POULTRY MANAGEMENT

UNIT 1 GENERAL INTRODUCTION

CONTENTS

1.0 INTRODUCTION

What are Non-Ruminants?

Non-ruminant animals are those animals that have simple stomach. They possess no rumen, reticulum and omasum. They have abomasum as the only true stomach. Examples include Poultry, Rabbits and pigs.

Meaning of poultry

Poultry generally refers to domesticated birds that are used mainly as food to man. These include domestic fowl, ducks, turkeys, guinea fowl, pheasant, quails, ostrich, pigeons, doves etc. many species, breeds and strains of poultry are used in the service of man. Some of these species are of limited importance examples are guinea fowl, goose, ducks and the ostrich, others and particularly Gallus domesticus (domestic fowl) have assume a worldwide importance.

Domestic fowl are believed to have been domesticated in Asia around 2500 BC, Geese in Egypt 1500 BC, turkey in Mexico 2500 BC, ducks in China 2500 BC, Muscovey ducks were found in Peru in the sixteenth century and were probably domesticated at about that time. Most modern breeds of poultry were developed from 1850 onwards. Modern breeding programmes to produce hybrids started in 1950s and 1960s.

2.0 OBJECTIVES

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

- explain the terms poultry and non-ruminants
- know the advantages and disadvantages of keeping poultry
- understand the problems or constraints of poultry production in Nigeria
- know the guide lines on how to improve Poultry production in Nigeria
- distinguish the different commercial breeds of Chickens and their Characteristics.

3.0 MAIN CONTENT

3.1 Taxonomy of the domestic fowl

It is important to trace the taxonomy of the domestic chicken in the animal kingdom considering its importance as a supplier of meat and eggs to ever growing population of the world.

Below is the taxonomy of the domestic chicken: Kingdom -

Animalia

Phylum	-	Chordata
Class	-	Aves
Subclass	-	Neomithes
Order	-	Galliformes
Family	-	Phasinidae
Genus	-	Gallus
Specie	-	Gallus domesticus

3.2 Advantages of poultry keeping

1) They have comparatively small body size which makes it reasonably possible to be raised in a confinement. The success of the extensive range of systems and methods that have been developed to produce chickens in widely varying environments is an important step to the success of poultry keepers.
2) There is a low cost of production and quick return from poultry compared to other farm animals.
3) Poultry meat and egg are high quality animal protein sources. Eggs are the most nutritive and have the best amino acid profile known to man.
4) Poultry are efficient feed converters to meat and egg (i.e. they have high feed efficiency)
5) Poultry production can be used to minimize the protein intake in- balance in Nigeria.
6) There is excellent product acceptance with respect to social and religious traditions, in other words no strong taboo against the eating of poultry product, thereby ensuring ready market for the products.
7) Curative and preventive drugs are available for most poultry diseases.
8) Poultry birds assist in scientific research.
9) Poultry also gives useful by-product like feathers and droppings (feaces).Their droppings contain more nitrogen, phosphorus, and potassium than other animal wastes.
10) From a genetic standpoint, the short inter-generation interval of this species (about 1 year) has favoured the rapid selection of breeds which meet more of the specific demands of consumers.

3.3 Disadvantages of keeping poultry

1) The digestive tract of birds is relatively short compared to other farm animals and can only utilize high quality concentrate feeds. These are also use as feed for human making them to be in direct competition with man.
2) They are highly susceptible to extreme weather conditions and diseases.

SELF-ASSESSMENT EXERCISE

ia. Explain the term ‘non-ruminants’ using suitable examples.
b. Discuss the advantages and disadvantages of poultry keeping.

3.4 Problems or constraint of poultry production in Nigeria

1) Because of the competition with man the cost of feed ingredient is high.
2) Housing, diseases and parasitic problems.
3) The nutrient composition of available feed ingredient not well understood.
4) The nutrient requirement of birds for maintenance and production is not well known.
5) Unavailability of adaptable egg laying and broiler birds.

3.5 Guidelines to improve poultry production

1) Farmers should provide balance ration to improve the birds diet.
2) Farmers should follow sound management practices.
3) Farmers should adopt proper vaccination programmes and effective disease control measures.
4) Farmers should renew their stock regularly.
5) Farmers should raise birds of imported breed that are more productive.

3.6 Breeds of chickens and their characteristics.

All breeds and varieties of chicken are due to natural selection. Many are commercially exploited. These include:

3.6.1 Egg type

These are breeds raise for egg production. They have small body size and slow growth rate. Examples are Harco, Ancona, Rhode Island Red, black leghorn white leghorn.

3.6.2 Meat type

They are breeds raised for meat production. They have large body size, they are also heavy breed, and they have faster growth rate. Examples are light Sussex, white Sussex, white Wyandotte, Plymouth Rock and Anak.

3.6.3 Dual purpose

These are birds that are raised for both meat and egg production. Examples are Light Sussex, Rhode Island Red, and Plymouth Rock, New Hampshire etc.

In today's economic reality, in developed countries dual-purpose breeds are regarded as in efficient, producing neither meat nor eggs very efficiently. However in Nigeria dual-purpose birds can be very useful especially in less intensive systems of production.

For example the cocks are used for meat production and the hens for the production of both eggs and meat. Both are considerably older when slaughtered than are broilers and therefore, have more flavour.

3.6.4 Rhode Island Red

The Rhode Island red originate from America the feather is red with some black feather in part of the wing. It has yellow skin and lays large brown eggs.

3.6.5 Leghorn

The white leghorn has white feather and is use mainly for egg production. It is small in size and lays over 300 white shell eggs in a year.

The brown leghorn produces brown shells eggs and is not as productive as the white leghorn.

3.6.6 Light Sussex

It is an important English breed which grows rapidly. It is large with good fleshing property. It is good as a broiler but poor as a layer. Some exotic breeds of chicken are shown below.

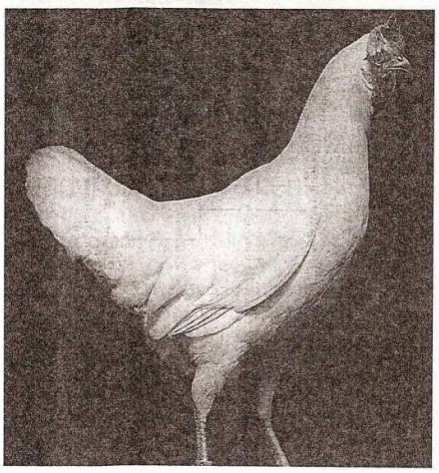


Fig 1.1 White leghorn

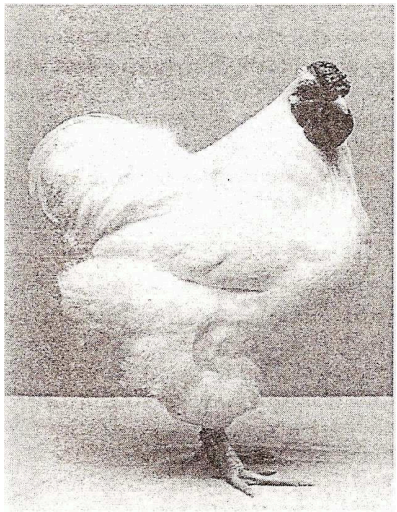
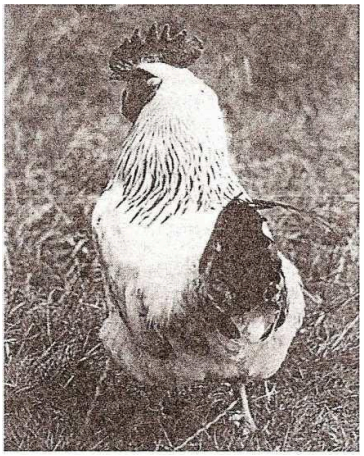
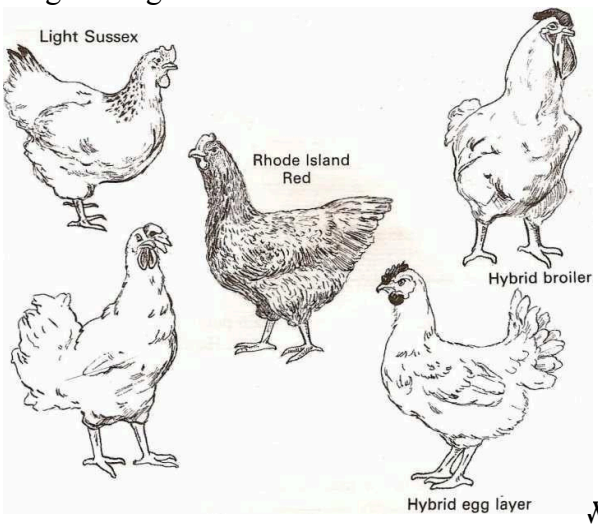


Fig 1.2 White Wyandotte

Source: Poultry - Tropical Agriculturalist by A. J. Smith, page14 &15



Source: Poultry - Tropical Agriculturalist by A. J. Smith, page 15
Fig 1.3 Light Sussex



White leghorn

Fig 1.4 Poultry breeds

Source: Livestock rearing in the tropics by I. McDonald and J. Low, page 90

3.6.7 Barred Plymouth Rock

The feather colour is grayish black with white underneath, while the sides are black with prominent streaks of white spots. They are heavy breeds and are used for dual purpose. They lay brown eggs.

