necessary supplements to the course material.

The importance of Non-Ruminants –Poultry, Piggry and Rabbits in Nigeria. Origin and domestication of Poultry, Piggry and Rabbits. Breeds, feeding and management of Poultry, Piggry and Rabbits. Diseases and their control in Poultry, Piggry and Rabbitry. The housing and equipments of poultry, pigs and rabbits and the processing, marketing and storage of poultry, pig and rabbit products.

**COURSE MATERIALS**

The course material consists of the following:



**MODULE 1: IMPORTANCE, DOMESTICATION AND ORIGIN OF MONOGASTRIC ANIMAL**

**UNIT 1:**

**CONTENTS**

## INTRODUCTION

The importance of monogastric animals in Nigeria cannot be over emphasized. Monogastric animals are animals with simple and single stomachs. Monogastrics have their importance, origin and various means of domestication. They include poultry, swine and rabbits. The importance of monogastric animals are as follows: Acceptability; Good sources of protein. They are also good experimental animals: requires low capital intensive, they are good source of mineral, requires little space for rearing, has short generation interval, generations of employment opportunities, provision of raw materials, for companionship, as gifts etc

Domestication brings about an entirely different animal species which becomes naturally accustomed to living among human in a beneficial relationship. Domestication can be defined as hereditary re-organization of wild into domesticated form. It is entirely different from taming. Origin is the point where the animal came from. Origin also means the animal social and family background, their genetic makeup eg, weight, colour, genetic trait and resistance to disease.

## 2.0 OBJECTIVES

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

- Know the importance of monogastric in Nigerian
- Recognize the origin of monogastric in Nigerian
- Be acquainted with the domestication of monogastric in Nigerian
- The distribution of monogastric animals

## 3.0 MAIN CONTENT

- 3.1 Importance of monogastric
- 3.2.Origin of monogastric animals
- 3.3.Domestication and distribution of monogastric animals

### 3.1.2: Importance of Swine

Swine/Pigs are very intelligent and learn quickly. They pick up tricks faster than dogs. Pigs rank number 4 in animal intelligence behind chimpanzees, dolphins and elephants. Piglets learn their names by two to three weeks of age and respond when called. Pigs are very social animals. They

form close bonds with each other and other species. Pigs enjoy close contact and will lie close together when resting. Pigs use their grunts to communicate with each other. Pigs are highly prolific. A sow can give birth to a litter containing 7 to 18 piglets, about 2 – 3 times a year. The gestation period of a sow is 114 - 115 days (3 months, 3 weeks and 3 days). A piglet (baby pig), weighs about 1.5 kilograms at birth and will double its weight in just 7 days. Weaning occurs at two months of age or less. Pigs are very clean animals. They keep their toilets far from their living or eating area. Even piglets only a few hours old will leave the nest to relieve themselves. Domestic pigs are rarely aggressive. The only exceptions are sows with a young litter and boars if provoked.

Pigs are much more tolerant of cold than heat. Pigs have no sweat glands, so they can't sweat. They roll around in the mud to cool their skin. The layer of dried mud protects their skin from the sun. If available, pigs, who are great swimmers, prefer water to mud. Some pigs have straight while some have curly tails. Pigs have a great sense of smell. Their powerful but sensitive snout is a highly developed sense organ. Pigs also have a great field of vision, because their eyes are on the sides of their heads. Pigs have four toes on each hoof, but only walk on two toes per foot. A mature pig has 44 teeth. A pig can run a 7 minute mile. Pigs can be reared almost anywhere given suitable housing and management. Domesticated pigs are commonly raised as livestock by farmers for meat (generally called pork, hams, gammon or bacon), as well as for leather. Their bristly hairs are also used for brushes. Some breeds of pig, such as the Asian pot-bellied pig, are kept as pets.

Pigs have some major potential advantages which make them suitable for use in providing quick and cheap supply of animal protein. Potentials of the Pig Pigs produce meat without contributing to the deterioration of the natural grazing lands and are less affected by seasonal changes. They are fast growing. They convert concentrate feed to meat twice as efficiently as ruminants. They have high fecundity and prolificacy and short generation interval. Their output in terms of yield of meat per tonne of live-weight of breeding female per year is in the region of six times that of cattle. They have a quicker turn-over rate on investment as compared to cattle. Their relatively small size, when compared with cattle, provides for more flexibility in marketing and consumption.

### 3.1.3: Importance of Rabbits

**.** Acceptability; the rabbits is generally accepted and there is no religious taboo against eating rabbit meat

Good sources of [protein: the protein content of the meat is about 16-18% crude protein which compare favourable with other conventional livestock meat.

Low cholesterol content: the meat of rabbit is low in cholesterol. The meat is a good antidote for those with hypertension.

They are good experimental animals: the animals are use for research purposes

Low capital intensive: Rabbit farming can be started with very low capital. They do not attract high price compared to cattle, sheep and goat.

They are good source of mineral: Rabbit mat is rich in calcium, iron and phosphorus

Little space: Rabbit farming requires little space for rearing

Hardiness: Rabbit is a hardy and well adapted to the environment.

Rabbit has short generation interval

They can tolerate high fibre diet than poultry

They can also be used as pet

The efficiency of feed utilization is high

The faeces could be used to improve the fertility of the soil

They can kiddle 6-7 times in a year

The meat is tasty and better than the conventional livestock

### 3.2.1: The Origin and Domestication History of Chickens (Gallus domesticus)

The history of chickens (*Gallus domesticus*) is still a bit of a puzzle. Scholars agree that they were first domesticated from a wild form called red junglefowl (*Gallus gallus*), a bird that still runs wild in most of southeast Asia, most likely hybridized with the gray junglefowl (*G. sonneratii*). That occurred probably about 8,000 years ago. Recent research suggests, however, there may have been multiple other domestication events in distinct areas of South and Southeast Asia, southern China, Thailand, Burma, and India. Since the wild progenitor of chickens is still living, several studies have been able to examine the behaviors of wild and domestic animals.

Domesticated chickens are less active, have fewer social interactions with other chickens, are less aggressive to would-be predators, are less susceptible to stress, and are less likely to go looking for foreign food sources than their wild counterparts. Domestic chickens have increased adult body weight and simplified plumage; domestic chicken egg production starts earlier, is more frequent, and produces larger eggs.

The earliest possible domestic chicken remains are from the Cishan site (~5400 BCE) in northern China, but whether they are domesticated is controversial. Firm evidence of domesticated chickens isn't found in China until 3600 BCE. Domesticated chickens appear at Mohenjo-Daro in the Indus Valley by about 2000 BCE and from there the chicken spread into Europe and Africa. Chickens arrived in the Middle East starting with Iran at 3900 BCE, followed by Turkey and Syria (2400–2000 BCE) and into Jordan by 1200 BCE.The earliest firm evidence for chickens in east Africa are illustrations from several sites in New Kingdom Egypt (1550–1069). Chickens were introduced into western Africa multiple times, arriving at Iron Age sites such as Jenne-Jeno in Mali, Kirikongo in Burkina Faso and Daboya in Ghana by the mid-first millennium CE. Chickens arrived in the southern Levant about 2500 BCE and in Iberia about 2000 BCE.

Chickens were brought to the Polynesian islands from Southeast Asia by Pacific Ocean sailors during the Lapita expansion, about 3,300 years ago. While it was long assumed that chickens had been brought to the Americas by the Spanish conquistadors, presumably pre-Columbian chickens have been identified at several sites throughout the Americas, most notably at the site of El Arenal-1 in Chile, ca 1350 CE.

Genetic studies in the early 21st century first hinted at multiple origins of domestication. The earliest archaeological evidence to date is from China about 5400 BCE, in geographically widespread sites such as Cishan (Hebei province, ca 5300 BCE), Beixin (Shandong province, ca 5000 BCE), and Xian (Shaanxi province, ca 4300 BCE). In 2014, a few studies were published supporting the identification of early chicken domestication in northern and central China (Xiang et al.). However, their results remain controversial.

A 2016 study by Chinese bioanthropologist Masaki Eda and colleagues of 280 bird bones reported as chicken from Neolithic and Bronze age sites in northern and central China found that only a handful could securely be identified as chicken. German archaeologist Joris Peters and colleagues (2016) looked at environmental proxies in addition to other research and concluded that the habitats conducive to jungle fowl were simply not present early enough in China to allow for the domestication practice to have taken place. These researchers suggest that chickens were a rare occurrence in northern and Central China, and thus probably an import from southern China or Southeast Asia where evidence of domestication is stronger.Based on those findings, and despite the fact that southeast Asian progenitor sites have not as yet been identified, a northern Chinese domestication event separate from that of southern China and Southeast Asia does not at present seem likely.

### 3.2.2: The Domestication of Pigs

The domestication history of pigs (*Sus scrofa*) is a bit of an archaeological puzzle, in part because of the nature of the wild boar that our modern pigs are descended from. Many species of wild hog exist in the world today, such as the warthog (*Phacochoreus africanus*), the pygmy hog (*Porcula salvania*), and the pig-deer (*Babyrousa babyrussa*); but of all the suid forms, only *Sus scrofa* (wild boar) has been domesticated. That process took place independently about 9,000-10,000 years ago in two locations: eastern Anatolia and central China. After that initial domestication, pigs accompanied early farmers as they spread out of Anatolia to Europe, and out of central China to the hinterlands. All of the modern swine breeds today there are hundreds of breeds around the globe are considered forms of *Sus scrofa domestica*, and there is evidence that the genetic diversity is decreasing as cross-breeding of commercial lines threatens indigenous breeds. Some countries have recognized the issue and are beginning to support the continued maintenance of the non-commercial breeds as a genetic resource for the future.

#### Distinguishing Domestic and Wild Pigs

It must be said that it is not easy to distinguish between wild and domestic animals in the archaeological record. Since the early 20th century, researchers have segregated pigs based on

the size of their tusks (lower third molar): wild boars typically have broader and longer tusks than domestic pigs. Overall body size (in particular, measures of knucklebones [astralagi], front leg bones [humeri] and shoulder bones [scapulae]) has been commonly used to differentiate between domestic and wild pigs since the mid-twentieth century. But wild boar body size alters with climate: hotter, drier climates mean smaller pigs, not necessarily less wild ones. And there are notable variations in body size and tusk size, among both wild and domestic pig populations even today.

Other methods used by researchers to identify domesticated pigs include population demography — the theory is that pigs kept in captivity would have been slaughtered at younger ages as a management strategy, and that can be reflected in the ages of the pigs in an archaeological assemblage. The study of Linear Enamel Hypoplasia (LEH) measures the growth rings in tooth enamel: domestic animals are more likely to experience stress episodes in diet and those stresses are reflected in those growth rings. Stable isotope analysis and tooth wear can also give clues to the diet of a particular set of animals because domestic animals are more likely to have had grain in their diets. The most conclusive evidence is genetic data, which can give indications of ancient lineages.See Rowley-Conwy and colleagues (2012) for a detailed description of the benefits and pitfalls of each of these methods. In the end, all a researcher can do is look at all of these available characteristics and make her best judgment.

Beginning with the first domestication, pigs became the main domestic animal in China. Pig sacrifice and pig-human interments are in evidence by the mid-6th millennium BC. The modern Mandarin character for "home" or "family" consists of a pig in a house; the earliest representation of this character was found inscribed on a bronze pot dated to the Shang period (1600-1100 BC).

Pig domestication in China was a steady progress of animal refinement lasting a period of some 5,000 years. The earliest domesticated pigs were primarily herded and fed millet and protein; by the Han dynasty, most pigs were raised in small pens by households and fed millet and household scraps. Genetic studies of Chinese pigs suggest an interruption of this long progress occurred during the Longshan period (3000-1900 BC) when pig burials and sacrifices ceased, and previously more or less uniform pig herds became infused with small, idiosyncratic (wild)

pigs. Cucchi and colleagues (2016) suggest this may have been the result of a social-political change during the Longshan, although they recommended additional studies.The early enclosures used by Chinese farmers made the process of pig domestication much faster in China compared to the process used on western Asian pigs, which were allowed to roam freely in European forests up through the late Middle Ages.

### 3.3.3Origin and Domestication of rabbit

The European wild rabbit evolved around 4,000 years ago on the Iberian Peninsula, the name 'Hispania' (Spain) is translated from the name given to that area by Phoenician merchants, meaning 'land of the rabbits'. When the Romans arrived in Spain around 200BC, they began to farm the native rabbits for their meat and fur. The Romans called this practice 'cuniculture' and kept the rabbits in fenced enclosures. Inevitably, the rabbits tried to escape and it is perhaps no surprise that the latin name 'Oryctolagus cuniculus' means 'hare-like digger of underground tunnels'.

Wild rabbits are said to have been first domesticated in the 5th Century by the monks of the Champagne Region in France. Monks were almost certainly the first to keep rabbits in cages as a readily available food source, and the first to experiment with selective breeding for traits such as weight or fur colour. Rabbits were introduced to Britain during the 12th Century, and during the middle Ages, the breeding and farming of rabbits for meat and fur became widespread throughout Europe. Sources suggest that some women among the Medieval gentry even kept rabbits as pets.

Up until the 19th century, domestic rabbits had been bred purely for their meat and fur, but during the Victorian era, many new 'fancy' breeds were developed for the hobby of breeding rabbits for showing. Industrialization also meant that many people moving from the country to the expanding towns and cities, brought rabbits with them; apart from poultry, they were the only 'farm' animal to be practical to keep in town. Although many of these rabbits were bred for meat, it became increasingly common among the rising middle classes to keep rabbits as pets.

During the two World Wars, governments in both Britain and the United States encouraged people to keep rabbits as a source of home grown meat and fur, both for themselves and to help feed and clothe soldiers. After the wars, many people continued to keep rabbits in their gardens, and they become common place as household pets. Rabbits have become the third most popular pet after cats and dogs in the UK, unlike cats and dogs however they are traditionally seen as 'children's pets', and often sadly misunderstood.

**Domestication of Rabbit**

All the domesticated breeds of rabbits were from the European wild rabbit, *Oryctolagus cuniculus*. Rabbits were originally classified as rodents, but they are now in their own order, the Lagomorphs. The Lagomorphs are different from the rodent by means of dentition six instead of four incisor teeth. Also the Lagomorphs are divided into two main families, namely the pikas and the hares. Pikas or the rock rabbits are commonly found in the mountainous areas. Lagomorphs Hares, differs from rabbit in that they are born in the open without nest and fully haired, with their eyes open and can run within few minutes of birth. They are also known to have long legs and takes long leaps when running. Hares have the scientific names *Lepus europaeus* and *Lepus californicus*- black tailed jack rabbits. The two main genera of rabbits are the true rabbits (*Oryctolagus cuniculus)* and the cotton tail rabbits *(Sylvilagus).*Domestication was first recorded in the rabbit husbandry in early Roman times, when rabbits were kept in leporaria or walled rabbits garden.