3.6.8 Harco

Harco is a heavy American breed and has been commonly used to develop the present day breeders. It is a good egg laying bird.

Other breeds like the Ancona, Andalusian and Spanish white are all of the Mediterranean origin and are early maturing between 150-160 days, producing 240-250 white shell eggs per year.

3.6.9 Local breeds

These are breeds peculiar in the west African sub-region they are generally small with tough flesh. They are poor layers but good brooders. Their feather varies in colour from white to black including multi-colour mixtures.

3.6.10 Hybrids

They are commonly seen and use in commercial farms. They are generally high yielding in both meat and egg production. They are fast replacing most standard birds.

4.0 CONCLUSION

There are many advantages of keeping poultry, the few problems associated with their keeping can be corrected by following some few guidelines. Several breeds of chickens are available and can be commercially exploited.

5.0 SUMMARY

In this unit will have learnt that:

- Poultry generally refers to domesticated birds that are used mainly as food to man. These include domestic fowl, ducks, turkeys, guinea fowl, pheasant, quails, ostrich, pigeons, doves etc.
- Advantages of keeping poultry include-their small body size, low cost of production, high quality protein, feed efficiency, not associated with taboos, useful by-products, short generation interval and help to improve protein intake.
- Problems associated with poultry keeping includes, feed competition with man, housing, diseases, parasites and lack of adequate knowledge in their nutrition.
- To improve poultry production we need to improve birds diet, sound management practices, vaccination programs e.t.c.
- There are several breeds of chickens that are available and all can be exploited commercially.

6.0 TUTOR-MARKED ASSIGNMENT

1a) List the problems and constraints of poultry production in Nigeria and suggest ways of their improvement.
b) Name five improved breeds of chickens that are found in Nigeria.
c) Briefly explain the characteristics of any three breeds mentioned above.

7.0 REFERENCES/ FURTHER READING

Lee, S. and Summers, J. D. (2000) Broiler breeder production. McDonald, I. and Low, J.

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Sainsbury, D. (1992) Poultry Health and Management Smith, A. J., and Coste, R. (2001) (Poultry) The Tropical Agriculturalist (CTA) Macmillan

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UNIT 2 POULTRY PRODUCTION SYSTEMS

CONTENTS

1.0 INTRODUCTION

There are several production systems employed by poultry farmers in different parts of the world. Examples include: Extensive or Free range system, Semi-intensive or Restricted range system and Intensive system. Each of these systems has its merits and demerits.

Poultry of various classes are kept either for meat or egg production. For example white leghorns are normally used for egg production while broiler strains are based on crosses between Cornish white, New Hampshire and white Plymouth Rock.

Large poultry units are being increasingly developed in areas of high temperature that are not traditional to advanced methods of husbandry and special techniques are needed for satisfactory management of poultry under these conditions.

In a tropical environment the design and construction of poultry houses must take into consideration the climatic and weather conditions of the environment. The guiding principle is to keep poultry productive throughout their producing life. This involves the provision of optimum conditions of temperature, humidity, ventilation and light.

Another important principle relates to design and durability. Poultry house should be structurally strong, durable, and cheap.

2.0 OBJECTIVES

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

- know the different systems used in the production of poultry.
- understand the advantages and disadvantages of each production system of keeping poultry.
- understand the guide lines on how to improve on our poultry production system in nigeria.
- distinguish the different commercial breeds of chicken that are suitable for each production system based on their characteristics.

3.0 MAIN CONTENT

3.1 Extensive/ Free Range System

This system involves the rearing of chickens in an open unrestricted environment with or without artificial shelter. This is the most common system of poultry production in Nigeria. It has the following advantages

3.2 Advantages

1) Reduce cost of feeding.
2) Nutritional deficiencies rarely occur because of access to green feed, grains, white ants and other insects.
3) It involves low capital investment.
4) It eliminates cannibalism among the birds.

3.3 Disadvantages

1) Difficulties in controlling birds, especially during disease outbreak, breeding and proper feeding.
2) Loss of eggs and birds through accidents, theft and predators.
3) Requires large area of land.

3.4 Semi-Intensive/Restricted Range System

This system involves the use of poultry rum which is an area of land enclosed by fence of wire netting. The birds are allowed to wonder about during the day and at night they are kept in poultry house.

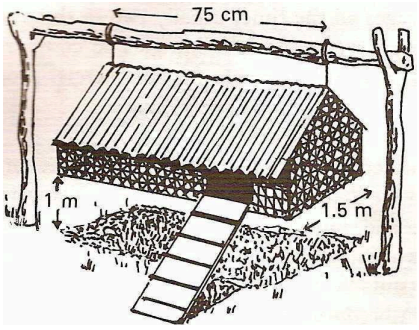

Fig 2.1 Suspended poultry house for about 10 birds
Source: Livestock rearing in the tropics by I. McDonald and J. Low page 92

a)
b)

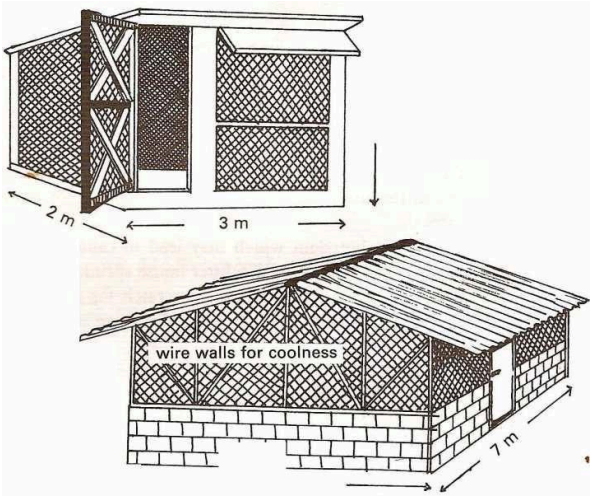

Fig 2.2 a) Simple chicken house for hot areas for 10 birds.
b) Deep litter house for 200 layers, warm climate
Source: Livestock rearing in the tropics by I. McDonald and J. Low page 92

3.4.1 Advantages

This system has the advantages that the birds are under strict control e.g. prevented from crossing with inferior cocks. The birds are protected from predators and accidents.

3.4.2 Disadvantages

The disadvantages include high cost of production and large space or land requirement.

3.5 Intensive System

3.5.1 Deep litter system

In the deep litter system, the birds are confined to a large permanent house. The floor is kept covered with finely cut straw, rice hall or sawdust. Troughs of dry mash and water are always made available for the birds.

An initial litter layer of 2-3 inches is recommended for young birds, this is build up to 9 inches for the adult birds. The litter is normally renewed ones every year or when it becomes lumpy. Floor space per bird is 1 square feet or 30.5cm.2

This system can be used to raise broilers and layers. In addition to feeding and water troughs, perches and nest boxes are provided for the layers.

3.5.2 Advantages

1) No risks of trouble from predators.
2) With proper condition, there is less risk of parasitic infection.

3.5.3 Disadvantages

1) Increase chances of nutrient deficiency especially when bird are not well fed, incidence of cannibalism also increases.
2) Difficulties of keeping the floor clean especially during the rainy season when humidity is very high.
3) It involves high capital investment.
4) It predisposes birds to social vices such as fighting, cannibalism, broodiness in laying birds.

3.6 Battery cage system

The birds are housed or kept in cages within the house. The cages varies in size, type and form but they are all designed with facilities to provide water and feed as well as egg and droppings

collection. The system is very efficient for raising layers. The cages are either constructed entirely of wire or wire and wooden frames. Most cages are about 18 inches high and 8 inches deep. The width of individual cages varies depending on whether they are designed to hold one, two or more birds (14 inches for one layer or two light breeds).

The floor is of wire mesh to allow droppings drop through. The floor slopes from behind into which eggs roll as they are laid. The cages are usually arranged in blocks of 3 or 4 tiers. See fig 2.3a. Modern cages incorporates some forms of mechanical feeding.

Fig. 2.3a Intensive Battery house Fig 2.3b House with a slatted floor

Source: Tropical Agriculturalist by A. J. Smith page 132

3.6.1 Advantages

1) The birds are easy to manage.
2) It is also very easy to cull unproductive birds.
3) Better control of parasites and minimal incidence of diseases.
4) It also prevents cannibalism and broodiness in birds.
5) High production and low mortality rate.

3.6.2 Disadvantages

1) It involves high capital investment.
2) There is need for a well balance ration.