## 4.0 CONCLUSION

Poultry and swine do have similar importance in the economy of Nigeria. The rabbit is a monogastric animal with some ruminant features giving it a comparative advantage over other monogastric animals.

## 5.0 SUMMARY

Monogastric animals which include poultry, swine and rabbits are animals with simple and single stomachs unlike ruminant animals with four chambered stomachs. They have their origin ,distribution and importance

**6.0 Tutor-Marked Assignment**

1. Describe the origin of monogastric animals
2. Compare and contrast the distribution of poultry, swine and rabbit
3. Elucidate on possible importance of poultry, swine and rabbit.
4. List the benefit of poultry in Nigeris
5. What role does swine play in Nigeria?
6. How does the rabbit, differ from other monogastric animals?

**7.0 References/Further Readings**


*"Fowl". Online Etymology Dictionary. Etymonline.com*. Retrieved *February 12*, 2014.

*"Poultry". Online Etymology Dictionary. Ehitymonline.com*. Retrieved *February 12*, 2014. *"Poultry". Encyclopædia Britannica. Encyclopædia Britannica, Inc. June 6, 2013.*

*Crawford, R. D. (1990). Poultry Breeding and Genetics. Elsevier. p. 1. ISBN 0-444-88557-9. Dixon, Rev Edmund Saul (1848). Ornamental and Domestic Poultry: Their History, and Management. Gardeners' Chronicle. p. 1.*

*Card, Leslie E. (1961). Poultry Production. Lea & Febiger. ISBN 978-0-8121-1241-2.*

K. Kris Hirst is an archaeologist with 30 years of field experience. She is the author of *The Archaeologist's Book of Quotations* and her work has appeared in *Science* and *Archaeology*.

*Krause-Kyora B, Makarewicz C, Evin A, Girdland Flink L, Dobney K, Larson G, Hartz S, Schreiber S, Von Carnap-Bornheim C, Von Wurmb-Schwark N et al. 2013. Use of domestic pigs by Mesolithic hunter-gatherers in northwestern Europe. Nature Communications 4(2348).*

*Larson G, Liu R, Zhao X, Yuan J, Fuller D, Barton L, Dobney K, Fan Q, Gu Z, Liu X-H et al. 2010. Patterns of East Asian pig domestication, migration, and turnover revealed by modern and ancient DNA. Proceedings of the National Academy of Sciences 107(17):7686-7691.*

*Lega C, Raia P, Rook L, and Fulgione D. 2016. Size matters: A comparative analysis of pig domestication. The Holocene 26(2):327-332.*

**MODULE 2: BREEDS OF POULTRY, PIGS AND RABBITS**

**UNIT 1: DIFFERENT BREEDS OF POULTRY, PIGS AND RABBITS**

**CONTENTS**



## 2.0 OBJECTIVES

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

- Know the different breeds of non-ruminant animal

## 3.0 MAIN CONTENT

- 3.1 Breeds of the poultry

  When we think of animals in our lives, one of the last ones that I think about is the chicken even though we eat eggs and chicken weekly. So today, I'm going to enlighten you all on the **breeds and differences in chickens**.I will describe you, what chickens are

best for laying eggs, which ones are best for meat purposes, the chickens that are *best for eggs and meat, show poultry, and Bantam*.

**The A-Z of Chicken Breeds - Choosing the Perfect One**

**Ameraucana**

**Egg Laying:** Excellent (5/wk)

**Egg Color:** Light Blue

**Primary use:** Eggs

**Cold Hardy:** Yes

**Temperament:** Broody

COMING SOON

**Ameraucana**

**Egg Laying:** Excellent (5/wk)

**Egg Color:** Light Blue

**Primary use:** Eggs

**Cold Hardy:** Yes

**Temperament:** Broody

COMING SOON

**American Game**

**Egg Laying:** Fair (2/wk)

**Egg Color:** Whitish/Cream

**Primary use:** Ornamental

**Egg Laying:** Fair (2/wk)

**Cold Hardy:** Yes

**Temperament:** Hardy

COMING SOON

## Ancona


**Egg Laying:** Excellent (5/wk)

**Egg Color:** White

**Primary use:** Eggs

**Cold Hardy:** Yes

**Temperament:** Active

LEARN MORE

## Andalusian

**Egg Laying:** Good (3/wk)

**Egg Color:** White

**Primary use:** Eggs

**Cold Hardy:** No

**Temperament:** Active, Gentle

LEARN MORE

**Appenzeller Spitzhauben**

Egg Laying Good (3/wk)

Egg Color White

Primary use Eggs

Cold Hardy Yes (in winter)

Temperament Forager

COMING SOON

**Araucana**


Egg Laying Good (3/wk)

Egg Color Blue

Primary use Meat/Eggs

Egg Laying Good (3/wk)

Cold Hardy Yes

Temperament Flighty

COMING SOON

**Asil (Aseel)**

Egg Laying Poor (1/wk)

Egg Color Cream or Tinted

Primary use Ornamental

Cold Hardy Yes (in winter)

Temperament Aggressive

COMING SOON

**Australorp**

Egg Laying Excellent (5/wk)

Egg Color Brown

Primary use Meat/Eggs

Cold Hardy Yes

Temperament Hardy, Docile

COMING SOON

**Ayam Cemani**

Egg Laying Fair (2/wk)

Egg Color White

Egg Laying Fair (2/wk)

Primary use Ornamental

Cold Hardy Yes

Temperament Flighty

LEARN MORE

**Barnevelder**


Egg Laying Good (3/wk)

| | |
|---|---|
| Egg Laying | Good (3/wk) |
| Egg Color | Light brown |
| Primary use | Meat/Eggs |
| Cold Hardy | Yes |
| Temperament | Friendly, Active, Quiet, Lively |

LEARN MORE

**Braekel**

| | |
|---|---|
| Egg Laying | Very Good (4/wk) |
| Egg Color | White |
| Primary use | Eggs |
| Cold Hardy | Yes |
| Temperament | Active |

COMING SOON

**Brahma**

Egg Laying Good (3/wk)

Egg Color Brown

Primary use Eggs

Cold Hardy Friendly

Temperament Yes

COMING SOON

**Buckeye**

Egg Laying Good (3/wk)

Egg Color Brown

Primary use Eggs

Cold Hardy Yes

Egg Laying Good (3/wk)

Temperament Peaceful

COMING SOON

**California Gray**

Egg Laying Excellent (5/wk)

Egg Color White

Primary use Meat/Eggs

Cold Hardy Yes

Temperament Quiet

COMING SOON

**California White**

Egg Laying Excellent (5/wk)

Egg Color White

Primary use Eggs

Egg Laying Excellent (5/wk)

Cold Hardy Yes

Temperament Quiet

COMING SOON

**Campine**

Egg Laying Good (3/wk)

Egg Color White

Primary use Eggs

Cold Hardy Yes

Temperament Active

COMING SOON

**Catalana**

Egg Laying Very Good (4/wk)

Egg Laying Very Good (4/wk)

Egg Color Pinkish Cream

Primary use Meat/Eggs

Cold Hardy Yes

Temperament Active

COMING SOON

**Chantecler**

Egg Laying Very Good (4/wk)

Egg Color Brown

Primary use Meat/Eggs

Cold Hardy Yes

Temperament Gentle

COMING SOON

**Cochin**

| | |
|---|---|
| Egg Laying | Good (3/wk) |
| Egg Color | Brown |
| Primary use | Ornamental |
| Cold Hardy | Yes |
| Temperament | Friendly, Calm, Quiet |

LEARN MORE

**Cornish**

| | |
|---|---|
| Egg Laying | Good (3/wk) |
| Egg Color | Brown |
| Primary use | Meat |
| Cold Hardy | Yes |
| Temperament | Aggressive |

COMING SOON

**Cubalaya**

| | |
|---|---|
| Egg Laying | Very Good (4/wk) |
| Egg Color | Light brown |
| Primary use | Meat/Eggs |
| Cold Hardy | Yes (in winter) |
| Temperament | Forager |

COMING SOON

**Derbyshire Redcap**

| | |
|---|---|
| Egg Laying | Very Good (4/wk) |
| Egg Color | White |
| Primary use | Meat/Eggs |
| Cold Hardy | Yes |
| Temperament | Hardy |

COMING SOON

**Dominique**

Egg Laying Very Good (4/wk)

Egg Color Brown

Primary use Meat/Eggs

Cold Hardy Yes

Temperament Forager, Calm, Personable, Hardy

COMING SOON

**Dorking**

Egg Laying Good (3/wk)

Egg Color White

Egg Laying Good (3/wk)

Primary use Meat/Eggs

Cold Hardy Yes

Temperament Calm, Docile

COMING SOON

**Dutch Bantam**

Egg Laying Good (3/wk)

Egg Color Light Brown

Primary use Eggs

Cold Hardy No

Temperament Friendly, Flighty

COMING SOON

**Easter Egger**

Egg Laying Very Good (4/wk)

Egg Color Green/Blue/Pink/Multi

Primary use Eggs

Cold Hardy Yes

Temperament Peaceful

COMING SOON

**Faverolles**

Egg Laying Very Good (4/wk)

Egg Color Light brown, Pinkish

Egg Laying Very Good (4/wk)

Primary use Ornamental

Cold Hardy Yes

Temperament Gentle, Docile

COMING SOON

**Fayoumi**

Egg Laying Good (3/wk)

Egg Color Off-white, Tinted

Primary use Eggs

Cold Hardy No

Temperament Flighty

COMING SOON

**Hamburg**

Egg Laying Very Good (4/wk)

Egg Laying Very Good (4/wk)

Egg Color White

Primary use Eggs

Cold Hardy Yes

Temperament Docile

COMING SOON

**Holland**

Egg Laying Good (3/wk)

Egg Color White

Primary use Meat/Eggs

Cold Hardy Yes

Temperament Calm

COMING SOON

**Houdan**

Egg Laying Good (3/wk)

Egg Color White

Primary use Meat/Eggs

Cold Hardy No

Temperament Sweet, Easily handled

LEARN MORE

**Iowa Blue**

Egg Laying Good (3/wk)

Egg Color Brown

Primary use Meat/Eggs

Cold Hardy -

Temperament Skittish

COMING SOON

**Ixworth**

Egg Laying Very Good (4/wk)

Egg Color Tinted

Primary use Meat/Eggs

Cold Hardy -

Temperament Alert, Active

COMING SOON

**Jangmigye**

Egg Laying Very Good (4/wk)

Egg Color Light Brown

Primary use Ornamental

Cold Hardy -

Egg Laying Very Good (4/wk)

Temperament Friendly, calm

COMING SOON

**Japanese Bantam**


Egg Laying Fair (2/wk)

Egg Color Cream or tinted

Primary use Exhibition /Ornamental

Cold Hardy No

Temperament Hardy, Bit flighty

LEARN MORE

**Java Chicken**

Egg Laying Good (3/wk)

Egg Color Cream or tinted

Primary use Meat/Eggs

Egg Laying Good (3/wk)

Cold Hardy Yes

Temperament Hardy, Docile

COMING SOON

**Jersey Giant**

Egg Laying Very Good (4/wk)

Egg Color Brown

Primary use Meat

Cold Hardy Yes

Temperament Calm, Docile

COMING SOON

**Kuroiler**

Egg Laying Good (3/wk)

Egg Color Brown

Primary use Meat/Eggs

Cold Hardy -

Temperament Friendly, Feed Continuously, Good Foragers

COMING SOON

**Lakenvelder**

Egg Laying Good (3/wk)

Egg Color Tinted, White

Primary use Eggs

Cold Hardy No

Egg Laying Good (3/wk)

Temperament Active, Quick

COMING SOON

**Lamona**

Egg Laying Very Good (4/wk)

Egg Color White

Primary use Meat

Cold Hardy -

Temperament Friendly, Docile

COMING SOON

**Legbar**

Egg Laying Very Good (4/wk)

Egg Color Light Blue

Egg Laying Very Good (4/wk)

Primary use Eggs

Cold Hardy Yes

Temperament Forager

LEARN MORE

**Leghorn**

Egg Laying Very Good (4/wk)

Egg Color White

Primary use Eggs

Cold Hardy No

Temperament Nervous, Flighty

LEARN MORE

**Malay**

Egg Laying Fair (2/wk)

Egg Color Light-brown

Primary use Meat

Cold Hardy -

Temperament Aggressive

COMING SOON

**Marans**


Egg Laying Good (3/wk)

| | |
|---|---|
| Egg Laying | Good (3/wk) |
| Egg Color | Dark brown |
| Primary use | Meat/Eggs |
| Cold Hardy | Yes |
| Temperament | Quiet, Docile |

LEARN MORE

**Marsh Daisy**

| | |
|---|---|
| Egg Laying | Good (3/wk) |
| Egg Color | Tinted |
| Primary use | Eggs |
| Cold Hardy | Yes |
| Temperament | Calm, Active |

COMING SOON

**Minorca**

| | |
|---|---|
| Egg Laying | Very Good (4/wk) |
| Egg Color | White |
| Primary use | Ornamental |
| Cold Hardy | No |
| Temperament | Noisy, Flighty |

COMING SOON

**Modern Game**

| | |
|---|---|
| Egg Laying | Poor (1/wk) |
| Egg Color | White |
| Primary use | Ornamental |

Egg Laying Poor (1/wk)

Cold Hardy No

Temperament Curious, Friendly

COMING SOON

**Naked Neck**

Egg Laying Fair (2/wk)

Egg Color Light brown

Primary use Meat/Eggs

Cold Hardy Yes

Temperament Cold hardy

COMING SOON

**Nankin**

Egg Laying -

Egg Color Tinted

Primary use Ornamental

Cold Hardy Yes

Temperament Friendly, Calm

COMING SOON

**New Hampshire**

Egg Laying Very Good (4/wk)

Egg Laying Very Good (4/wk)

Egg Color Brown

Primary use Meat/Eggs

Cold Hardy Yes

Temperament Competitve, Aggressive

COMING SOON

**Norfolk Grey**

Egg Laying Very Good (4/wk)

Egg Color Tinted

Primary use Meat/Eggs

Cold Hardy -

Temperament Active Forager

COMING SOON

**Old English Game**

Egg Laying Good (3/wk)

Egg Color Tinted, Cream

Primary use Meat

Cold Hardy Yes

Temperament Self-sufficient, Noisy, Aggressive

COMING SOON

**Orloff**

Egg Laying Fair (2/wk)

| | |
|---|---|
| Egg Laying | Fair (2/wk) |
| Egg Color | Light Brown |
| Primary use | Meat |
| Cold Hardy | Yes |
| Temperament | Calm |