3.7 fold system

The fold system has a house made together with the run to form one unit. This unit can be moved from one place to another. (see fig 2.4)

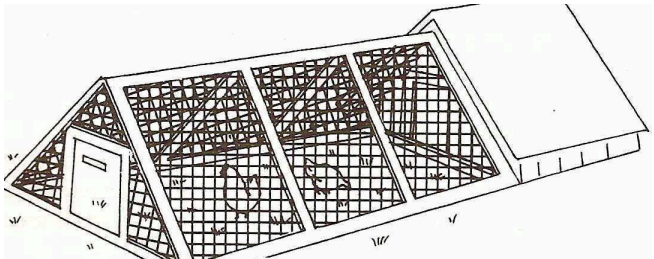

Fig 2.4 Fold unit, should be moved daily
Source: Livestock rearing in the tropics by I. McDonald and J. Low page 92

3.7.1 Advantages

1) The birds can be examine and attended to individually when necessary.
2) The birds dropping improves the soil fertility.
3) Farmers can combine poultry keeping and crop rotation.
4) There is reduced build-up of parasite because the unit can be moved from one place to another.

3.7.2 Disadvantages

1) The system is only suitable for small or backyard poultry business.

3.8 Poultry Housing

Reasons for providing suitable housing for poultry

1) To protect the birds from bad weather.
2) To protect the birds from thieves and predators.
3) To be able to control the birds.
4) To be able to keep the birds in age group

3.8.1 General principles of poultry housing in the tropics

In a tropical environment the design and construction of poultry houses must take into consideration the climatic and weather conditions of the environment. The guiding principle is to keep poultry productive throughout their producing life. This involves the provision of optimum conditions of temperature, humidity, ventilation and light.

Another important principle relates to cost and durability. Poultry house should be structurally strong, durable, and cheap.

3.8.2 General guidelines

The following guide lines will help a poultry farmer in providing simple and adequate housing for poultry under tropical conditions.

1) External wall should be low(about 0.6m-1m) with a chicken wire mesh(1-2cm) extending from the wall to height of 2m leaving some margin under the roof for un impeded or free air flow.
2) The roof should be of corrugated material or thatched.
3) There should be enough roof overhangs to prevent rain from

entering the pens.

4) Internal partitions when necessary should be made of wire mesh to aid unrestricted air circulation.
5) The poultry house should be clear of other buildings or structures which may obstruct the free flow of air.
6) The poultry house should not be too wide (more than 9m) as this tend to cut down fresh air movement in and out of pen.
7) The house should be constructed in an east west direction, to protect the birds from the direct rays of the sun.
8) Water reservoir should be located under shades to prevent excessive heat up of water during hot days.
9) Stocking density for tropical areas should be 10-20% lighter than the temperate environment.
10) Poultry houses should be located on a well-drained ground to prevent flood.
11) The poultry house should be accessible by road to facilitate evacuation of produce or delivery of feed and other supplies.

3.9 Poultry Equipment

It is very important that food troughs should not be overfilled and neither should the tube feeders be too widely opened (fig.2.5 and fig. 2.6) the construction of the food trough is also important and there exist types that reduce spillage and so reduce food wastage by up to 20 percent. Food wastage can turn a profitable enterprise into one making a considerable loss.

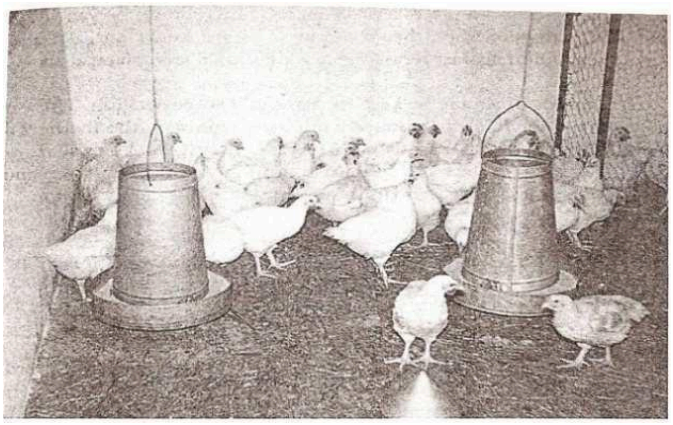

Fig 2.5 Growing birds in pens where the food s is provided in tube feeders
Source: Tropical Agriculturalist by A. J. Smith page 129

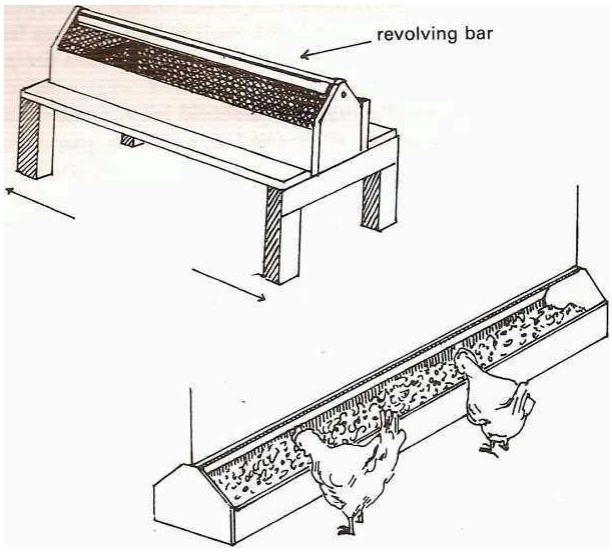

Fig 2.6 Feed trough and suspended feed tray for poultry
Source: Livestock rearing in the tropics by I. McDonald and J. Low page 98

Table 2.1 Floor space and trough space requirement per 100 chicks

Age (weeks)	Floor space (m2)	Trough space (m)
0-4	4	1.5
5-8	9	3.0
9-20	12	6.0

For drinkers and food troughs the requirements are
1. It should be impossible to tilt over.
2. It should have adequate size and depth.
3. It should discourage scratching out of contents.
4. It must not cause injury to the bird.
5. It should be cheap and can be constructed locally.
6. It should allow the bird full access and not limit food intake.

3.9.1 Maintenance of poultry equipment

Proper maintenance includes the following:

- cleaning of feeders and drinkers and emptying them every day in case of deep litter system;
- Complete cleaning using soap and water and if possible disinfectants. This should be followed by complete drying and disinfection in direct sunlight;

SELF-ASSESSMENT EXERCISE

i. Discuss the general principles of poultry housing under tropical conditions.
ii. List the qualities of good feeders and drinkers on a poultry farm

4.0 CONCLUSION

There are several production systems employed by poultry farmers in different parts of the world, these are Extensive or Free range system, Semi-intensive or Restricted range system and Intensive system. Each of these systems has its merits and demerits.

However, in a tropical environment the design and construction of poultry houses must take into consideration the climatic and weather conditions of the environment.

5.0 SUMMARY

In this unit we have learnt that:

- Poultry has proved to be particularly versatile domestic bird that is adapted to almost all environments and system of production.
- Poultry production makes it an open choice for the farmer to decide which system of production he is interested based on his capital, skills, and needs.
- In a tropical environment the design and construction of poultry houses must take into consideration the climatic and weather conditions of the environment.
- The guiding principle is to keep poultry productive throughout their producing life. This involves the provision of optimum conditions of temperature, humidity, ventilation and light.
- Another important principle relates to cost and durability. Poultry house should be structurally strong, durable, and cheap.
- It is very important that food troughs should not be overfilled and neither should the tube feeders be too widely opened. The construction of the food trough is also important and there exist types that reduce spillage and so reduce food wastage by up to 20 percent.
- Food wastage can turn a profitable enterprise into one making a considerable los.

6.0 TUTOR-MARKED ASSIGNMENT

1a. Compare and contrast the extensive/free range system and the intensive system of poultry production.

b. Explain the reasons for providing suitable housing for poultry.

7.0 REFERENCES/FURTHER READING

Lee, S. and summers, J. D. (2000) Broiler breeder production. McDonald, I. and Low, J. (1985) Livestock rearing in the tropics Macmillan education Ltd.

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Williamson, G. and Paye, W. J. A. (1987) An introduction to Animal husbandry in the tropics.

UNIT 3 FEEDING PRINCIPLES OF POULTRY

CONTENTS

1.0 INTRODUCTION

The digestive system of the fowl is simple but well-organized. Food is picked up by the beak and selected on the basis of feel and appearance rather than tastes. However, birds do have a functional olfactory system and the influence of taste and smell cannot be entirely overlooked.

To understand the principles behind the feeding of the chicken it is useful to look at the way the birds digest its food.

Poultry are monogastric they are unable to manufacture essential amino acids or the B vitamins, and they cannot exist on high fibre diets. The diets of birds which are intensively housed and which have access to neither soil, grass, nor sunshine must contain the materials essential for the processes of maintenance, production and reproduction.