COMING SOON

**Orpington**

| | |
|---|---|
| Egg Laying | Good (3/wk) |
| Egg Color | Light Brown |
| Primary use | Meat/Eggs |
| Cold Hardy | Yes |
| Temperament | Calm |

COMING SOON

**Pekin**


Pekin Batman

| | |
|---|---|
| Egg Laying | Good (3/wk) |
| Egg Color | Brown |
| Primary use | Ornamental |
| Cold Hardy | Yes |
| Temperament | Docile |

**Penedesenca**

| | |
|---|---|
| Egg Laying | Good (3/wk) |
| Egg Color | Dark Brown |
| Primary use | Eggs |
| Cold Hardy | No |
| Temperament | Active |

COMING SOON

**Phoenix**

| | |
|---|---|
| Egg Laying | Poor (1/wk) |
| Egg Color | Golden, Silver |
| Primary use | Ornamental |
| Cold Hardy | No |
| Temperament | Unfriendly, Docile |

COMING SOON

**Plymouth Rock**


| | |
|---|---|
| Egg Laying | Very Good (4/wk) |
| Egg Color | Brown, Light Brown |
| Primary use | Meat/Eggs |
| Cold Hardy | Yes |
| Temperament | Calm |

LEARN MORE

**Polish**

Silver Laced Polish Chicken

| | |
|---|---|
| Egg Laying | Good (3/wk) |
| Egg Color | White |
| Primary use | Ornamental |
| Cold Hardy | Yes |
| Temperament | Friendly |

LEARN MORE

**Red Shaver**

Egg Laying -

Egg Color Brown

Primary use Meat/Eggs

Cold Hardy Yes

Temperament Calm, Friendly, Quiet, Hardy

COMING SOON

**Rhode Island Red**


| | |
|---|---|
| Egg Laying | Excellent (5/wk) |
| Egg Color | Brown |
| Primary use | Meat/Eggs |
| Cold Hardy | Yes |
| Temperament | Hardy |

LEARN MORE

## Rhode Island White

Egg Laying Excellent (5/wk)

Egg Color Brown

Primary use Meat/Eggs

Cold Hardy Yes

Temperament Calm, Easy going

COMING SOON

## Scots Dumpy

Egg Laying Good (3/wk)

Egg Color Off-white, Tinted

Primary use Meat/Eggs

Cold Hardy Yes

Temperament Quiet

COMING SOON

## Scots Grey

Egg Laying -

Egg Color Cream

Primary use Meat/Eggs

Cold Hardy Yes

Temperament Forager, Active

COMING SOON

## Sebright

Egg Laying Poor (1/wk)

| | |
|---|---|
| Egg Laying | Poor (1/wk) |
| Egg Color | White |
| Primary use | Ornamental |
| Cold Hardy | No |
| Temperament | Friendly, Active |

LEARN MORE

**Frizzle**


| | |
|---|---|
| Egg Laying | Good (3/wk) |
| Egg Color | Tinted, White |
| Primary use | Eggs |
| Cold Hardy | No |
| Temperament | Good forager, Hardy |

LEARN MORE

**Serama**


| | |
|---|---|
| Egg Laying | Very Good (4/wk) |
| Egg Color | Cream or Tinted |
| Primary use | Ornamental |
| Cold Hardy | No |
| Temperament | Calm, Manageable, Assertive, Confident |

LEARN MORE

**Shamo**

Egg Laying Fair (2/wk)

Egg Color Brown

Primary use Ornamental

Cold Hardy No

Temperament Pleasant, Docile

COMING SOON

**Sicilian Buttercup**

Egg Laying Very Good (4/wk)

| | |
|---|---|
| Egg Laying | Very Good (4/wk) |
| Egg Color | White |
| Primary use | Eggs |
| Cold Hardy | No |
| Temperament | Active |

COMING SOON

**Silkie**

| | |
|---|---|
| Egg Laying | Good (3/wk) |
| Egg Color | Tinted, Cream |
| Primary use | Eggs |
| Cold Hardy | Yes |
| Temperament | Friendly, Calm |

LEARN MORE

**Speckled Sussex**

Egg Laying Very Good (4/wk)

Egg Color Brown, Cream, Tan

Primary use Meat/Eggs

Cold Hardy Yes

Temperament Alert, Docile

COMING SOON

**Sultan**

Egg Laying Poor (1/wk)

Egg Color White

Primary use Ornamental

Cold Hardy No

Temperament Friendly, Docile

COMING SOON

**Sumatra**

Egg Laying Fair (2/wk)

Egg Color White

Egg Laying Fair (2/wk)

Primary use Ornamental

Cold Hardy Yes

Temperament Flighty, Jumpy

COMING SOON

**Vorwerk**

Egg Laying Good (3/wk)

Egg Color Cream

Primary use Meat/Eggs

Cold Hardy Yes

Temperament Alert, Active

COMING SOON

**Welsummer**

Egg Laying Very Good (4/wk)

Egg Color Dark brown

Primary use Ornamental

Cold Hardy Yes

Temperament Friendly, Intelligent

COMING SOON

**White Faced Black Spanish**

Egg Laying Good (3/wk)

Egg Color White

Egg Laying Good (3/wk)

Primary use Eggs

Cold Hardy No

Temperament Wild, Active

COMING SOON

**Yokohama**

Egg Laying Poor (1/wk)

Egg Color Tinted

Primary use Ornamental

Cold Hardy No

Temperament Calm, Quiet

- 3.2 Breeds of the pigs

Unit 2: Breeds.

The breeds discussed below are merely those found frequently within the tropics.

**Black-skinned breeds**

These breeds are popular for their high resistance to sunstroke.

**Birkshire:** This breed is British in origin. It has six white tips. Each end of the legs has one as well as the snout and tail. The snout is short with pick ears spread apart. The body is quite stocky and low on the ground. The breed has poor prolificacy. Litter size has been reported to be less than seven piglets with average of 5.73.

**Hampshire:** This breed is coloured black with a white belt around the forequarter of the body. It is medium in size with high prolificacy; good nursing mothers and converts feeds efficiently

with lop ears and good harm, hence it has a high reputation for ham and bacon production as well as being a good grazer.

**White Breeds**

**Large White or Yorkshire:** This breed has become one of the most wide spread in the tropics including Nigeria even though it is British in origin. It is a large breed characterized by a long and heavy body carried on strong legs. The ears are erect, big, triangular and pricked.

The Large White is a high adaptable breed. The sows (are good mothers with high milking ability and prolificacy. They are good feed converters and are used for bacon and pork production. Its limitation is the susceptibility to sunburn.

**Landrace:** It is a Danish breed although several types are now available such as Swedish, American etc. The breed has been popularly used for crossbreeding purposes in many parts of the tropics. Selection objectives have centered on reducing the content of low-priced carcass fat while at the same time increasing the muscle content of the back and hindquarters.

The breed is very prolific with large litter size. The carcasses are also excellent and lean. The

problem with this breed is that it is not always quite adaptable in the tropics and as such performance characteristics could be low when compared to other breeds such as the Large White.

**Tamworth:** This is also a British breed characterized by a brown coat on a white skin. It is long and narrow while the hair is coarse. Growth rate is considered slow when compared with some other British breeds. It is however less susceptible to sunburn and tolerant to changes in diets.

**Duroc-Jersey:** The breed is America in nature. The pigs have high fecundity and are pigs of the land type. The head is slightly concave with the ears carried horizontally. The skin colour is red. The body is not as well developed as the Large White breed but growth performance is considered good.

**Poland China**

An old breed of pig, the Poland China was known earlier as "Hot Type". The Poland China is believed to be a crossbred developed in the USA from Russian and Big China pigs.

The Poland China breed has a colour pattern that is similar to that of the Berkshire. This

is because the Big China or the Warren hogs had been improved by previously crossing them with the Berkshire.

Like the Berkshire, it has 6 white points, one on each of the feet, one on the tip of the tail, and one on the tip of the nose, Poland China pigs are generally larger than other modern breeds.

The Poland China's growth performance has been fairly good in the Tropics, although it is susceptible to kidney worms and other parasites.

Poland China is an efficient feed converter. With good feeding and management, they grow rapidly. Among the different breeds, they are considered the heaviest at any given age.

**Spotted Poland China**

The present breed of Spotted Poland China can be traced back to the spotted pigs whose ancestors were the original Poland China. The spotted Poland China is of more recent origin than most of the other established American breeds of pig.

The standard colour of the Spotted Poland China is 50 percent white and 50 per cent black with large, even spots. The Breed Association of the Spotted Poland China requires that body must be as least 20 percent but not more that 80 percent white. Spotted Poland China pigs sometimes tend to become chubby with too much fat laid down on body and neck. For breeding purposes, strict selection should he conducted to produce meat-type pigs, especially when the Poland China is crossed with indigenous pigs in the Tropics.

A large number of farmers in the Tropics do not quite accept a spotted breed of pig and for breeding purposes they prefer a breed with a solid colour.

**Local Breeds**

These breeds are in most cases black or brown. They are generally small in size when compared with the exotic breeds and are mostly found in the southern part of Nigeria.

These pigs are scavengers and could be very destructive to crops. They eat up human and domestic feaces and offalls when found. They are usually dirty, sleeping and wallowing in muddy water during the day. These are usually secondary hosts for endo-parasites (e.g. tapeworm) transfer to human.

The cost of production is cheap since the owners do no spend money to purchase drugs and feeds. The animals are sometimes given kitchen waste in their sleeping places. It is only in few

cases that shelter is provided and even then it is usually substandard. The end result therefore is that productivity is very low. The use of exotic breeds for up grading purposes, provision of adequate shelter and the feeding of protein and energy supplements are some of the measures that can improve the productivity of these breeds.

- 3.3 Breeds of the rabbits

**BREEDS OF RABBITS**

A breed can be define as a group of domesticated animals that have common ancestors and are similar in characteristics like colour, weight at maturity, type of fur/hair coat, feed conversion rate, performance, temperature, eyes and ear. Breeds are different from types.

**Common Breeds of Rabbits:**

**Alaskan**: Black in colour has a thick coat and weighs about 2.7-3.9kg). Its origin is Germany

**American standard Chinchilla**: It has fine fur that is smooth and glossy (1 ¼) inch long coat), dense, relatively round body, weight 4.1-5.5kg, originated from Chinchilla.

American rabbit

**American Checkered Giant**: Its colour is black with white or blue markings along the spine, body spots, check spots, coloured ears, eye circles and butterfly marks on nose, can weigh 5kg at maturity.

Checkered Giant rabbit

**American Fuzzy Lop:** Variety of coat colours, compact muscular body, dense coarse coat and of course ear folded over to slightly below the jaw. Weighs about (1.6-1.8kg)

American Fuzzy Lop

**American Sable:** Sepia brown, medium build with soft, dense fine coat with coarse guard hairs. (3.2-4.5kg).

**Argentes**: Black, blue brown or creamy white. Weighs between 2.3-3.6kg

**Belgine hare**: Reddish tan or chestnut with slate blue undercolouring, slender build, fairly stiff coats. It weights is 2.7-4.3kg.

Belgian Hare Belgian Hare

**Brittania petite**: Under 1.1kg, ruby white eye, black chestnut agouti, slender, fine boned build with a sleek, silly coat.

**Californian**: Rounded body, medium build, and short smooth coat.3.6-4.5kg, with black nose, ear, feet and tail.

Californian rabbit

**Champagne D'Argent**: Bluish white hair interspersed and slate blue undercolour, plump body. Black at birth, white hair start growing at about (2) two months. Weight is 4.1-5.5kg.

**Checkered Giant**: Weighs over 5 kg with black or blue markings (along spine, body spots, cheek spots, coloured ears, eye circle, and butterfly mark on nose).long hair-like body.

Checkered Giant rabbit

**Cinnamon**: Rust or cinnamon colour with grey on belly. Rust coloured spots inside hind legs as well as butterfly mark on nose and ear rings. Their weight is 3.9-5kg.

**Crème D' Argent**: Creamy white with orange undercoat, and butterfly markings on nose. 3.6-5kg.

**Dutch**: Weighs 1.6-2.5kg. White black body, blue to brown, chocolate, steel are tortoise. The front of the face, body and the black feet are white, the rest are coloured.

Dutch rabbit

**Dwarf /Blanc de Hotot**: Less than 1.4kg, White with black eye rings. Rounded body.

Blanc de Hotot

**English lop**: Agouti, broken self, shaded, ticked or wide band colour groups. Very long lop ears and this breed weighs over 4.1kg.

English Lop

**English Spo**t: White with black, blue, chocolate, gold, grey, lilac or tortoise. Marking include butterfly mark on the nose, coloured ears, eye rings, spine marking (which is herringboned) and a spot on the cheek and a chain of spots along the body. Long arched body (like a hare) .2.3-3.6kg.

English Spot

**Flemish Giant (Patagonian)**: Long rabbit, heave build (but should not be fat), colour is black, blue light grey, sandy steel grey white. Weigh over 5.9kg.

**Florida white**: Pure white, rounded body (1.8-2.7kg).

**French Lop**: Agouti, broken self, shaded, ticked or wide band colour groups. Muscular, heavy build. Weighs 4.5kg and over.

**New Zealand White:** The New Zealand white breed of rabbit is characterized by, white fur, the weight is between2.5-5kg at maturity depending on the feed and other management practices.

New Zealand white rabbit

**New Zealand Red:** The New Zealand red breed of rabbit is characterized by red fur, the weight is between2.5-5kg at maturity depending on the feed and other management practices.

**Rex**: This is the

Mini Rex

**Angora**:

**Fauve de Bourgogne**:

**Himalayan:** This is the

Himalayan rabbit

:

## 4.0 CONCLUSION

Poultry, swine and rabbits by their breed definition vary according to purpose eg meat, production and dual purpose monogastric animals.

## 5.0 SUMMARY

Monogastric animals which include poultry, swine and rabbits are animals with dual, meat and reproduction purpose.

## 6.0 Tutor-Marked Assignment

1. Describe any five breeds of monogastric animals
2. Compare and contrast the dual and meat breeds of poultry, swine and rabbit
3. List six breeds of poultry
4. How many breeds of swine do we have in Nigeria?
5. How many breeds of rabbit do you know?

## 7.0 References/Further Readings


*"Fowl". Online Etymology Dictionary. Etymonline.com*. Retrieved *February 12*, 2014.

*"Poultry". Online Etymology Dictionary. Ehitymonline.com*. Retrieved *February 12*, 2014.