The essential nutrients can be conveniently grouped under the following:

- Water
- Carbohydrates } sources of
- Fats and oils } Energy
- Protein (amino acids)
- Vitamins
- Minerals

2.0 OBJECTIVES

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

- understand how digestion takes place in the poultry.
- learned the nutritional requirement of poultry in terms of their energy, protein vitamin and mineral needs.
- know the plant and animal sources of proteins and other types of feed available to poultry.
- appreciate the recommended nutrient allowance for poultry under tropical conditions.
- be familiar with growth rate, feed intake and floor space required of pullets, broilers etc.

3.0 MAIN CONTENT

3.1 Digestive System of Poultry

1. Beak
2. Tongue
3. Oesophagus
4. Crop
5. Proventriculu
6. Gizzard
7. Duodenum
8. Small
9. Large intestine
10. Cloaca
11. Caeca
12. Liver
13. Gall-bladder
14. Pancreas
15. Bursa of fabricus
16. Bronchus
17. Lung

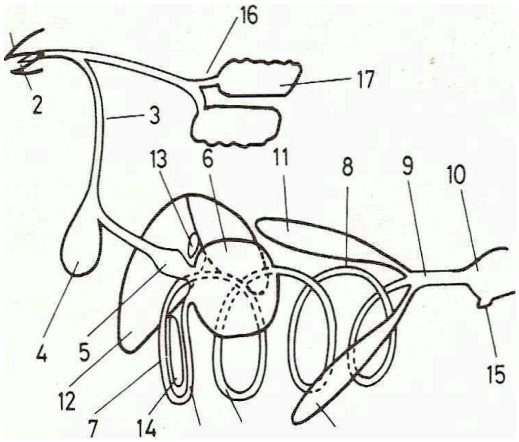

Fig : 3.1
Source: Poultry Health and Management by D. Sainsbury page 24

The fowl is a simple stomach animal. Digestion starts from the mouth. The beak is adapted for picking of the feed. The tongue is an arrow shaped barbed like structure which forces feed into the oesophagus. Salivary glands secrete saliva which lubricate the feed and facilitate the downward movement into crop. The crop act as a storage pouch which retain feed for gradual passage into the stomach (proventriculus). The feed acted upon by enzymes and amylase which break down carbohydrate. In the stomach, feed mixed with gastric juice containing enzyme pepsin and hydrochloric acid. The Pepsin breakdown protein into amino acid. The feed particles then moves into the gizzard which is a bean shaped strong muscular organ, which crushes or breakdown feed particles by its rhythmic contraction into pulp. This process is assisted by the presence of insoluble grit, the feed then passes into the duodenum loop which is the first part of the small intestine where most of the enzymatic digestions of feed take place. The pan crease secret various amylotic, proteolitic and lipolitic enzyme into the duodenum. The liver also produces bile which hydrolyses fats. Digestion is completed in the small intestine and the nutrients are absorbed through its wall. At the junction of the large and small intestine are two blind sacks known as caeca. Their main function is for fibre digestion and water absorption.

Large intestine is also responsible for water absorption and storage of feacal matter or digesta which passes into the cloaca where they are secreted.

3.2 Nutrients Requirement of Poultry

3.2.1 Nutrition

Nutrition is the process which provides nourishment to a living organism. This implies the provision of certain food elements (nutrients) which the body of the organism absorbs and uses to perform its normal function associated with life as well as storing the excess in its tissue. The nutrients required by poultry include:

1) Energy
2) Protein
3) Vitamins
4) Minerals
5) Water

3.2.2 Energy

Energy requirement by poultry are supplied from carbohydrate and lipids. In adverse condition, protein can also be broken down to supply energy. The energy in poultry is normally expressed in unit of metabolizable energy per unit weight e.g. kilo joule/gram (KJ/G) or requirement in terms of metabolizable energy per day (KJ/day).

The metabolizable energy refers to that portion of the feed which is available to the bird for the production of meat and egg and for the maintenance of vital function and body temperature.

Birds are usually given free access to feed and they eat to satisfy their energy requirement. The more increase in energy value of feed the less its intake and the reverse is true.

Sources of energy
Maize; Sorghum; Millet; Wheat; Barley; Maize bran; Wheat bran; Brewers dried grain (BDG); Cassava; Yam; Vegetable oils (groundnut coconut, soybean cotton seed e.t.c.)

3.2.3 Protein

Proteins are nitrogen containing compounds. They promote growth and flesh formation. Proteins are made up of units of amino acids. The synthesis of proteins in the body requires about twenty different amino acids. Ten of these amino acids cannot be synthesis by the birds and must be provided in the diet.These are termed essential amino acids. Examples include:

Phenyl alanine; Valine; Threonine; Tryptophan; Isoleucine; Methionine; Histidine; Arginine; Leucine; Lysine

The non-essential amino acids are:
Alamine, Aspartic acid, Glycine, Proline, Hydroxyl praline, Tyrosine, Serine, Cysteine, Cystine, Glutamine.

Of all the essential amino acids. Lysine, methionine and tryptophan are called critical amino acids because they are the most limiting amino acids in feed stuff.

In general deficiency of essential amino acids leads to poor growth, poor egg production and low feed utilization.

Sources of proteins

Sources are of two types, plants and animal sources.

Plant sources
Sunflower meal, Palm kernel meal, Soya bean, Bambara nut, Cotton seed cake, Ben seed meal, Bambara nut meal, Locust bean meal, Shear butter meal, Groundnut cake, Soybean meal, Cowpea e.t.c.

Animal sources
Fish meal, Meat meal, Maggot meal, Termite meal, Chicken offal meal, Grasshopper meal, Feather meal, Meat and bone meal, Blood meal e.t.c.

3.2.4 Water

Water is the most important nutrient of farm animals. The body of chicken is composed of at least 70% of water so also the egg. It is usually made freely available to poultry.
The water intake of birds varies with age, temperature, size, diet and rate of egg production.

Table 3.1 Estimated water intake (at 21◦C) of chicken of various ages:

Age (week)	**water intake/100 birds (litre/day)**
0 - 2	4 - 5
2 - 5	7 - 10
5 - 10	15
10 - 20	18 - 22
Adult layers	20 - 30

Lack of water can seriously retard growth rate and impaired egg production. In tropical countries water deprivation can lead to death within a very short period of time

3.2.5 Minerals

Minerals are inorganic substances required by farm animals to build their skeleton and perform various metabolic function in the body. Minerals are classified into two groups based on their level of requirement.

1) Macro or major elements which are minerals required in relatively large quantity
   which are calcium, potassium, magnesium, sodium chlorine and sulphur.
2) Micro or minor elements which are required in small quantities. These are iron, zinc,

copper, molybdenum, selenium, iodine, manganese, cobalt and fluorine.
The major minerals in poultry feeding are calcium and phosphorus.
The common sources of minerals include:
Bone meal
Oyster shell
Limestone
Di calcium phosphate
Common salt
Wood ash
Green grass etc
The micro minerals are usually in corporated as pre-mix in which form they contains most of the trace minerals in the right proportion required by the various classes of chicken.

3.2.6 Vitamins

Vitamins are organic compounds not synthesis by the body but essential for normal growth and good health. They are required in small amount. There are thirteen vitamins required by poultry. They are the fat soluble and water soluble vitamin.

Fat soluble vitamins include:
Vitamin A, D, E, K

Water soluble vitamins include:
Thiamine (B1)
Riboflavin (B2)
Pyridoxine (B6)
Pantothenic acid

Nicotinic acid

Biotin
Folic acid
Cobalamine (B12)
Ascorbic acid
Some of these vitamins are available in green feeds, grains and animal proteins.
All are available in synthetic form (vitamin premix).

3.2.7 Feed additives

1) Anti oxidants: examples include ethoxyquine or butylated hydroxytoluene at the rate of 112g per tone of feed to prevent oxidation of vulnerable vitamins especially vitamin A.
2) Coccidiostats: This is usually introduced at prophylactic levels in broilers diet according to the recommendation of the manufacturers. It is completely withdrawn towards the end of the fattening period

3.2.8 Types of poultry feed

Table 3.2 Types of poultry feed

Classes of poultry	**Age (weeks)**	**Ration**
Broilers	0-6	Broiler starter
Broilers	7-10	Broiler finisher
Layers, Breeders & pullets	0-8 9-16 17 and above	Chicken starter mash Growers mash layers mash.