*"Poultry". Encyclopædia Britannica. Encyclopædia Britannica, Inc. June 6, 2013.*

*Crawford, R. D. (1990). Poultry Breeding and Genetics. Elsevier. p. 1. ISBN 0-444-88557-9.*

*Dixon, Rev Edmund Saul (1848). Ornamental and Domestic Poultry: Their History, and Management. Gardeners' Chronicle. p. 1.*

*Card, Leslie E. (1961). Poultry Production. Lea & Febiger. ISBN 978-0-8121-1241-2.*

K. Kris Hirst is an archaeologist with 30 years of field experience. She is the author of *The Archaeologist's Book of Quotations* and her work has appeared in *Science* and *Archaeology*.

*Krause-Kyora B, Makarewicz C, Evin A, Girdland Flink L, Dobney K, Larson G, Hartz S, Schreiber S, Von Carnap-Bornheim C, Von Wurmb-Schwark N et al. 2013. Use of domestic pigs by Mesolithic hunter-gatherers in northwestern Europe. Nature Communications 4(2348).*

*Larson G, Liu R, Zhao X, Yuan J, Fuller D, Barton L, Dobney K, Fan Q, Gu Z, Liu X-H et al. 2010. Patterns of East Asian pig domestication, migration, and turnover revealed by modern and ancient DNA. Proceedings of the National Academy of Sciences 107(17):7686-7691.*

*Lega C, Raia P, Rook L, and Fulgione D. 2016. Size matters: A comparative analysis of pig domestication. The Holocene 26(2):327-332.*

**MODULE 3: MANAGEMENT, FEEDING AND DISEASE OF MONOGASTRIC**

**UNIT 1: DEFINITIONS AND CLASSIFICATIONS OF FEEDSTUFFS**



**1.0 INTRODUCTION**

The quality of feedstuffs used in compounding animal feeds determines to a large extent the level of attainment of the animal's productive potential. There are benchmarks that feeding different class of poultry, swine and rabbits. Their combinations must meet in order to satisfy the standards set for feeding different classes of animals at .different productive stages and for animals to remain healthy and highly productive. These standards management practice must be ad heard to for proper productivity, while disease is a deviation from the normal. The major problem of livestock production is the control of diseases and parasites. It is evident that some animals are genetically resistant or susceptible to diseases and parasites. Since the inception of animal domestication, diseases and

parasites have been causing economic losses in livestock production. The losses due to diseases and parasitic infestations goes beyond death of animals but also reduced the value of the survivor. Selection for genetically resistant to diseases and parasites in livestock has been based on natural means. Man has achieved more in selection for diseases resistance in plants than in animals.

## 2.0 OBJECTIVES

By the end of this unit, you should be able to state clearly the:

- Definition and classes of feeding monogastric animals
- Importance and management of monogastric animals
- Basis of determining a disease condition and control

## 3.0 MAIN CONTENT

### 3.1 Feeding

Feeding is the act of giving feeds to animals. Feeds provides a source of nutrients to the body of animals

3.1.1: Poultry

Environmental temperature is considered to be the most important variable affecting feed intake and thus body-weight gain of birds. Adapted from data presented by North and Bell (1990), shows the effects of house temperature on growth and feed consumption of straight-run broilers. The increase in house temperature from 32 to 38°C causes a drop in feed intake of 21.3 g per bird per day and a reduction in body weight at 8 weeks of age of 290 g. Several workers have tried to quantify the extent to which reduced feed intake limits broiler performance at high environmental temperatures. Fuller and Dale (1979) studied two diurnal temperature cycles, a hot one consisting of 24–35°C and a cool one of 13–24°C. Birds were fed the experimental diets *ad libitum* in both environments, and an additional group of birds in the cool environment were limited to the amount of feed consumed by the birds in the hot environment. Their results showed that growth was depressed by 25% in birds maintained in the hot environment. When birds maintained in the cool environment were fed the same amount of feed as that consumed by

birds in the hot environment, their performance wasreduced by only 16% compared with those fed on an *ad libitum* basis.

3.1.2: swine

Pigs are not ruminants and so are not capable of deal efficiently with coarse foods. Foods for pigs usually con of ground cereals mixed with animal and vegetable proteins, all of low fibre content. As a result of the increasing demand and high prices associated with these cereal grains including the vegetable and animal protein sources pig produces Nigeria and others resulted to the use of less expensive energy sources and industrial by-products such as cassava root tubers, brewer's spent grain and palm-kernel meal. The crude fibre of brewer's spent grain and palm-kernel meal is relatively high and this limits their levels of inclusion in pig diets. Because of the rate, at which pigs grow and reproduce, and the fat that they spend some or all of their life indoor their ration require adequate mineral and vitamin supplements. It is important to feed for the maintenance and growth of the sow or gilt, and for pregnancy and milk production.

**Table 1 Recommended energy requirements of pigs**

| | | | | | |
|---|---|---|---|---|---|
| Live weight (kg) | 5 – 10 | 10 – 20 | 20 – 35 | 35 – 60 | 60 – 100 |
| Daily weight gain (kg) | 0.30 | 0.30 | 0.60 | 0.75 | 0.90 |
| Digestible energy kcal/kg | 3,500 | 3,500 | 3,300 | 3,300 | 3,300 |
| Metabolic energy kcal/kg | 3,360 | 3,800 | 3,170 | 3,170 | 3,170 |

**Table 2 Recommended crude protein requirements of pigs**

| Pigs | Expected mean daily live-weight gain (g) | Live-weight (kg) | Daily crude protein requirement (g) | % Crude protein in the diet |
|---|---|---|---|---|
| | 272 | 5 - 10 | 118 | 22 |
| Crowing and | 454 | 10 -20 | 204 | 18 |

| | | | | |
|---|---|---|---|---|
| Fattening | 590<br>726<br>771<br>863 | 20 – 35<br>35 – 60<br>60 – 80<br>80 - 100 | 268<br>376<br>427<br>494 | 16<br>16<br>14<br>14 |
| Gestation | - | 150<br>250 | 312<br>375 | 12<br>12 |
| Lactation(at maximum production) | - | 150<br>250 | -<br>- | 16<br>16 |
| Boar | - | 150<br>250 | 409<br>445 | 15<br>13 |

Crude protein digestibility varies according to live-weight from 80% up until 25 kg to 75% beyond.

**Table 3: Essential amino acids requirements (% of diet)**

| **Amino acid** | **NRC standards Young pigs 10 40 kg** | **French Standards (Reat)** | |
|---|---|---|---|
| | | **10 60 kg** | **60 100 kg** |
| **Arginine** | **0.20** | - | - |
| Histidine | 0.20 | 0.26 | 0.19 |
| Isoleucine | 0.55 | 0.67 | 0.53 |
| Leucine | 0.60 | 0.86 | 0.65 |
| Lysine | 0.75 | 0.84 | 0.62 |
| Methionnine/Cystine | 0.55 | 0.62 | 0.47 |
| Phenylalanine | 0.50 | 0.48 | 0.35 |
| Threonine | 0.45 | 0.58 | 0.42 |
| Tryptophan | 0.13 | 0.19 | 0.14 |
| Valine | 0.50 | 0.57 | 0.42 |

Cystine may replace 50% of the requirements for methoinine. Methionine should be used in the DL form.

The nutritional aspects of Pig management involve consideration of the digestive system of the pig and factors affecting digestion, feed composition, pre-treatment of feeds and nutritional requirements during the different stages or phases of life, the formulation and balancing nutrients in pig rations and the feeding managers essential for efficient pork production.

**Digestive System**

In many ways the physiology of digestion ~ absorption in the pig is similar to that of man. Like man, pig is omnivorous consuming food of both plant and animal origin.

The alimentary tract or canal of the pig (fig. 17) extends from the lips to the anus. Major parts of the alimentary canal are the mouth, pharynx, oesophagus, stomach, small intestine and large intestine. Its function is to provide necessary environment for the digestion and absorption the food. Digestion involves the breaking down of complex foodstuffs into simpler compounds so that they can be absorbed through the wall of the intestine into the bloodstream or lymphatic system and carried to the parts of body where they are needed. Enzymes are chemicals which aid the process of digestion. Each enzymes is found in particular part of the alimentary canal and aids the breakdown of a specific compound.

**Mouth**

Under natural conditions, the pig roots, i.e. it digs up soil, with its snout and carries the food to its mouth using the pointed lower lip. When pigs are not permitted to root, the food is picked up by means of the teeth, tongue and characteristic movement of the head. In the mouth the food is ground into a pulp by the teeth and mixed with saliva. The enzyme **ptyalin,** in saliva, begins to break down the food. The food is then pushed to the back of the mouth or pharynx and passes down the oesophagus into the stomach.

**Stomach**

In the stomach the food is churned up by the squeezing action of the muscular walls and the gastric juice is added to it. The gastric juice is produced by the gastric glads in the walls of the stomach and contains **mucus, hydrochloric acid** and **pepsin.** The mucus lubricates the food. The hydrochloric acid provides an acid environment, which prevents the further action of the ptyalin from saliva, and provides a suitable environment for the action pepsin.

The pig has a simple stomach which can only digest concentrate feeds such as grains and

their by-products, nu legumes and other seeds and their by-products, fish at mammalian by-products.

**Small Intestine**

In the small intestine, secretions or juices from the pancrea 1iver and small intestine complete the process of digestion the digested food can then diffuse through the walls on small intestine.

**Pancreatic juice** contains enzymes for digesting three major types of food: protein, carbohydrates and fats. The proteolytic enzymes **trypsin** and **chymotrypsin** partially digest proteins. The enzyme pancreatic **amylase** hydrolyses starch to maltose. The fats are broken down carboxylic acids and glycerol by the action of lipase.

**Bile** is created continually by the liver. The bile contains no digestive enzyme but is important in digestion because of the presence of the bile salts, which emulsify fat globules so that they are more easily digested by lipase.

**Intestinal juices** contain the following enzymes:

1. Several **peptidases** for splitting polypeptides into aminoacids:
2. Enzymes for splitting the disaccharides, sucro maltose, isomaltose and lactose into monosaccharid such as glucose, frutose and galactose:
3. Intestinal lipase for splitting neutral fats into glycerol and carboxylic acids; and
4. Very small amounts of intestinal amylase for splitting carbohydrates into disaccharides.

**Large Intestine**

The large intestine is the site for the absorption of water into the body, It secretes mucus to lubricate the undigested food. In response to bacterial infection it secretes large volumes or water and electrolytes. This action dilutes the irritating factors and causes rapid movement of the faeces towards the anus, resulting in diarrhoea.

**Absorption**

Food absorption does not take place in the mouth and oesophagus. The small intestine is the major site of food absorption.

The mucus membrane of the small intestine is highly modified as an organ of absorption us an organ of absorption by the presence of a large number of tiny finger-like projections called **villi.** These villi increase the surface area of the intestinal wall and so provide a large surface area for the absorption of food. In pigs the villi are shorter in length than in other farm animals. The absorbed foodstuffs may be transported round the body by the lymph and by the blood portal

system.

Fats are absorbed primarily by the lymph. Carbohydrate and products of protein digestion, water and inorganic salts are absorbed primarily by the blood.

3.1.3: Rabbits

(1) **CONCENTRATE**: these are feeds that are low in fluid and high in digestibility. They can be low in protein e.g. maize or high in protein e.g. fish meal. They can be of plant origin e.g. soya bean meal, groundnut cake, cotton seed cake and palm kernel cake. They can also be of animal origin e.g. meat meal, fish meal, blood meal e.t.c. They can be mixed i.e. plant and animal origin.

(2) **ROUGHAGES**: These are feeds high in fibre content or low in digestibility. These are dry roughage e.g. hay and straw as well as succulent roughages e.g. silage, roots (i.e. potato, cassava), and fodders (i.e. grasses, legumes and living vegetables).

**3.2.1: Disease of poultry**

3.2.2: **Disease Swine and Management**

The major problems of livestock production are the control of diseases and parasites. It is evident that some animals are genetically resistant or susceptible to diseases and parasites. Since the inception of animal domestication, diseases and parasites have been causing economic losses in livestock production. The losses due to diseases and parasitic infestations goes beyond death of animals but also reduced the value of the survivor.

**Some Common Poultry Disease are as follows**

1

Disease: Adenovirus (or egg drop syndrome)

Cause: Virus

Symptom: Nothing externally obvious but layers fails to peak, may lose appetite and/or have diarrhea. Eggs lose shell pigment; many being soft shelled or shell-less

Post mortem: -

Prevention: Vaccine recently developed (Vaccination)

2

Avian: Encephalomy:

Cause: Virus

Symptom: Affects chicks to about four weeks of age, unsteady on feet, tremors in head and/or throughout body, leathergy, low appetite, sharp drop in production

Post mortem: - No change (may have brain lesions)

Prevention: Vaccinate (breeders) before production

Treatment:

3

Avian: Bumble foot

Cause: Virus egg transmitted

mSymptom: Bull-like swelling of foot, lameness, foot inflamed

Post mortem: -

Prevention: Check litter (should be 6ins deep) and roosts make sure jagged projections are nailed down. Most edges should be rounded off, free of splinters

Treatment: Advised for only valuable stock. Open swelling with sharp sterile knife and press out pus. Wash with antiseptic an apply iodine or sulpha ointment. Confine bird to small pen

4

Avian: Infectious bursitis (for gumboro disease)

Cause: Viral infection of bursa of fabricius

Symptom: Droopy, ruffled feathers, chalky diarrhea, vent pecking

Post mortem: Pale sometimes enlarged kidney, enlarged bursa,

Prevention: Vaccinate at 21 – 24days depending on anti-body status

Treatment: Maintain good management, keep birds comfortable and stimulate appetite

5

Avian: Fowl pox

Cause: Filterable virus

Symptom: Two forms, skintype shows as wart like lesions on comb wattles and legs. Diphtheritic type causes discharge from nostrils cheesy membrane in mouth and suffocation, death rate may be high

Post mortem: May have nicrotic lesions on throat

Prevention: Vaccination

Treatment: Remove pecrotic membrane if present in mouth and / or larynx. Add vitamins to water

6

Avian: Newcastle disease

Cause: Virus

Symptom: Gasping, wheezing, paralysis and twisted necks. Severe drop in egg production, soft shelled eggs

Post mortem: Mucus in trachea and thickened air sacks containing yellow exudates.