3.3 Recommended Nutrient Allowance for Poultry under Tropical Climatic Conditions

Table 3.3 Nutrient allowance for poultry under tropical climatic conditions

Nutrients	**Chicken ration**	**growers ration**	**Layers ration**	**Broiler starter**	**Broiler finisher**
Crude protein (%)	19.5	15.0	16.5	22.0	20.0
Crude fibre (%)	5.0	6.0	5.0	5.5	5.5
Metabolizable energy(kcal/kg)	2700	2650	2600	850	2900

Calcium (%)	1.0	0.80	3.20	1.0	0.80

Phosphate (%)	0.45	0.50	0.50	0.70	0.50
Sodium (%)	0.15	0.10	0.15	0.15	0.12
Vitamin A (iu)	5000	3500	4000	5000	3500
Lysine (%)	100	0.65	0.70	1.30	1.10
Methionine (%)	0.40	0.30	0.35	050	0.40
Tryptophan (%)	0.20	0.15	0.18	0.25	0.20

3.3.1 Feed requirement and body weight of Broilers

Table 3.4 Feed requirement and body weight of Broilers

Age (weeks)	Average weight/bird (Kg)	Feed requirement/ 100 birds (kg)	Feed requirement cumulative/100 birds
1	0.036	10	10
2	0.080	18	28
3	0.140	21	49
4	0.200	26	75
5	0.350	39	140
6	0.510	52	166
7	0.90	58	224
8	1.5	67	286
9	2.1	67	358
10	2.5	71	424

3.3.2 Growth rate, feed intake and floor space requirement of pullets

Table 3 .5 Growth rate, feed intake and floor space requirement of pullets

Age week	Body weight(g)	Feed/bird/Day (gm)	Floor space cm2/ bird
1	45	10	232
2	90	16	232
3	126	22	232
6	270	44	464
10	427	63	0.10

15	652	69	0.18
18	780	75	0.30
20	850	79	0.30

Note An average layer would consume 100gm of feed per day or up to 130gm for heavy breeds.

SELF-ASSESSMENT EXERCISE

ia) With the aid of a diagram briefly explain the process of digestion and absorption in poultry.

b) Explain the term 'nutrition' and comment on the requirement of Energy, Protein, Minerals, Vitamins and water in poultry.

4.0 CONCLUSION

Poultry nutrients is made up of Water, Carbohydrates, Fats and oils, Proteins (amino acids), Vitamins and Minerals, when these nutrients are ingested by poultry is capable of being digested, absorbed and utilized to supply us with eggs and poultry meat.

5.0 SUMMARY

In this unit we have learnt that:

- The fowl is a simple stomach animal and digestion starts in the mouth, ends in the small intestine and nutrients are absorbed through its wall.
- Caecum is for digestion of fibre and water absorption, while the large intestine is for absorption of water and storage of faecal matter.
- Energy required by poultry is supplied from carbohydrates, lipids and sometimes proteins.
- Essential amino acids are those amino acids that cannot be synthesized by the bird and must be provided in the diet. In poultry, lysine, methionine and tryptophan are the critical amino acids because they are the most limiting amino acids in feed stuff.
- Minerals are classified into macro or major and minor or micro elements. Those minerals required in large quantities are the major or macro minerals while those required in small quantities are the micro or minor minerals
- 13 vitamins are required by poultry, they are either fat or water soluble.

6.0 TUTOR-MARKED ASSIGNMENT

1a) What are proteins, Minerals and Vitamins?
b) Discuss proteins, Minerals and Vitamins under the following:
i) classification
ii) examples of each class
iii) common sources

7.0 REFERENCES/FURTHER READING

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UNIT 4 INCUBATION AND HATCHERY PRACTICES

CONTENTS

1.0 INTRODUCTION

Incubation is the management of fertilized eggs to ensure normal development of embryo into normal chick. Incubation can be achieved naturally (when the hen sits on the eggs for a period of time and keeps the eggs warm until hatching) or artificially by using machines known as incubators which provide the necessary heat until hatching. Some essential requirements of incubation include temperature, humidity, turning of the eggs, candling e.t.c.

2.0 OBJECTIVES

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

- to be familiar with the anatomical features of the hen's

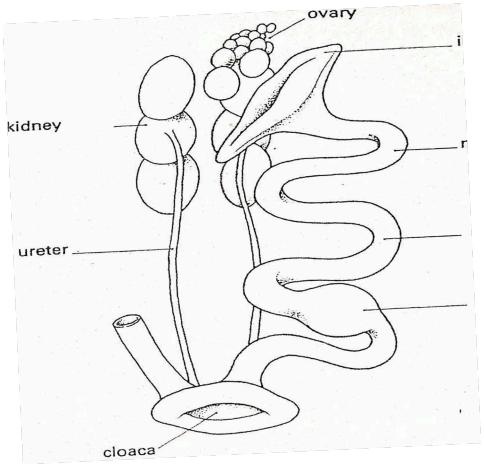
reproductive system.

- to know the composition of the egg and factors affecting the egg size.

- to understand the term ‘incubation’ its types, its essential elements as well as the basic operations of the incubator.
- to be exposed to the concept of hatchability and it’s application in calculating the overall productive performance of the farm.
- to recognized the techniques used in sex separation of young chicks.

3.0 MAIN CONTENT

3.1 Reproductive System of the hen



infundibulum

magnum

isthmus

shell gland

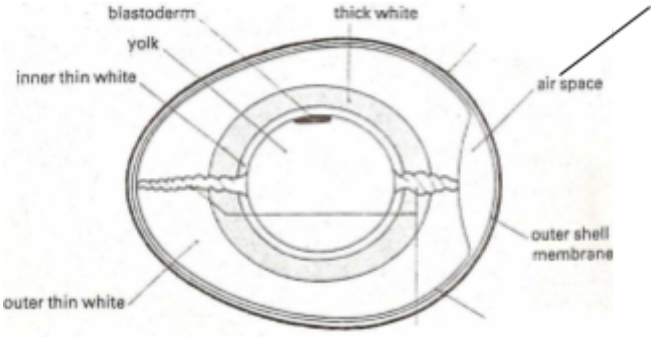
Fig 4: 1Urogenital and reproductive systems of a laying hen.

Source: *Tropical Agriculturalist by A. J. Smith page 131*

The left ovary produces numerous ova. Mature ova are released into the infundibulum where fertilization takes place. The ovum then migrates down to magnum where it receives its albumen, then to the isthmus where the shell membranes, some albumen, water and mineral salts are added. The shell is formed in the uterus for 18-21 hours.
From ovulation to laying takes 24-26 hours.

3.2 The avian egg

shell



Chalazae inner shell

Fig 4:2 Diagrammatic representation of an egg

Source: *Tropical Agriculturalist by A. J. Smith page159*

The avian egg is described as irregular ovoid and it is divided into three main parts
Shell and shell membrane 12%
Albumen and Chalazae 56%
Yolk 32%

3.2.1 Composition of the egg

Nutrients	Yolk	Albumen	Shell
Water	48	86	2
Protein	17	12	5
Fat	33	12	-
Ash	1	1	93
Carbohydrate	1	1	-

Factors affecting Egg size

1) Genetic factors
2) Age of the birds
3) Protein level of the diet
4) Environmental factors
5) Size of the birds
6) Ovum size

7) Intensity of egg laying

3.3 Incubation

Incubation is the process of aiding the development of a fertilized egg into a life chick by providing such factors as adequate temperature, humidity, ventilation and turning. There are two methods of incubation.

1) **Natural incubation**
   That is getting the hen to sit on fertilize egg to incubate the egg.
2) **Artificial incubation**
   Artificial incubation is carried out with incubator using fuels such as kerosene, gas, coal etc.

3.3.1 Essential requirement of artificial incubation

1) Adequate ventilation- there should be sufficient oxygen to supply the respiratory need of the embryo. Also carbon dioxide resulting from embryonic metabolism should not be allowed to accumulate.
2) Relative humidity of 60-65% should be provided to prevent excessive water loss by the egg.
3) Adequate temperature should be provided to ensure that life within the egg is maintained at the optimum level. The temperature of 37.5◦C is ideal.
4) Turner: There should be a turner to prevent the embryo getting stucked shell. This should be done at least three times daily.

3.3.2 Operation of the incubator

This is divided into two phases

1) Setting of the eggs 0-18 days.
2) Hatching of the eggs 19-21 days.

Some incubators combine the two operations while others are separate. The selected eggs are set on trays with the large ends up and placed in the incubator.

Fig. 4.3 Eggs in incubating compartments
Source: Tropical Agriculturalist by A. J. Smith page 170

The temperature requirement during the first week is 38oC, 39oC for the second week and 40oC for the third week.

The relative humidity requirement is 60-65%. There should also be free passage of air in the incubator. The egg should be turn at least three times daily up to the 18th day. On the seventh and sixteenth day of incubation the eggs are checked for infertile eggs and dead embryo by candling. Candling is the process of testing incubated eggs for fertility and development of the embryo. This is done by holding the egg before a strong shaded light see fig 4.4 or placing a strong hand torch under the tray.

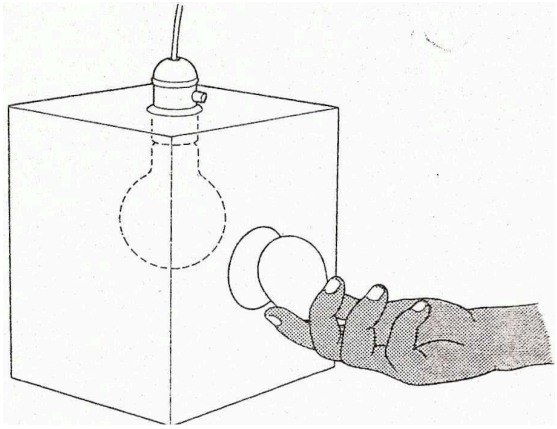


Fig 4 :4 A simple candling device (Chris Mc Kinnell)
Source: Tropical Agriculturalist by A. J. Smith page 170

3.4 Hatching

The eggs are moved from the incubator to the hatching compartment on the 18 day. The eggs are layed (Placed) flat in preparation for hatching. The relative humidity should be higher (70%) in hatching compartment.

3.4.1 Hatchability

Hatchability refers to percentage of eggs that were hatched, it should be about 80-90% from a good flock

Hatch of fertile
This refers to percentage of fertile eggs that were hatched.

Hatch of total
This refers to percentage of total eggs that were hatched.
Example: supposing 500eggs were incubated, after 7 days. 450 were found to be fertile. If 400 of the fertile eggs hatched into chicks. Calculate hatch of fertile and hatch of total?

Solution: Total eggs = 500
Fertile eggs = 450
Hatched eggs = 400
%hatch of fertile = 400/450 x 100 = 88.89%
% hatch total = 400/500 x 100 =80.0%

Note:
1) Hatch of fertile is usually higher than hatch of total.
2) Hatch of fertile is more precise because fertility is considered.
3) Hatch of fertile is of practical importance as it refers to the performance of the breeder stock.

3.4.2 Factors affecting hatchability

There are six factors affecting hatchability.
1) Fertility
2) Genetic
3) Nutrition
4) Diseases
5) Egg selection
6) Management practices

3.4.3 Fertility

Percentage fertility is the percentage of egg that are fertile and should be about 90-95% for a good flock.

Fertility is affected by the following

a) Mating ratio: mating ratio of 10 : 1 is recommended. If the ratio is higher the fertility of the egg will be lower.
b) Age of breeders: Fertility declines with age
c) Length of period between mating: A mated hen stores sperm and uses it up to 2 weeks.

Generally it requires 2 weeks after mating the flock before satisfactory fertility is achieved. The removal of the male from the flock is followed by decline in fertility within 2 weeks and few if any fertile eggs will be produced after 3 weeks.

3.4.4 Genetic factors

Hatchability is an inherited trait so strains (breeds) that possess high hatchability should be selected.

i) In-breeding without selection for hatchability has been shown to lower
hatchability in poultry.
ii) Cross breeding usually result in increase hatchability.
iii) Lethal or semi- Lethal genes may affect either fertility, hatchability and
livability (life).
iv) Rate of egg production: Eggs layed by hen producing at a high rate are more fertile
than eggs layed by low producers.
v) Age: Hatchability is maximum half way into the second laying year for females.
While for male is one year after sexual maturity.

3.4.5 Nutrition

The egg must contain the entire nutrients needed by the embryo for development. Breeder hen must be fed ration which supplies adequate quantities with the nutrients needed for the embryo to develop.

3.4.6 Disease

Eggs for hatching should be collected from healthy flocks. Disease causing organisms like Salmonella and Mycoplasma are transmitted from infected hen chiefly through the egg. Breeding stocks should be tested regularly to prevent infection.

3.4.7 Egg selection

Certain physical characteristics of eggs are related to hatchability among these are size, weight (50-60g), shape, shell quality and internal quality.

3.4.8 Management practices

Eggs for hatching should be collected immediately and stored below 20oC to arrest embryonic development. Fertile eggs deteriorate in quality after 4 days.
Fertile eggs should be stored at a temperature around 10oC and humidity 80%. Eggs should be stored with the broad end upward. Proper hygiene should be maintained in the hatchery. Eggs should be collected at least 3 times daily. Soiled eggs should be rejected or fumigated with formaline solution.

SELF-ASSESSMENT EXERCISE

i. a) What are the factors affecting the size of an egg?
b) In Lamido farm, 5,000 eggs were incubated, after 7 days 4,600 eggs were
Found to be fertile, if 4,200 of the fertile eggs hatched into chicks calculate hatch of fertile and hatch of total and comment on your result.
C) Discuss in detailed the factors affecting hatchability of poultry eggs.

3.5 Sex Separation

The early separation of the sex of young chicks is important economic factor. There are several ways of sexing chicks.

1) By manual vent inspection at day old. At the center of the vent of a male chick is located a pin edge size structure called the process. This can be easily seen with aid of the magnifying lens. A female vent shows no such structure.
2) Sexing can also be done when the chicks are five to eight weeks old. Such a separation is based on larger size combs and wattles, longer tail feathers, stouter shanks, with prominent scales and generally larger body size in cockerels than in pullets.
3) Sex-linked colour differentiations: for example at day old, golden comet breed have dark gold coloured pullets while the cockerels look white.

4.0 CONCLUSION

The avian egg therefore, can be divided into three main parts as shell and shell membranes, albumen and chalazae and the yolk. The egg can be incubated either naturally or artificially. Hatchability as well as fertility is affected by genetic factors but again it is management which go above genetics in its effect.

5.0 SUMMARY

In this unit we have learnt that:

- Factors affecting egg size include; genetic factors, age of the birds, protein level of the diet, environmental factors, size of the birds, ovum size and intensity of laying.
- The essential requirements of artificial incubation are adequate ventilation, relative humidity of 60-65%, temperature of 37.5˚C and turning at least three times daily.
- Incubator operation is divided into setting and the hatching phase.
- Hatchability refers to percentage of eggs that were hatched; it should be about 80-90% from a good flock.
- Factors affecting hatchability are fertility, genetic, nutrition, diseases, egg selection and management practices.

6.0 TUTOR-MARKED ASSIGNMENT

1a) What do you understand by the term incubation?
b) Explain artificial incubation and its essential requirements.
c) Draw and label (i) the reproductive system of the hen
(ii) the avian egg

7.0 REFERENCES/FURTHER READING

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UNIT 5 MANAGEMENT OF DAY-OLD GROWERS, LAYERS AND BROILERS

CONTENTS

1.0 INTRODUCTION

The management of day old chicks is an important and delicate operation. Any mismanagement at this stage will show up later as heavy financial loss to the farmer through excessive mortality, disease outbreak and poor productivity. Growers refers to growing pullets of 9- 20 weeks of age. The birds may be kept in the same pen that was used for the initial rearing of the chicken but there should be enough floor and feeding space. At this stage the birds are changed from chick mash to growers mash. Layer is a matured female chicken meant for egg production. Layers are normally moved to the laying quarters at 18 weeks of age. They are either reared in battery cages or deep liter. The diet of the birds should be changed to layer mash.

2.0 OBJECTIVES

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

- acquire knowledge and understanding of growth rate and development of birds under confinement .
- recognize a good layer from a bad layer and also signs of a good broiler .

- raise birds from day old to table weight for broilers and or point of lay for layers as the case may be.

- to better understand the nutritional requirement and approximate daily feed intake of different classes of birds(day-old, growers, layers, broilers etc)

3.0 MAIN CONTENT

3.1 Management of Day Old Chicks

The management of day old chicks is an important and delicate operation. Any mismanagement at this stage will show up later as heavy financial loss to the farmer through excessive mortality, disease outbreak and poor productivity. The management starts before the arrival of the chicks. Two weeks to the arrival of the birds, the brooding pen should be clean and disinfected. Litter material should be spread to about 6-8 cm. of height.

3.2 Feeding and watering Equipment

Feeding and watering equipment of small sizes should also be provided. Twenty four hours before the arrival of the birds, brooder should be set to required temperature(35oC).

Feed and water should be put in place before birds arrival. On arrival dead and weak chicks should be removed. Chicks destined or meant to be layers should be fed chick starter mash while broilers should be fed broiler starter mash.

3.3 Temperature requirement of chicks

Table 5.1 Temperature requirement of chicks

Age of chick	**Temperature**
Day old - 1 week	35oC
1 - 2 weeks	30oC
2 - 3 weeks	26oC
3 - 4 weeks	23oC

Brooder space requirement is 40-60 cm2 per chick. Overcrowding of the bird should be avoided as this can lead to slow growth rate, disease build up, feather and toe pecking, this can be prevented by debeaking.

3.4 Broiler Management

The broiler is a young chicken of either sex, being intensively fed for meat production. With good strain, diet and management, they reach market weight of 1.5- 2kg live weight in 8-12 weeks. At this stage their meat is tender, juicy and well flavoured.

The broiler pen should be prepared as above prior to arrival of the chicks. When the broilers attend the age of 5-6 weeks, they should be transferred to the broiler finisher pen with free air movement. They should also be changed from broiler starter ration to broiler finisher ration. The broiler starter is a high protein moderate energy ration, while the broiler finisher is a high energy moderate protein ration. At this age the birds should average 500-900g in weight and consume about 58g of feed per day per bird. They should be allowed adequate floor space of about 0.25cm2 per chick to prevent cannibalism.