Prevention: Vaccination

Treatment: Keep birds comfortable, stimulate appetite. No treatment

7

Avian: Laryngotracheities

Cause: Virus

Symptom: Coughing, gasping, difficult breathing bird on keel extending neck on inhalation, soft shelled eggs, bloody mucus on floor or wall

Post mortem: Blood stained mucus in trachea (may become necrotic cast in later stages)

Prevention: Vaccination

Treatment: Keep birds comfortable, stimulate appetite

8

Avian: Marek's disease (Range paralysis)

Cause: Herpers virus

Symptom: Loss of weight, paralysis of legs or wings and sudden death. May occur as early as 5-8weeks of age

Post mortem: Tumors or enlargement of liver, spleen, kidney, ovary, testicles and nerves of wings and legs lesions in young birds

Prevention: Vaccination

Treatment: None

9

Avian: Lymphoid leucosis

Cause: Virus

Symptom: Loss of weight, usually in older birds

Post mortem: On liver and spleen enlarged tumors are noted

Prevention: Raising young birds away from adult stock may help

Treatment:None

10

Avian: Blue comb (mud fever)

Cause: Virus

Symptom: Increased thirst, loss of appetite, diarrhea, severe drop in egg production, signs of dehydration

Post mortem: Watery intestinal contents

Prevention: Sanitation

Treatment: Medication according to directions, water supply with molasses at the rate of 1pint per 5gallons for 8 hours

11

Avian: Pullorum (White diarrhea)

Cause: Bacteria

Symptom: Young birds, sleepy inactive, pasted up and high mortality

Post mortem: Unabsorbed egg lesions on lungs, liver and intestines

Prevention: Eggs from disease free breeders hatched in diseases free incubators

Treatment: Feed medication with furazolidone for 10days or water medication with furazolidone for 7- 10days

12

Avian: Fowl typhoid

Cause: Bacteria (*Salmonella gallinarum*)

Symptom: Inactivity, greenish diarrhea, dehydration fever

Post mortem: Liver swollen and dark spleen. Enlarged liver may have necrotic lesions

Prevention: Only eggs from disease free breeders should be hatched

Treatment: Furazolidone either in feed or water for 10days

13

Avian: Fowl cholera

Cause: Bacteria (*Pasteurella mutocidavicide)*

Symptom: Fever, dark head, white to greenish droppings, sudden deaths

Post mortem: Enlarged cooked liver hemorrhages in heart and other organs

Prevention: Sanitation, disposal of sick birds, isolation, vaccine

Treatment: Medication, according to direction

14

Avian: Mycosis (Pendulous crop)

Cause: Fungus (*Candida albicans*)

Symptom: Crop distention

Post mortem:  Cheesy material on crop lining

Prevention: Sanitation, do not crowd

Treatment: Fungicidal medication in feed or water according to direction

15

Avian: Thrush (also known as Moniliasis or sour-crop)

Cause: Fungus (*Candida albicans*)

Symptom: Affected birds grow poorly, depressed emaciation, foul smelling discharge from mouth, loss of appetite and weight

Post mortem:  Mucosa of crop is thickened with whitish circular ulcers. Crop contents are watery and foul smelling

Prevention: Practice sound hygiene and management, avoid over crowding

Treatment: Probably best to cull affected birds and apply thorough hygiene measures but coppersulphate can be tried in drinking water every other day for a week – 10 days

16

Avian: Aspergillosis or brooder pneumonia

Cause: Mold/ fungus

Symptom: Fever difficult breathing nervous sings mortality in poultry especially young birds. (Also dangerous to human beings)

Post mortem: Nodules in lungs and air sacks, exudates in air sacs

Prevention: Avoid moisty and moldy litter and feed, provide proper ventilation

Treatment: None

17

Avian: Coccidiosis

Cause: Parasitic Protozoa

Symptom: Pale comb and wattles. Bloody droppings and diarrhea. Hunching, emaciation and death sometimes at high rate

Post mortem: Intestinal wall thickened with whitish or redish areas, Cecal type may cause cecal sores with blood

Prevention: Complete control is difficult on litter but continuous use of LSF feeds with COXISTAC minimizes outbreak. Keep litre dry and soft and apply good sanitation measures

Treatment: Anti-coccidial drugs usually administered in water

18

Avian: Perosis (or slipped tendon)

Cause: Manganese or Choline deficiency

Symptom: Swollen hock joints, deformed legs, tendons, slipping away from joints. Birds hobble on hocks. Many birds affected at once

Post mortem: Balanced ration with adequate levels or Manganese, choline, folic acid and vitamin $B_{12}$. Feed livestock feed rations always

Prevention: Same as prevention

Treatment:

19

Avian: Spirochaetosis

Cause: Blood parasite (Borelia anserina)

Symptom: Marked increase in temperature, increased thirst, stands in crouched position, yellowish green diarrhea, increased amount of urates in dropping, mortality can be high

Post mortem: Spleen enlarged, pale and motted, hemorrhagic areas in spleen, enlarged heart, liver, kidneys, catarrhal inflammation of intestines

Prevention: Vaccination with killed organism (spirochaetosis)

Treatment: Destroy ticks with pesticides. Apply penicillin either by injection or drinking water.

20

Avian: Synovitis

Cause: Bacteria or mycoplasma

Symptom: Birds lose weight and avoid walking. hock joints and feet swell and are hot to touch. Affects limited number of the flock

Post mortem: In early cases the spleen is enlarged. The liver is enlarged, mottled greenish or dark in colour.

Prevention:

Treatment: Treatment of bacterial synovitis is possible with anti-bacterial but only recommended for large scale outbreaks. Where M. synovise is isolated, breeding birds may be treated with chlortetracycline in the feed and hatching eggs dipped

21

Avian: Fowl cholera

Cause: Bacteria (*Pasteurella mutocidavicide)*

Symptom: Fever, dark head, white to greenish droppings, sudden deaths

Post mortem: Enteritis mucus in beak

Prevention: Do not feed spoiled feed, promptly dispose of dead birds and rodents, avoid wet spots in liters

Treatment: Fuslh birds (magnesium sulfate or molasses flush). Clean equipments

22

Avian: Chronic respiratory disease (CRD or air sac syndrome)

Cause: Various mycoplasmae (*E. coli* saordarily)

Symptom: Coughing gurgling, sneezing, nasal exudates, weight loss and slow spread

Post mortem: Mucus in trachea and air sacs is thickened and containing yellow pus heart sac thickened

Prevention: Secure mycoplasma free stock

Treatment: Medication (antibiotics) in feed or water according to directions

23

Avian: Infectious sinusitis

Cause: Mycoplasma gallisepticum

Symptom: Nasal discharge, swollen sinuses, coughing and labored breathing

Post mortem: Exudates in sinuses, cheesy material in air sacs

Prevention: Blood test breeders, secure mycoplasma free poults. Keep away from chickens

Treatment: Drain sinuses and inject sinuses with antibiotics (early in disease)

**Diseases and Parasites of Pigs**

A lot of factors have been known to cause diseases to animals including pigs such factors are poor feeding and management practices, harmful climatic conditions, the activities of micro-organisms such as viruses, rickettsiae and bacteria and the harmful effects of parasites which could either be ecto/endo-parasites.

Micro-organisms are in most cases responsible for the symptoms and courses of the diseases that are transmissible from sick to healthy animals (infectious diseases). These organisms are considered as primary invaders, in contrast to certain other species of bacteria that can exert a harmful effect only on an animal whose resistance has already been lowered (secondary infection). Lowering of resistance is brought about by many environmental factors such as

deficient or inadequate rations but often it is a primary attack by a virus that weakens the animal (lowers its resistance). When the body is in this condition, some types of bacteria that are ordinarily harmless become active and give rise to disease (secondary infection).

This chapter was not aimed at providing an exhaustive information of pig diseases and parasites rather it is to serve as a guide for practical health control practices in pig production. The discussion below gives a detailed information on the major diseases and parasites of pigs in Nigerian and some other as well as their control measures.

**Diseases caused by bacteria**

**Swine erysipelas or diamond disease**

The disease is caused by the bacterium Erysipelothrix insidiosa. It is known to be very resistance to adverse conditions and could be found even amongst healthy pigs. An abrupt change in diet or a sudden change in the weather could cause the disease.

The disease exists in the septicaemic, cutaneous and chronic forms. In the septicaemic form the symptoms high fever, dulll appearance and the skin shows flat red patches. There is difficulty in breathing as a result oedema of the lungs. The cutaneous form is usually not very serious and it runs a milder course. The animal goes off its food and hides itself in the corners of pen. Parts of the body have purple or red, diamond-shaped and clearly demarcated patches hence the disease is also called diamond disease. The chronic form of the disease is characterized with un-thriftiness, chronic arthritis, swollen joints' and-stiffness which are first hot and painful and the animal is lame.

Regular vaccination can prevent this disease from occurring. Animals' should be vaccinated before breeding and three (3) weeks before farrowing. Treatment by using antibiotics such as penicillin rations like FORTECILLIN and TARDOMYOCEL effective against the septicemia and cutaneous forms. The disease is transmissible to human and adequate care should be taken in managing it.

**Anthrax or Splenic Fever**

Arod-shaped bacterium (Bacillus anthracis) causes this disease. When conditions are un-favourable, the Qrganise formsspore and become very resistant which only be, killed by moist heating at a temperature of 900C for 45 minutes or l000C for 10 minutes, They can survive in the soil for over 24 years. Any animal that died of anthrax should be burnt, not buried while the area is disinfected with 2.5% solution of formadlehyde. Apart from pigs, all animals including map

are susceptible.

Infection from sick to healthy animals occurs by contact (wounds) inhalation of dust containing anthrax spores or by insect transmission, Incubation period is usually 1-3 days and could be cronic in-pigs. Signs of infection are high fever and dark mucous membranes, difficulty in breathing, weakness and swelling in the region of the neck, breast, and genital organs. There could also be difficulty in swallowing and dripping of dark blood from the body openings such as the mouth, nostrils, anus and vagina. Infected animals die after some few hours or some days of infection. Control is by vaccination using penecillin and oxytetracycline. It is very i5l1portant to thoroughly cleanse and disinfect any object or equipment including clothing, footwear and exposed parts of the body of the livestock attendant that had contact with a sick animal.

**Brucellosis** (Contagious abortion)

The organism, *Brucella suis* is the cause of brucellosis in pigs. It survives for, a period up to 2 years in protein containing animal tissue such as the remains of after birth and on pasture, Sources of infection include after births, fetal fluid, post-parturient vaginal discharges and milk. Infection is either through mucous membranes of conjunctiva and mouth or through some wounds on the skin of animals. Animals also become infected by feeding on contaminated feeds or water.

The disease could be acute, sub acute or chronic after an incubation period of at least 14 days and results in temporary or permanent sterility, stillborn or weak pigs. Abortion may also result when the sow is 2 or 3 weeks pregnant while inflammation of the testicles in males may cause sterility. There is no effective treatment for this disease. Therefore, control and prevention programme of testing and or disposing infected animals should be rigid. If many of the breeding animals are affected it may be wise10 replace them with disease free stock. Brucellosis is a transmissible disease to man.

**Malignant Oedema (Grangrenous Septicaemia Braxy)**

This disease is caused by *Clostridlium septicum* a type of bacterium that multiplies only in the absence of oxygen. It is common in rich humus soils. It forms spore during unfavourable condition in order to be resistant and the spore can only be killed at temperature of above 300C. Infection is usually during the birth process or through wounds sustained by the animals during fighting, castration etc. Infection could also be through the mouth, which is restricted to the

digestive canal. The symptoms are fever, loss of appetite und general weakness of the body. If the infection is through wound, anill-defined swelling will occure. This swelling may spread under the skin and affect the whole of one side of body and spreads later to the neck region. When the swelling is cut the liquid that escapes gives a rancid odour. If the infection is through birth process, vaginal lips will be swollen followed by the discharge of greyish mocous membrane. Fever and diarrhoea will set in later.

Treatment is only possible at the early stage of infection. The use of broad-speetrum antibiotics such as penicillin and oxytetracyclin are recommended for both treatment and control.

**Pneumonia and bronchial pneumonia**

The most dangerous bacteria responsible for this are the *Pasteurella.* This disease results to inflammatory infections of the respiratory tract. The symptom is difficulty in breathing and reduction in volume of air inspired and expired during each breathing movement. Others are animals having heavy sides complemented- with coughs, loss of appetite and weight, which may be followed by death. The disease may be treated with antibiotics while 'a simple way of preventing it is to make available a sheltered wooden sleeping area with straw to eliminate cold at night.

**Cystitis/nephritis**

Cystitis is due to bacterial infection of the bladder and subsequent kidney Infection and is particularly preva1enb in sows in confined housing. The disease can be recognised by the presence of pus, and later blood, in the urine. Generally species of *Streptococcus* and *Corynebacterium* are involved, and although large doses of antibiotics can sometimes be beneficial, the disease is usually fatal, due to the difficulty of getting the antibiotic to the site of infection.

Antibiotic treatment of the penile sheaths of boars and increasing exercise levels for sows by avoiding close confinement can help prevent the condition.

**Enteric Colibacillosis**

Diarrhea caused by the bacterium *Eschericha coli* is the most common cause of death in piglets. *E. coli* are normal inhabitants of the intestinal tract, particularly the large intestine. Various stress conditions cause these bacteria to multiply rapidly in the small intestine. They produce toxins, which stimulate a massive fluid loss into the small intestine, leading to scours and dehydration.

*E. coli* scours is primarily a problem in piglets up to 10 days of age. The sows remain healthy, the piglests will continue to suckle, they develop a severe watery diarrhea and mortality can be heavy. The infection will spread slowly among newly-born piglets.

The main preventative measure that can be used against E. coli scours is good management, i.e. not allowing for stressful conditions in the piglets which will trigger off scoruing. Antibiotics given orally can be effective if given immediately symptoms are seen. Vaccines are available which when given to sows and gilts help ensure that new-born piglets receive additional antibodies via the colostrums.

Gut oedema is another condition caused by e. coli. It affects pigs after weaning, normally between eight and 25kg live weight. The condition is most prevalent in the fastes-growing pigs and the typical symptom is oedema in the region of the stomach and intestines. Pigs begin to stagger proportion of animals which are affected will vary considerably. It is generally believed that stress is the major cause of gut oedema, particularly overeating of high protein diets. The disease can be contained by reducing feed-intake, increasing the fibre-level and lowering the protein-content of the ration.

The clinical signs are a raised body temperature and can increased respiration rate accompanied by bouts of coughing. Enzootic pneumonia is a complex condition in which various environmental conditions and stress are involved. The mycoplasmas are resistant to antibiotics and the best policy is to try to keep a herd free from the disease. Antibiotic treatment is useful to prevent the occurrence of secondary infections, which can often occur.

**Greasy Pig Disease (exudative epideramitis)**

The disease is caused by an infection of the skin with a skin bacterium, Staphylococcus hyiens, and affects pigs from one to seven weeks of age. There is scale-formation on the skin, which gives rise to crusts, and the kin becomes greasy with matted hair. There is no fever and pigs do not scratch. In the early stages, the condition can be confused with zinc deficiency.

There are effective medications for dipping infected pigs, combined with broad spectrum antibiotic injections.

**Mastitis-metritis-agalactia (MMA Syndrome)**

This syndrome is a common problem, which results from bacterial infection in the newly-farrowed sow and may occur as a single entity, or any of the three combined. In sows infected with mastitis, the mammary glands become swollen and inflamed and this may or may not be

associated with an infected uterus (metritis). In either case there is invariably a lack of milk flow (agalactia) and piglets will become thin and begin to die on the second or third day due to starvation.

**Diseases Caused by Virus**

**African Swine Fever**

The virus causing this disease is very resistant; hence control in form of providing immunity to the animals has been difficult. It has become a very serious problem to piggeries in Nigeria as well as some other countries in Africa following recent outbreaks.

The disease may be para-acute or chronic and pigs are affected through contact with both wild and domestic animals carrying or excreting the virus. The incubation period is between 5-15 days. The symptoms are high temperature, loss of appetite, dullness, bluish discoloration of the snout, ears and legs. Hemorrhages into the skin and diarrhea are also observed. There is a bloody discharge from the nose and throat and a drop in white blood cell count. Occasionally there could be convulsions accompanied by muscular tremours. Dehydration is also a common feature.

All attempts to treat this disease have proved abortive and no vaccine has yet been found to control it. Infected herds should be slaughtered while the premises thoroughly disinfected with a strong disinfectant, which should only be restocked after about 6-8 weeks. Preventive health measures have been observed to be effective in controlling the disease, but they have to be adhered to strictly. States below are the measures for the prevention of the disease.

1. The disease must be notified whether confirmed clinically or even suspected.
2. Isolation of and prohibition of movement of animals from the infected and neighboring units.
3. Taking of samples to an official laboratory for diagnosis
4. Compulsory slaughter of all stock on the infected unit whether ill, suspected or healthy
5. Destruction of cadavers and contaminated products, disinfection use of insecticides and rodenticides
6. +Control of movement of pigs 'within those regions where the infection is concentrated; prevention of pigs leaving these regions.
7. Disinfection of means of transport
8. Prohibiting fairs and markets whilst taking into account movement of centers of infection
9. Prohibition of use of swill from human origin or uncooked slaughter house waste in pig

feeding.

10. Restocking of infected units dependent upon the introduction of a small group of marker pigs to establish whether the virus is still present before complete restocking.
11. Prohibition of the sitting of piggeries next to restaurants, abattoirs, meat factories" offal processors, etc.
12. Control of ticks and other vectors in extensive units
13. Organization of a regional surveillance service to include specialist personnel, and a fully equipped laboratory analysis service with personnel qualified in the diagnosis of different-swine fever.

**Swine Influenza**

Swine influenza is a highly contagious respiratory disease caused by an influenza virus. It is normally triggered off by a stress, particularly rapid changes in temperature. Although mortality is low, the disease has important economic consequences due to stunting and reduced live weight gains,

The first sign of the disease is normally a cough, with a high temperature and loss of appetite. The disease spreads rapidly, breathing becomes jerky and the hair coat develops a rough appearance. Secondary infection with bacteria may complicate the condition.

There is no treatment or preventive vaccine available. Infection can be prevented by good management and the avoidance of stress.

**Swine Pox**

Swine pox is a virus disease and is transmitted either by direct contact or by ecto-parasites such as lice. Small red areas (about 1.25cm in diameter) appeal on the skin around the head, ears and ventral surface, which eventually form scabs.

There is no treatment for swine pox, but although unsightly it rarely causes serious loss and clears up after a short time.

**Transmissible Gastroenteritis (TGE)**

TGE is a virus disease which causes acute diarrhea, vomiting and early death in young piglets. H also affects older pigs, causing diarrhea and vomiting, hilt rarely death.

There is no treatment. Infected pigs can be isolated or killed and buried. After infection, the

whole herd is likely to be immune.

**Disease cause by protozoa**

**Coccidiosis**

Coccidia, which are protozoa, are the cause of this disease. In the process of development they invade the lining membrane of the intestine. Reproduction of the organisms is either through sexual or asexual form. When developing they destroy the cells lining the wall of the intestine during which severe injury is caused to the bowel. Symptom of this disease in young pigs is bloodstained diarrhea (dysentery). Under severe invasion the animal faeces become evil smelling and contain blood and mucus. The animal soon becomes emaciated and this will be accompanied with death.

Since the cause of this disease is normally through the feeding of contaminated feeds and water, maintenance of a high standard hygiene serves as effective means of control. The addition of coccidiost at low levels will also be effective. In cases that are not too severe the use of sulphur containing drugs serves as effective means of treatment.

**Trypanosomiasis**

This disease is normally acute or chronic and is caused by blood parasites belonging to the class called Flagellata. Infection is transmitted by both flies of the species of Glossina, which spread the disease by attacking a healthy animal after having sucked blood from one that was infected. The causal protozoan organisms are *Trypanosoma vivax, T brucei and T Simiae.* Symptoms of the disease are anemia, loss of condition and great weakness. There are also swelling in animals particularly in the reproductive organs. The disease can be successfully treated with drugs such as Naganol, Samorenil or Berenil provided that it is caught in the early stages.

**Parasitic diseases**

**Ecto-parasites**

**Ticks**

Ticks are of different types and they cause economic loss to the farmer. They are numerous

in the tropics and subtropics. They feed on the blood of their host. When in the un- fed state they are usually flat but when engorged with blood they become spherical. The weight of host blood taken in by ticks can be many times the weight of their bodies. The saliva produced when sucking blood could be toxic since other diseases may be transmitted to the animals. The damaged skin also serves as entrance through which micro-organisms can enter the body. Control is by the use of highly active insecticides, mainly in the form of sprays, dips, and washes. Such insecticides are **Asuntol, malathion, Lindane, rotenone bacnex** and **neguvon.**

**Mange**

Mange is produced by a mite, *Sarcoptes scabiei var suis.* Mange causes intense itching and pigs can be injured when they continuously rub themselves against hard objects. The mites dig themselves into the skin of the animal causing the skin to become dry and scaly. The tissues and blood of the animal serves as their food. The animal could also have lack of appetite while the lesions created serve as entrance for micro-organisms. Anti-parasitic preparation such as vapona, iodine and malathion applied as baths or showers and brushed into the skin are very effective in curing the condition.

**Lice and Fleas**

Both of them are small wingless insects. Lice can be grouped into two; biting lice and sucking lice. Pigs are parasitized by the blood sucking lice. Lice and fleas feeding habit causes irritation and the animal responds by biting, scratching and rubbing. Loss of appetite could result. To control dip, spray or wash the animal with suitable insecticides such as Asuntol, eamphos, Lindane, vapona and malathion. The use of ivomectin injection IS also recommended.

**Flies**

These insects are widely distributed throughout Nigeria and other parts of the tropics. They cause serious economic loss to farmers. They cause restlessness to the animals when they fly over their bodies. Many of them also bite and suck blood and in this way they transmit infection from one animal to another. Control measure is by spraying the pigs, pens and the external surrounding with suitable insecticides such as those recommended for lice and fleas.

**Endo-parasites**

**Roundworms**

These are a particular hazard when pigs are free ranging or not kept on concrete floors. The large roundworm *(Ascaris Lubricoides)* is very common and can cause a lot of damage in pig herds. Adults live in the small intestine and can grow up to 300mm long and 6mm thick.

The female is capable of laying thousands of eggs per day, which pass out in the dung and become infective if ingested by' other pigs, after 21 days. These eggs are extremely resistant and can remain infective for many years. As part ofthe life-cycle eggs hatch out in the pig after ingestion and the larvae migrate through the liver and lung. Irritation in the lungs causes coughing and ill-thrift, particularly in younger pigs. Damage is also done to the liver, which renders it liable for condemnation at slaughter (milk-spot liver'). Moreover, if infection is heavy the adult worms can partly obstruct the small intestine, causing weakness and loss of weight by the pigs.

Another harmful worm is the whip-worm *(Trichuris suis).* This worm, which is about 35 mm long when adult, lives in the large intestine and causes considerable damage to the gut wall resulting in diarrhea and weight loss. The nodular worm *(Oesophagostomum spp.)* also lives in the large intestine. It burrows into the intestinal wall forming nodules, and can cause diarrhea (sometimes bloody) and anemia. The kidney worm *(Stephanuru dentatus)* lives in the kidney and eggs are excreted via the urine. When ingested, larvae migrate through the liver to the kidney and tissue damage results. This kidney worm is a major handicap for free ranging pig-farming systems and is often the main reason why pigs are penned. ringworms *(Metastrongylus spp.)* can also be a problem in free-range pigs; infection occurs when pigs eat earthworms, which are the intermediate hosts. Lungworms cause irritation and coughing and predispose the lung to secondary pneumonia.

Contaminated feed and water are the usual source of infection with internal parasites. Control can be affected by breaking the life-cycle, which means regularly moving range pigs on to fresh ground and frequent cleaning and removal of faeces in housed pigs. At the same time, unless there is good evidence that there is no worm infection in the herd; breeding pigs should be routinely dosed with broad spectrum anthelminthics and young stock dosed soon after weaning.

**Tapeworms**

The common tapeworm is *Taenia solium.* The pig is its intermediate host and the adult worm lives in man. Pigs the larvae then encyst in the pig's muscle) particularly in the region of the heart and

tongue.

If the pig meat is then eaten by man, the larvae hatch out and the cycle is completed. As a consequence, carcasses which are affected (measly pork) a.re condemned at slaughter. By preventing pigs having access to human faeces, the parasites can be eliminated. In some countries live pigs are checked at the market place by trusted experts for the presence of tapeworm cysts in the tongue. The result of the examination influences the price Paid to the producer.

### 3.3.3: **Rabbit Disease and Management**

Disease is defined as a deviation from the normal or as a morbid process n\having a characteristic number of symptoms. A disease may affect the whole body or any of its parts and the causes may or may not be know.

This is one of the most discouraging aspects of rabbit production. The death of a mature doe is not only an economic loss, but it also has an emotional impact on the rabbit producer. Income and breeding materials can be wiped out overnight by disease and death. Disease and death are integral part of any livestock operation. The successes of failure of your rabbit farm will depend on your ability to keep disease at a minimum level. Most disease occurs because of lack of proper management

**Disease Diagnosing**

Some disease can be diagnosed by observation of clinical signs while the rabbit is living. Other diseases cannot be diagnosed without a post-mortem examination and in some cases with special techniques. As a rabbit producer, you should become very familiar with the normal physiological characteristic of a rabbit and the normal appearance of the internal organs (normal temperature, $102^0$-$103^oF$; the normal pulse rate, 140-150; normal respiratory rate, 50-60 and the normal general appearance.

Quarantine

All sick rabbits and those that have been exposed to or infested should be isolated, and those that have been brought new should be kept for a while before adding to the herd. These precautionary measures may prevent spread of infection in the rabbitry. During quarantine, rabbits should be examined closely every day for signs of disease, especially signs of nasal discharge or diarrhea. The use of antibiotic may be advisable if rabbits are brought from an unknown source

## Some Disease of Rabbits

### Introduction

Rabbits are very healthy, hardy little animals provided they are fed housed properly. Nevertheless, the home – bred rabbit can suffer from a few troubles that are curable and one or two for which there is no satisfactory remedy at present known. Usually if illness occurs in the rabbits, it is due to some error in management, such as poor ventilation or faulty feeding. " Prevention is better cure" is an old saying, and it also applies to rabbit keeping.

The most important disease of rabbits is pasteurellosis and enteritis

### Pasteurellosis

All rabbitries are infested with *pasteurella multocida.* Many rabbits carry this organism in their nose even when showing absolutely no sign of nasal discharge. The term " pasteurellosis " covers a multitude of clinical conditions all caused by *P multocida.* By far the most commonest manifestation of pasterurellosis is the condition called *snuffles. However,* pastereullosis is also evidenced by pneumonia, abscesses, weepy eyes, pyometera (uterine infection), orchitis (testicular infection), and wry neck.

### Enteritis

A major cause of death in fryer rabbits is the complex of disease called enteritis

### Diseases of Rabbits

### Rules of Good Management to Prevent Diseases

1. State with good healthy stock from a reliable source.
2. Provide good housing and pens or hutches with no draughts.
3. Allow for plenty of fresh air.
4. Give suitable good and clean water.
5. Ensure absolute cleanliness in the rabbitry.
6. Keep records so that any trouble can quickly be traced to its source.

### Chills

This is a common killer of baby rabbits, even in the neat, and is caused by a direct draught on them, either from above or from a crack in the floor of the nest box a area. In cold weather, see that there is a good wooden floor in the nest. Or place a sheet of marine plywood between the nest box and the pen floor. Plenty of soft hay is the

best nesting material, but the doe will dig right to the floor to deposit her babies. This why a floor is essential. Chill usually affects baby rabbits during the fortnight of their lives, sudden dearth being the first and only obvious symptom. Preventing the illness by keeping litters warn and the rabbit house of equable temperature is the only possible treatment.

**Cold**

A rabbits with a cold has a running nose and sneezes, and a sneezing rabbit is dangerous until the cause has been found. If the running eyes and nose are as a result of an infection, the rabbit must be isolated from all the others, preferably under a verander or other shelter out of doors. If the cold does not clear up within a week or so then it is better to kill the victim and burn or bury the carcass, for it probably has an infection, which can be passed very easily to the rabbits. Could must be prevented by quick isolated of any suspect case and by not buying stock from a sneezing herd.

**Pneumonia**

This sometimes appears in a rabbit herd housed indoors is a almost always due to faulty ventilation, chill in young rabbits or as a secondary complication in due to faulty ventilation, chill in young rabbits or as a secondary complication in rabbit of poor general stamina. The victim is as a miserable, huddled in a corner of its pen with a rate of breathing almost too quick to count. It dies within 24 hours Attention to the quality of the diet and to the general condition in which the rabbits are living will help to help to prevent further case. Rabbits housed in warm, weather proof hutches out of door seldom get colds or pneumonia. The danger lies in stuffy indoor conditions and in too wide a range of temperature from day to night.

**Coccidiosis**

This is one of the most common ailments found in homebred rabbits and is not so easy to clear from the herd. Every rabbit caries at least a few coccidians ( the causal organisms). Coccidiosis can flare – up into an acute attack, due perhaps to wrong feeding, under- feeding or when it has suffered from extra stress. Coccidiosis is of 2 kinds. There is one, which affects the liver. This is not usually fatal. The other form of coccidiosis attacks the intestine. This is much more likely to kill its victim. The rabbit looks thin, has a staring coat, a razor back and in the early stages, an unusually large appetite, with the extra food not resulting in even or normal growth rate. The irritation caused in the intestine prevents the rabbit from absorbing the nourishment via the cells of the intestines. Water soluble drugs are usually given to the newly weaned rabbits for five days or for three days The stick rabbit should be taken from the pen or hutch to prevents spresd.