Vaccination should be ensured at the right time. Good sanitary condition should be maintained.

Coccidiostat should be included in their feed which should be withdrawn two weeks to marketing time. This is to prevent the transfer of the drug to the tissues of the birds and then further to the consumer. Broilers should have free access to water and feed at all times.

Note
Broilers make economic gains within 10 weeks, beyond 12 weeks, they tend to eat much more than they gain resulting in lowered profitability. It is therefore essential to market them at about 8-12 weeks of age.

3.5 Signs of a good Broiler

The sign of a good broiler chicken include
1) Constricted pelvic bone
2) Dry and constricted vent
3) Not very bright comb

3.6 Management of Growers

Growers refers to growing pullets of 9-20 weeks of age. The birds may be kept in the same pen that was used for the initial rearing of the chicken but their should be enough floor and feeding space. At this stage the birds are changed from chick mash to growers mash. This diet is lower in protein (15-16%) and energy compared to the chick and broilers mash.

This is to prevent excessive fat deposition by the pullets. The diet need not contain a coccidiostat. Feed wastage during the

growing phase can be a very serious problem. This can be reduced by using feeds that reduce spillage. They should also be deworm from 16th week.

3.7 Management of Layers

Layer is a matured female chicken meant for egg production. Layers are normally moved to the laying quarters at 18 weeks of age. They are either reared in battery cages or deep liter. The diet of the birds should be changed to layer mash. This diet is higher in calcium, energy and protein compared to the growers mash. Two weeks to commencement of laying, level of calcium in the diet should be increased to 3-4%. This is to enable adequate deposition of calcium in their bones for use in shell formation when the birds start to lay. The laying birds should be fed adlibitum because any form of rationing would result in reduced rate of egg production. There should be adequate water supply. This is because lack of water will result in decreased egg production and possibly death.

Perches and nests should be provided on deep liter. To stimulate egg production, the length of artificial day should be increased to 16-18 hours. Eggs should be collected at least twice daily and properly recorded. The most common management problems in laying flocks are broodiness and moulting.

3.7.1 Characteristics of good layer

1) Comb is bright red
2) Bright eyes.
3) Pelvic bone- four fingers width
4) Vent – large, soft, moist and oval vent
5) Good layers are very active and alert.
6) They have prominent, soft, smooth wattles.
7) They have worm soiled and close plumage.
8) They have bright red face

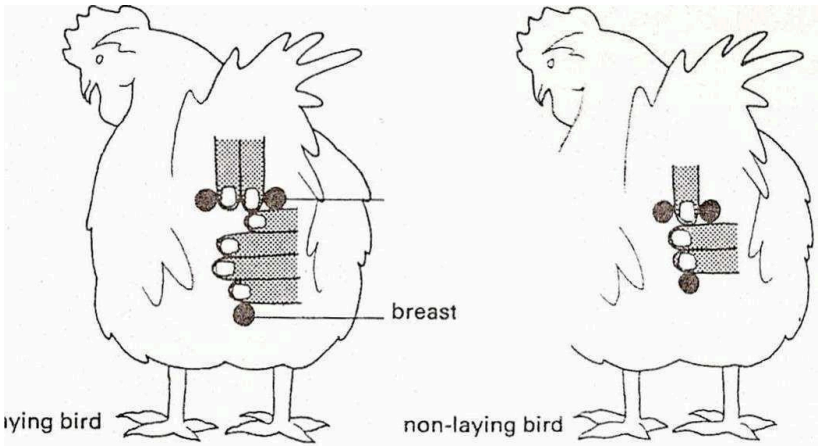

Fig 5:1 A simple means of distinguishing laying birds from non laying birds (Courtesy of ATB)
Source: (Poultry) Tropical Agriculturalist by A. J. Smith page 139

3.7.2 Calculating Productivity of laying flock

1. Hen day egg production (HDEP)
   This is the number of eggs laid expressed as percentage of the number of layers on hand.

HDEP = Total number of eggs laid / Total number of layers on hand x 100

2. Hen housed egg production:(HHEP)

This is the number of eggs laid expressed as percentage of the number of layers housed at the initial stage.
HHEP = Total number of eggs laid / Total number of layers housed at beginning of lay x 100

SELF-ASSESSMENT EXERCISE

1. Your tutor should organize a visit to nearby poultry farm where can enrich your knowledge with the practical aspect of poultry management. Have a free interaction with the poultry farmer. You are expected to be able to answer the following questions.

2a) What are the precautionary measures to be taken in growers' management?
b) List the signs of good layers and good broilers.

4.0 CONCLUSION

Chicks may therefore be reared on litter or on the floor from day-old until hey are ready to enter the laying house. Similarly, broiler chickens

are reared from day-old to about 46-70 days in controlled environment house on built-up litter of wood shavings or straw or mixture of the two types.

5.0 SUMMARY

- In this unit we have studied that:
  The management of day old chicks starts two weeks before the arrival of the chicks.
  Brooding pen should be clean, disinfected, liter material should be spread to about a
  height of 6-8 cm, feeding and watering equipment to be set and temperature set at
  35˚C.
- The broiler house should be set as above but the diet should be broiler starter diet and at the age of 5-6 weeks the birds may be transferred to the broiler finisher pen with free air movement. The ration should be change to broiler finisher ration.
- The signs of good broiler include constricted pelvic bone, dry constricted vent, an not very bright comb.
- The growers are between 9-20 weeks of age and their ration should be changed from chick mash to growers mash, this is to prevent excessive fat deposition.
- Layers are normally moved to laying quarters at the age of 18 weeks either in deep liter or battery cage system and their diet changed to layers mash.
- The signs of a good layer are bright red comb, bright eyes, pelvic bone with four finger width, large vent, soft, moist and oval vent, active and alert. Have soft smooth wattles and bright red face.

6.0 TUTOR-MARKED ASSIGNMENT

1a) Describe the management Practices needed for successful management of day-old chicks in a poultry farm.

b) Compare and contrast the management of a layer in a battery cage to that of a Layer in a deep liter system.

7.0 REFERENCES/FURTHER READING

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UNIT 6 POULTRY DISEASES AND THEIR PREVENTION

CONTENTS

1.0 INTRODUCTION

Good management built on the foundation of basically sound units and buildings, not only will disease be far less likely to occur but, in addition, productivity can be enhanced at all stages.

2.0 OBJECTIVES

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

- know how poultry diseases are broadly classified (pathogenic, management, deficiency, and metabolic) and their examples.
- apply practical measures of preventing poultry diseases from spreading.
- recognized most important vaccines against some common diseases of poultry in the tropics.
- appreciate the means of transmission, causative agents, signs, prophylaxis and treatment of some bacterial, viral and parasitic diseases of poultry.

3.0 MAIN CONTENT

3.1 Disease and Disease Prevention

Disease is any deviation from the normal physiological state of health. It is always better to prevent a disease than to cure it. It is necessary to

aimed at disease prevention by planning a disease control programme with a veterinarian. Poultry birds should be vaccinated against prevalent

diseases. It is important to maintain strict sanitation practice by cleaning the poultry house and surroundings regularly. Prevent birds, personnel, vehicles and stray birds from entering the farm unless disinfection is properly carried out. Where there is an out break of a disease immediately contact a veterinarian

3.2 Diseases of poultry

Diseases of poultry can be broadly classified into:

a) Pathogenic diseases:

These are diseases brought about by the presence of one or more pathogenic or causative organisms.

b.) Management diseases:

Bad management can be caused of pathogenic invasion and can also cause diseases directly e.g. overcrowding can lead to rapid transfer of disease from sick animals to healthy ones. It can also cause inadequate access to feed and water. Other examples of poor or bad management that can lead directly to diseases are:

i) Failure to vaccinate at the right time.
ii) Failure to remove dead birds promptly.
iii) Poor or old litter.
iv) Failure to remove droppings regularly
v) Overcrowding
vi) Poor ventilation
vii) Poor incubation hygiene
viii) Uncontrolled access to poultry farms and lack of foot baths
ix) Indiscriminate transfer and mixing of eggs, stock and poultry equipment.

c.) Deficiency diseases

These are diseases caused by lack of one or more essential nutrients needed for growth and development in the body.

d.) Metabolic diseases

These are group of diseases which are caused by a faulty metabolic process in the body. This is caused by the absence in the body of certain fat carrying substances resulting in the accumulation of fat in the liver, intestines, gizzard, kidneys and heart.

3.3 Disease Prevention

The following precautions can be taken by poultry keepers to prevent the spread of diseases.

i) The setting and management of poultry houses: this is very important in any disease control programme. It is necessary to ensure that birds of different ages are not kept in close proximity, this is to prevent diseases spreading from older birds to younger ones.

ii) The poultry house should be thoroughly clean and disinfected and a gap of at least 2 weeks allowed before bringing in a new batch of birds.

iii) Sick birds should also be removed promptly to prevent them becoming a source of infection to other birds.

iv) Dead birds should be buried or incinerated.

v) Control by vaccination: Birds should be vaccinated against the common diseases in a locality.

vi) Control by Chemotherapy or prophylaxis: Another way of preventing diseases is by the use of good management associated with prophylactics such as Coccidiostats and sulpha drugs.