**Enteritis or Scours**

Enteritis means stomach upset and inflammation of some parts of the intestines leading to scours and death. A diet in which the ingredients are not properly balanced, include the rabbit having been fed too much protein: too little fibre.

**Mastitis**

This is inflammation of the mammary glands in a nursing doe. It occurs if her little one does not take all the milk, injury, a rough floor or edge to the nest box, or a scratch from a baby's claw also causes it. Treatment is with an antibiotic drug.

**Ear Canker**

Rabbit get a mite in the ear, which cause the ear to be with a crusty discharge and its channels to become very inflamed. It is quit simple to cure the condition but it takes a little time and patience. Clean out the crusty discharge with damps cotton wool on an orange stick. Apply one of the preparation sold by chemists for ear canker, possibly a benzyl benzoate one. Repeat every five days until the ear is quite normal again. Two or three application will be necessary to ensure that both mites and eggs are destroyed completely. As the infection is easily passed from one rabbit to another, wash the hands after dealing with a rabbit with it and thoroughly disinfect the pen or hutch when it is cured.

**Sore Hocks**

This is a conditions or sore in the hock ('elbow' on the back legs). This is caused when the rabbits stamps on the floor, a sagging wire floor or rough solid floor, because the fur is thin and poor on its feet. The hock may be red or sore, has broken skin or scabs from infected sores. The sore may be cleaned with warm soapy water and treated with an ointment such as iodine or a zinc preparation.

## Rabbit Management in the Tropics

Cause of kitten mortality

1. **Abandonment by mother:**

   If the young kittens are touched with hand, the mother usually abandons such "contaminated" KITTENS. When young ones have been born on the cage or have fallen down, they could be removed with the aid of newspaper or blunt-ended flat boards.

2. **Cats, Dogs and Ants**

A rabbit raiser may forget to place a nest box in the hutch just before a doe kindles. If the young one arc born on the wire, they can wriggle through the holes and drop on the floor below to be killed by cold or be eaten by cats, dogs: 0, soldier ant the floor is made; of weak wire, dogs might tear the wire and eat up the kittens.

**3 Frights**

Pregnant does might become frightened by a crowd of people or by 'dogs, cats rats etc. trying to catch them in their hutches. They run about in their cages and nervous tension may lead to abortion and death of the newborn kittens already in nesting boxes.

**4. Cuts and strangulation between the wire mesh.** Apart from cuts, strangulation between wires can also cause death.

**5. Poor Nutrition of the doe.**

Young ones born through poor nutrition status usually die shortly after birth because they are too weak to live, Nutritional deficiencies can impair the proper development of the foetus, In order to meet her diet deficiency, the mother may eat up her kittens. Such cannibalism is, however, not common. Cannibalism could be prevented if the protein requirements of the doe is met through the diet.

4.7 Lactation

Lactation in rabbits is optimum at about three weeks. Kittens develop rapidly if their mother gets good and sufficient food. The stage of growth is shows by the folk wing weights.

Birth Weight: -25.-90% (60gm)

50--60 days of age - about 1800 grams – 2kg

Adult (mature) - 2..5 – 454 kg.

1.

The initial rapid increase in weight is greatly influenced by the milk production of the mother. During lactation, adequate good quality concentrate, sufficient succulent greens and plenty of clean fresh water should be provided to ensure production of abundant milk for the younger ones.

Rabbits vary considerably in management systems. If they are handled properly they will gentle and easy to manage, and these characteristics should considered in selecting breeding stock. Some does can be very aggressive while others are not. A doe that is fairly aggressive

for a few days following kindling should not be condemned f she is gentle at other times. Aggressiveness means that she is alert and ready to protect her young litter. Some of the doe that are good mother show this trait.

It should be emphasized that good management is the key to a successful rabbit rising. Then quality of the stock, the quality of feed, cages equipment and the housing/ building will help to overcome the poor performance of rabbit management. Rabbit keeping involved a high degree of management skills when compare to other livestock producers. Good sanitation, close observation of the animals and ventilation, help to control enteritis and respiratory infections.

## 4.0. CONCLUSION

Feeding gives the desired performance in monogastric animals, when the feed give is adequate and accessibility of feed enhances performance. Though the requirements of the animals largely governs the desired supplied volume, Its consumption and efficiency of utilization is influenced by varied factors that must be understood if the full productive potential of the animals are to be met. Proper medication and vaccination will also give goo performance.

## 5.0. SUMMARY

The common disease of Poultry, swine and rabbits and their curative, preventive and control measures are described. These include chills, colds, pneumonia, coccidiosis, enteritis, mastitis, mastitis, ear canker, menge and sore hocks.

## 6.0 TUTOR-MARKED ASSIGNMENT

1. What is  feeding
2. How can one manage poultry, swine and rabbit
3. What can you do to prevent disease in the farm
4. Mention any four disease you know

5. Describe 2 diseases of rabbits related to an environmental condition.
6. How would you treat mastitis, ear canker and hock in rabbit?
7. Describe the various diseases of rabbits.
8. Discuss how they can be prevented, cured and controlled.
9. State 3 bacterial Disease of rabbits and state how they can be cured.
10. Describe 2 nutritional diseases of rabbits.

## 7.0 REFERENCES/FURTHER READINGS

Atteh, J.O. (2002). Principles and practice of livestock feed manufacturing. Printed by Adlek Printers, Ilorin.

Olomu, J.M. (2011). Monogastric Animal Nutrition. Principle and practices. Printed by St Jackson Publishing, Benin City.

Netherway, M. E. P (1979). Home Rabbit keeping, Brighton, London

EP Publishing Ltd. P.71

deBlas, C and Wiseman, J(1998) The Nutrition of the Rabbit.

Cambridge University Press. P. 344

Mc Donald, I. and J. Livestock Rearing in the Tropics. London: Macmillan Education d..138.

# MODULE 6: HOUSING AND EQUIPMENT OF MONOGASTRIC ANIMALS

## UNIT 1: Housing and equipment of Monogastric animals

1.0 INTRODUCTION

### 1.1: Housing:

The size and type of house provided for rabbit will depend upon the population of stock and species or type of stock the house is meant for. Generally the floor can be concrete floor with strong or solid blocks foundation.

In the tropics the wall of rabbit houses are short about 1-2meters from the ground and the other parts are made with wire mesh upwards to the roofing level. Roofing materials such as asbestos sheet, aluminum sheet, corrugated iron sheet, plastic sheets or thatched mesh are used to provide shade or roof for livestock houses. Various types of roofs ranging from monitor roof, A-shaped roof, semi- monitor roof, gable roof and lean to or shed roof are used in rabbit house.

However, irrespective of the housing method or type adopted by a particular farmer, the house should meet the following aims:

1 Protect stock from unfriendly climatic condition such as heavy rainfall, sunshine, wind movement etc.
2 Provide adequate condition necessary for good health of animals.
3 Provide protection against theft of stock.
4 Provide protection against wild animal and other predators that are likely to attack stock or transmit diseases to stock.
5 Facilitates all farm operation such as feeding, watering, medication etc.
6 The house must be cost effective
7 It must be spacious
8 It must be easily cleaned
9 It must be well ventilated
10 It must protect the kitten from escape

The type of housing must depends on the class of rabbit to be reared.

**1.2: Equipment**

There are many types of equipment available which are necessary for successful poultry ,swine and rabbits farming. People of different countries are getting inspired in poultry farming day by day as it is a great way of earnings. The demand of animal protein is increasing due to high population growth and monogastric farming is a great solution of it. So the demands of animal

products are increasing. Proper management, care and sufficient equipment are a must for successful production of animals.

3.0: MAIN CONTENT

3.1Importance of housing

3.2Housing and equipment requirements of monogastric animals

3.3 Cages

Some essential poultry, swine and rabbit products/equipment is shortly described below.

**Automation Equipment**

- Automatic Cooling System Panel
- Auto Control Unit
- Pressure Control Unit

**Brooding Equipment**

- Gas Brooder
- Electric Brooder
- Diesel Brooder
- Homemade Brooder

**Cooling Equipment**

- Exhaust Fan
- Air Circulating Fan
- Pad Cooling Systems
- Curtain Winching System

**Disinfection Equipment**

- G-kill Flame Gun
- Baby G-kill Flame Gun
- Pressure Water Cleaners

**Drinkers**

- Chick Drinkers
- Jumbo Drinkers
- Bell Drinkers
- Grower Drinkers
- Cage Drinkers

**Feeder**

- Chick Feeder
- Grower Feeder
- Parent Feeder
- Chick Feeder Tray
- Cage Feeder

**Heating Equipment**

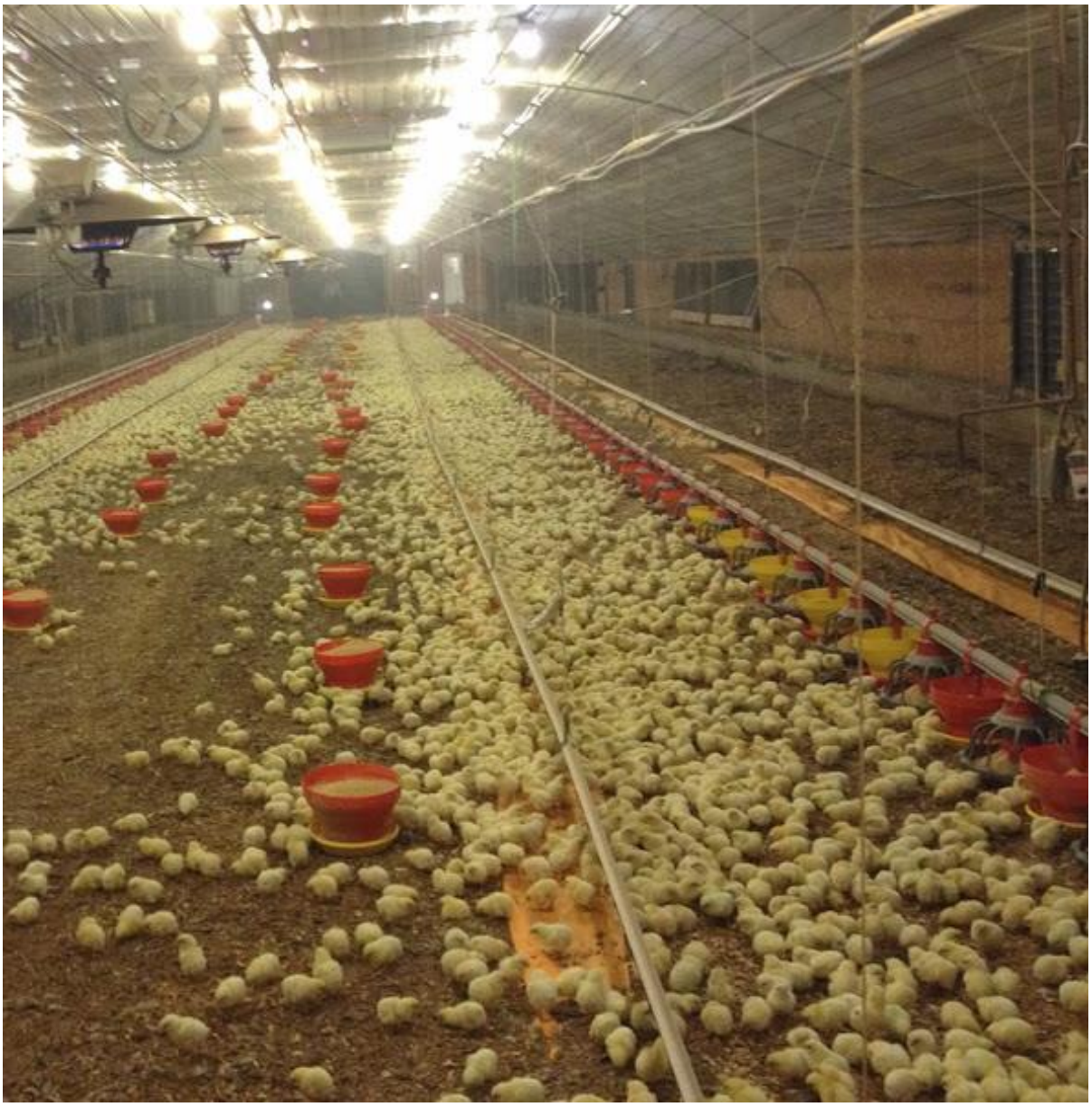
- Space Heater
- Electric Heater
- Diesel Heater
- Hericane

**Other Layer Poultry Equipment**

- Chick Guard
- Sprinklers
- Hygrothermo Meter
- Moisture Meter
- Eggs and Chicks Transportation Trays

- Vaccinator
- Debeaker Machines
- Chain Link
- Boxes or Nest for Laying Eggs
- Poultry Nipples
- Hanging Scale
- Bird Transportation Cage

But for proper growth and maximum production from your birds, you have to make a suitable house for them and ensure good environment.



**Modern Feeding System**

Automatic Feeding System

Automatic Watering System

PVC Confinement

Feed Storage

 Feed Delivery System

4.0: CONCLUSION

5.0: SUMMARY

6.0: TUTOR-MARKED ASSIGNMENT

7.0 REFERENCES/FURTHER READINGS

Smith, A.J. (2001). Poultry. Technical Centre for Agriculture and Rural Co-operation. Macmillan Publishers Limited. 242pg

## MODULE 4: PROCESSING, MARKETING AND STORAGE MONOGASTRIC PRODUCTS

### UNIT 1: Processing, Marketing and Storage Monogastric Products



#### 1.0: INTRODUCTION

Processing is a combination of slaughtering, removal of skin/fur/feather, grinding, seasoning, heat treatment, smoking, salting and other processes, marketing of animals products involves a series of business activities or services associated with the transfer of farm animals and their product from the producers to the consumers. It includes selling of farm livestock and their products to the ultimate consumers or users. Storage is the ability to preserve the animal product.

#### 2. 0:O BJECTIVES

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

- Appreciate the vital role processing of the monogastric animal products

- Realize that processing available to the animal products can extend their shelf live
- Understand that through marketing of the animal products producers can sell their products to the consumers
- Comprehend the essence of storage loss and dehydration of animal products.
- Understand that processing, marketing and storage are the key to the optimum performance and productivity of animals.

## 3.0: MAIN CONTENT

### 3.1:.Importance of Processing, Marketing and Storage of Poultry products

Traditionally chickens are sold alive. During last few years, a few commercial farms with increased broiler production have introduced dressed and frozen chicken and gradually getting market, especially in hotels, restaurant and among a few educated customers. Recently, consumer's attraction towards fast food influenced the dressed chicken marketing. It is unfortunate that there is no technology to produce hygienic poultry products, by-products and further processed. Chicken meat, clour, flavour, texture, appearance and nutrients for oxidation or hydrolysis or other chemical reactions may be lost due to storage/preserve). Prechilling period of dressed carcass with skin is to be at least 8 h before freezing for retaining better carcass quality. Freezing temperature is also a matter in these regards. Some research work noted that prechilled carcass with skin may be stored for 18-20 days at -2±0.5°C as frozen temperature , 6 months at -18°C and 1 year at -30°C in the liquid N-frozen without affecting on flavours, aroma, tenderness, juiciness, pH, moisture binding capacity and consistency.

Most of the consumers buy chicken alive and get them slaughter, de-feather and eviscerate either at the corner of the market or at house. For dressed broilers there is lack of trust in slaughtering method; whether it is done by Killing method, fear of disease broiler slaughtering and fear of dead broiler slaughtering.

Dressed chicken is easy and convenient to the consumers, relief bothering of processing and save time. Therefore, demand for dressed chicken is increasing all over the World with the change of

life style, food habit and lack of availability of manpower. In the developed country, chickens are slaughtered, processed and package at processing plant only. The consumer purchased frozen packed chicken either whole chicken or cut up parts. Though demand of dressed chicken is increasing, but quality control is not at all developed in Nigeria.

The problems of live marketing are; hazardous for environment, spread disease, increase cost of production for transportation, death for handling and storing. For the lack of processing facilities and proper marketing of poultry and poultry products, farmers are not getting remunerative price. So, we need to establish a suitable poultry product processing and preserving technology and marketing system for domestic market and export with a reasonable price.

A systematic technology of collection, processing, storage and distribution of broilers to the markets and finally to the consumers ensure regular supply of live and dressed birds and stabilize market price. Some small and big broiler farm partially processing broiler from their own stock and they are distributing directly to the restaurant or hotel or consumers. A part after packing and freezing send to their selling point in the big cities. The major part of the broilers are however, sold alive direct to the consumers, restaurant and hotel.

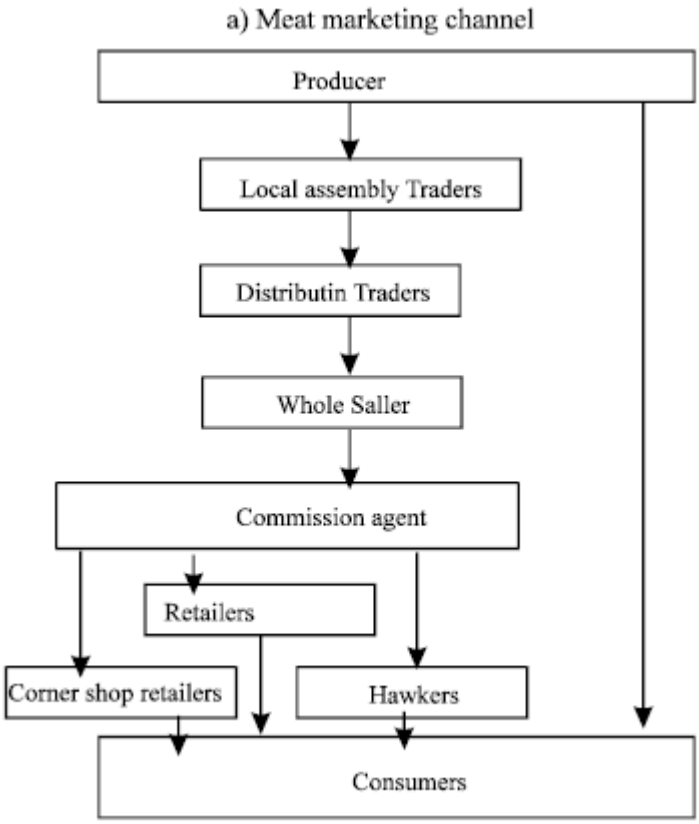
A part of the poultry by products like; viscera, blood, feather, shank etc are used as fish feed, while majority of by products are simply wasted and pollute the environment. Poultry dropping is the important source of fertilizer to fertile the land. Source of Uric acid in poultry droppings is converted into urea.

The following problems are arisen with processed poultry products: A few commercial farms are processing broiler but improper sanitary measurement in processing plant to maintain microbial load which influence spoilage and considerable odors of meat due to following reasons:

Lack of scientific knowledge about processing and skilled manpower b) lack of modern instrument and equipments c) non plan processing plant to maintain the hygienic measurement d) manual processing, deteriorate the quality of meat (Slaughtering de-feathering, evisceration etc) e) lack of refrigeration facilities f) none of technology on preservation (Pre-chilled, with or without skin, how long and temperature etc.

**Egg:** Egg is the perishable poultry product. The systematic method egg processing and grading has not been developed. Eggs are sold without packing and grading. Table eggs are used in the restaurant, hotel and various types of industry. Eggshell may be used as a source of calcium (Ca) in the diet of poultry. Egg grading and packing is essential: a) to prevent egg breakage problem due to transportation and reduce spoilage of egg b) to facilitate egg storing c) to remove heterogeneity of eggs for maximum benefit, which appraise consumer choice and capability to purchase.

**Marketing of poultry meat and egg:** Marketing system remains still in traditional and heterogeneous condition.




As a result, producers are not getting remunerative price and the consumers are paying more price per unit products. Reasons for non -remunerative price to small producers are:

a) Producers are unable to establish a marketing system without having Government policy, b) they are too far from consumers, c) they are not able to find out, what consumer want or need, d)

they are too small as regards output, e) they do not have vehicle to bring their products to consumers, f) most of the consumers are not habituated to eat broiler meat, g) live chicken marketing is popular in Villages, because of trust on dressed birds for slaughtering method , diseased or dead bird. Therefore, appropriate marketing channel is needed for favour of producer or consumer.

**Marketing problems are faced by the Farmers:** Most of the consumers are interested to purchase live birds instead of processed birds due to lack of trust, whether the birds were slaughtered as method, dead or diseased birds.

**Consumer preference:** Most of the ultimate consumers prefer *broiler* chicken because of their taste, firmness, pigmentation and leanness.

**Supply of chicken:** When the chickens are found in large number, buying decision is negatively influenced.

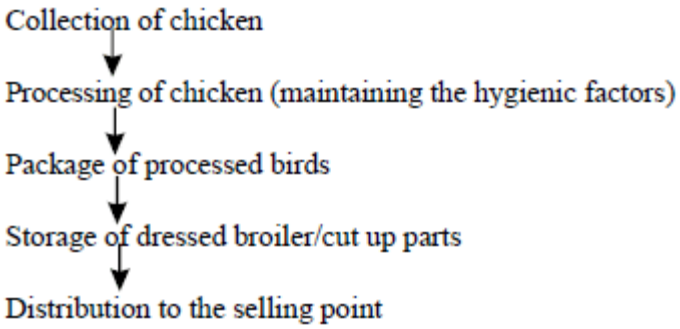
**Storage facilities:** Farmers have no storage facilities and storing instruction (How and how long should be stored)

**Transportation:** Small producers are affected adversely in selling of poultry products through losing weight and breakage of eggs. The consumers are buying with a expense of higher price.

The unscrupulous middleman is taking the advantages.

**Cut up broiler:** Since consumer has no concept on white and dark meat, there is no premium price on brest meat.

**Price variation:** Price varies in different seasons. Eggs are sold at higher price in winter than in summer. The opposite trend is true in case of broiler marketing.




### 3.2.: Importance of Processing, Marketing and Storage of Swine products

### The Processing and Marketing Of Pigs

### Transport

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

Some measures which can be taken minimize these stresses are:

1. Ensure that the loading ramp is properly designed with solid walls and is at the correct height the truck or trailer.
2. Handle the pigs quietly and gently at all times. Avoid the use of sticks
3. Do not feed pigs for 12 hours before loading
4. Avoid loading and travelling during the heat of the day
5. Spray the pigs with cold water before loading and again in the truck
6. Provide a cover on the truck, good ventilation, adequate bedding and ensure the floors are not: Slippery.

Make sure that 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.

### Slaughter Procedures

### Stunning

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

- **Mechanical A** heavy hammer or other implement is used to stun the animals on the head Stunning with a captive-bolt pistol is quite efficient.
- **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% carbon dioxide where they will lose consciousness within two seconds,

**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.

**Scalding and De-hairing**

By immercing the carcass in water at 65% to $75^0$C, the hair is loosened and can be removed by scraping. For the small-scale producer who is slaughtering on-the farm, a drum of water over a fire is adequate for scalding purposes. Alternatively, when 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.

**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 then be separated and the gut emptied and cleaned away from the rest of the meat.

**Meat Hygiene**

The freshly killed carcass is an ideal breeding ground for bacteria und hygienic conditions are therefore of paramount importance to prevent infection Ideally, carcasses should be chilled immediately after slaughter and the meat should remain chilled until it is cooked. Where

refrigeration 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 slaughter house, all carcasses should be examined by a qualified meat inspector. He will examine the carcass and offal's critically for signs of parasitic infection e.g 'milk-spot' livers, damaged lungs etc and other departures from health. Meat that does not pass inspection is condemned and should be burnt.

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

a. Private Sales: these involve selling of one or more pigs to the local consumer, other pig producers, butchers or middlemen. The pigs are sold live and prices are normally subjected to bargaining. This method is most common among rural small-scale producers. It has the advantage of being the simplest. To ensure adequate prices for pig farmers, marketing cooperatives are recommended.
b. Public Sales: in these methods, pigs are taken to a central place, where they are sold by auction on live basis to the highest bidder.
c. Direct Sales to Butcher: the pigs are sold to the butcher directly by producer without middle men. The method is more applicable to the large scale producers. Fluctuations in prices can be serious problem in this system of pig marketing.

d. Contract Sales: Under this system, contract is entered into with an abattoir to supply a certain number of pigs over a period of time at a set price. This condition allows the producer to plan this production strategy over a fairly long period of time. Fluctuation in input prices however, can be a problem in this system.

## Transportation

Care must be taken while transporting pig to the market or slaughter house. Excessive stress on the pig can lead to mortality in transit.

Pigs to be transported should not be fed 12hours before loading

Provide a loading van if many pigs are to be transported at once to the market.

The loading ram should be properly designed to be at the same height with the cart, truck or trailer.

Handle pigs with uttermost care

Spray with cold water before loading, if possible. Load and Travel in the cooler part of the day.

In the early in the morning for short journeys and in the night for long journeys.

The truck to be used should be covered but with provision for adequate ventilation and bedding on the floor.

Avoid mixing pigs of different sizes, ages and herds. Similar considerations should also apply at the lair age (i.e. where pigs are held prior to slaughter). The pigs should be handled and driven with care.

## Marketing

The ability to market pigs at the right time is a major determining factor to the success of commercial pig production. A recent international conference on pig production in Nigeria identified marketing as the number one constraint to increased commercial pig production. Small holder farm have not problems as per marketing, but the commercial farmer have to put marketing a major issue determining their success. Pig can be marketed using the following market outlets;

a. Private Sales: these involve selling of one or more pigs to the local consumer, other pig producers, butchers or middlemen. The pigs are sold live and prices are normally subjected to bargaining. This method is most common among rural small-scale producers. It has the advantage of being the simplest. To ensure adequate prices for pig farmers, marketing cooperatives are recommended.

b. Public Sales: in these methods, pigs are taken to a central place, where they are sold by auction on live basis to the highest bidder.

c. Direct Sales to Butcher: the pigs are sold to the butcher directly by producer without middle men. The method is more applicable to the large scale producers. Fluctuations in prices can be serious problem in this system of pig marketing.

d. Contract Sales: Under this system, contract is entered into with an abattoir to supply a certain number of pigs over a period of time at a set price. This condition allows the producer to plan

this production strategy over a fairly long period of time. Fluctuation in input prices however, can be a problem in this system.

### 3.3.: Importance of Processing, Marketing and Storage of Rabbits products

**Processing and Marketing of rabbit products**

Rabbit will reach maturity or table size as from 5-6 months of age depending on breeds, location, feeding and other management practices. Buck that has been used for service more than 2 years could be culled. Does that produces small number of kit can also be culled?

There are different ways of processing / killing rabbits by stunning or direct methods. It can be killed by stunning or direct killing.

**Stunning**: this is the process of making the animal/rabbit to be slaughter unconscious by hitting the back of the head with heavy object or iron rod and thereafter slaughter around the neck region.

**Direct Method of Killing**: This involve the most common ways of killing animals eg the use of Knife and gun shot. It also involve the holding down the hind-limbs, head and cutting the rabbit neck with a sharp knife and allow the blood to drain. The blood can be washed from the body of the animal for further processing.

**Defurring**: This is the methods of removing the fur after slaughtering. Fur could be removed: either by scalding or flaming

**Scalding**: This involves dipping the slaughtered or killed animal inside hot water of about 60C for 3-5 minutes. Sharp object could then be used to scrap the fur.

**Flaming**: This is the traditional way of removing the fur by placing the killed rabbit on burning straw, fire-wood or stove. It has been reported that flamed rabbit taste better than scalded rabbit.

4.0: CONCLUSION

5.0: SUMMARY

6.0: TUTOR-MARKED ASSIGNMENT

**7.0:REFERENCES/FURTHER READINGS**


Aini, I., (1990). Indigenous chicken production in South-East-Asia. World`s Poult. Sci. J., 46: 51-57.

Barua, A., M.A.R. Howlider and Y. Yoshimura,{ 1998). Indigenous naked neck fowl of Bangladesh. World's Poult. Sci. J., 54: 279-286. CrossRef | DirectLink |

Bulgakova, L.V., (1975). Storage of poultry in the super cooled condition. Trudy Vsesoyuznyi Nauchno-Issledova Telskii Institut Myasnoi Promyshlennosti, 19: 12-14.

Das, S.R. and S.K. Raha, (1998). Marketing of poultry birds in Sylhet District of Bangladesh. Economic Affairs, Article No. 1.

Hossain, S.A., (1999). Marketing of egg and broiler in Bangladesh. Proceedings of the 2 International Poultry Show and Seminar, (PSS'99), Worlds' Poultry Science Association, Bangladesh-Branch, pp: 59-69.

Huque, Q.M.E., (1993). Current status of poultry production and marketing system in Bangladesh. Agricultural Research Project-II. BARC, USAID/CHECCHI and Company Consulting, Inc.

Payne, W.J.A. (1990). An introduction to Animal husbandry in the tropics. 4th edition. Longman Singapore Publishers.

Babayemi, O.J., Abu, O.A. and Opakunbi, A. (2014). Integrated Animal Husbandry. Positive Press, Ibadan.