Table 6.1 The most important vaccinations against common diseases in the tropics:

Disease	**Vaccination**	**Age of bird**
New castle	Intra occular Lasota Komorov	Day old 3-4 weeks 6 weeks
Mareks disease (infectious bronchitis)	*MD-Vaccine *IB- Vaccine Via water Or Intra occular	Day old *7-10ddays **2-3 weeks again 24 weeks
Infectious bursal disease (Gumboro) (IBD)	Gumboro vaccine	10-14 days 5 weeks
Fowl pox	Chicken N.P.X Fowl pox vaccine poxine and poxinet Re- Vaccinate	Day old 3 weeks 12-14 weeks
Fowl typhoid	fowl typhoid vaccine	4 weeks
Fowl cholera	Fowl cholera vaccine Repeat	12 weeks again 17 weeks

* Broilers * MD Marek's disease

** Pullets * IB Infectious Bronchitis

3.4 Common Diseases of Chicken

Table 6.2 Common diseases of Chickens

Name	Means of Transmission	causative Organism	Signs	Prophylaxis	Treatment
New castle Disease	Bird to bird by droplet in air	Virus	Paralysis difficulty in breathing greenish diarrhoea	Vaccination either dead or live vaccine	None
Infectious bronchitis	Bird to bird	Virus	Respiratory problems large decrease in egg production.	Vaccination	Antibiotics to control secondary infections
Fowl cholera or pasteurellosis	Through water and food to nose and mouth	Bacterium .	Severe diarrhea Blue combs and wattles reduction in food intake	Annual vaccination with live vaccine	Remove, slaughter and destroy infected birds. Clean infected premises

Names	Means of Transmission	Causative organism	Sings	Prophylaxis	Treatment

Marek's disease and leukosis	Bird to bird	. Virus	Affected birds 12-24 weeks old. Causes paralysis and death of 10-30% of flock	Vaccination Isolation	None
Fowl pox	Mosquitoes and other biting insects and through	Virus	Scabs on the comb, wattles,	Vaccination Isolation	Cull clinically affected birds. Vaccinate uninfected

	damaged skin		eyelids Death		ones.
Gumboro disease (infectious bursitis)	By direct contact especially in young birds	Virus	Prostration of birds Diarrhoea	Isolation vaccines are available	None
Pullorum disease	From hen to chick through egg	Salmonella bacterium	High death rate in chicks. White diarrhea	Adult carriers should be removed	Sulphur drugs or furazolidone
Name of Disease	**Means of transmission**	**Causative organism**	**Signs**	**Prophylaxis**	**Treatment**
Coccidiosis	From the droppings of infected birds	Protozoa of infected eimeria spp	Watery and bloody diarrhea High death rate	Feed coccidiostat Separate young and adults	Sulphanamide, pyrimidine or prolium in water

SELF-ASSESSMENT EXERCISE

1a) List the poor management practices that can lead to disease in a poultry farm.

b) Describe the precautions to be taken by poultry keepers to prevent the spread of diseases.

4.0 CONCLUSION

Diseases of poultry can be broadly classified into pathogenic, management, deficiency and metabolic diseases, there control and prevention is of paramount importance to ensure both maximum profitability and productivity.

5.0 SUMMARY

In his unit we have studied that:

- It is always better to prevent a disease than to cure it, this is done through good management practice, strict sanitation, adequate nutrition vaccination against prevalent diseases, prompt removal of dead and sick birds,
- The common diseases of poultry in the tropics include: New castle disease, Infectious bronchitis, Fowl cholera, Mareks disease, Fowl pox, Gumboro disease, pullorum disease and coccidiosis.

6.0 TUTOR-MARKED ASSIGNMENT

1. Discuss Newcastle, Fowl cholera and Gumboro diseases under the following:
   i) Vaccination programme
   ii) Causative agents and signs
   iii) Means of transmission
   iv) Prophylaxis and treatment

7.0 REFERENCES/FURTHER READING

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UNIT 7 POULTRY PRODUCTS AND MARKETING

CONTENTS

1.0 INTRODUCTION

Any farmer who's production capacity is more than what he can eat with his family and relatives, he must fine a market for the surplus otherwise it becomes a burden on him.

The need for poultry meat or egg varies from Country to country and from locality to locality. The marketing of poultry meat is different from the marketing of poultry eggs.

In developing countries like Nigeria, where there is shortage of animal protein, marketing of broilers depend on their market price. For farmers near a town or a city, setting the market price at a level which the consumer will be prepared to pay , will be met with people eager to buy and disposal of products will not be a problem. For farmers from rural areas that are away from the main market, the cost of transporting his product to the market may make his product more expensive with no

profit.

2.0 OBJECTIVES

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

- to understand how the poultry egg are processed preserved over time.
- to be familiar with external and internal egg quality characteristics that are used in grading of an egg.
- be aware of the procedure of processing table birds for marketing purposes.

3.0 MAIN CONTENT

3.1 Poultry Products and Marketing

It is of no value to produce poultry commodities (egg and Meat) without serious effort to secure a market for them.

3.2 Egg marketing

The egg is a highly perishable product and if not given proper care between the time it is laid and time it is consumed, it may deteriorate markedly in several respects for example

- Gross changes in weight as a result of evaporation of moisture through the shell mostly from the albumen.
- Flavour and odour changes also occur in storage either due to internal chemical changes or to the absorption of extraneous odour by the egg.
- Relative changes in size and form of egg components such as yolk and albumen can indicate age in storage.
- Other changes are inter conversion of minerals and organic contents, specific gravity, permeability, viscosity, gaseous concentration and microbial changes.

3.3 Egg grading

The most important point considered in egg for consumption is quality. In general the interior and exterior factors are considered.

3.3.1 Exterior qualities used for grading eggs

1. Soundness of shell

2. cleanliness
3. size

4. colour
5. shape and texture

3.3.2 Interior qualities used for grading eggs

1. Condition of the yolk
2. condition of the shell
3. condition of the air cell.

3.4 Egg processing and preservation

Eggs are processed to prolong their keeping or storage life. Methods of prolonging edible life of an egg include:

i) Prevent contamination with faeces and other dirt
ii) Chilling at temperatures between -0.5oC and -2oC and relative humidity of 88% (can store for 2-3 months)
iii) Chemical treatments aimed at sealing the shell pores and thus preserving the egg contents from environmental changes and gaseous diffusion using example. Vegetable oils, Vaseline, lard, gelatin, agar-agar and alum as coating agents.
iv) Heat treatment: egg can be momentarily (5 seconds) dipped in boiling water to coagulate the thin film of albumen enclosing the egg membrane.
v) Dehydration: usually applied to the shelled eggs to produce powdered products or flakes.

3.5 Marketing Table Birds

Table birds are broilers, old hens cockerels and cocks. They can be marketed live or dressed and ready to cook. Consumers in the southern part of Nigeria buy very little live poultry but in the northern part of the country, live birds are commonly sold in the markets.

3.5.1 Processing of Table Birds

It involves the following stages:

i) Killing and bleeding.
ii) Scalding
iii) Plucking or picking
iv) Dressing and evisceration.

3.5.2 Killing

Birds are killed by any of the following methods.

i) By hatching off the head from the live chicken.
ii) By cutting the head off with a knife.
iii) By cutting the jugular vein.

After killing, the chicken is allowed to bleed.

3.5.3 Scalding

Scalding is the used of hot water (50-55oC) to soften the skin and facilitate the removal of the feathers.

3.5.4 Picking or plucking

The scalded bird is then de feathered by hand picking. However, in commercial processing units, mechanical pluckers consisting of rotating drums with several stickers usually of rubber or plastics are used.

3.5.5 Dry plucking

Chickens can also be de feathered by plucking of the feathers by plucking of feathers without scalding. Though laborious the method preserves a good colour of the skin and keeps longer than scalded carcass.

The birds can also be de feathered by means of fire or Wax plucking.

3.5.6 Dressing and Evisceration

Dressing entails the removal of the head, neck, feet, gizzard, lungs, liver, intestine, crop, legs and other intestinal tissues. The internal evisceration is done by slitting between the end of the keel bone and the rectum and then plunging the hand to remove the contents of the body cavity. The dressed chicken is sold whole or in parts.

3.5.7 Chilling

Dressed chickens are usually chilled to prevent bacterial growth and enzymatic activities. This is achieved by placing the carcass in a cold chamber with temperature of 1-5oC.

3.5.8 Storage

The temperature depends on the length of time that the carcass are to be stored. For a day or two temperature of 2oC is ideal. If for a long period of time, they should be frozen to -5oC to -18oC.

In Nigeria the prices of poultry products is determine by the forces of demand and supply. A typical market organization of poultry products in a developing economy is as follows:

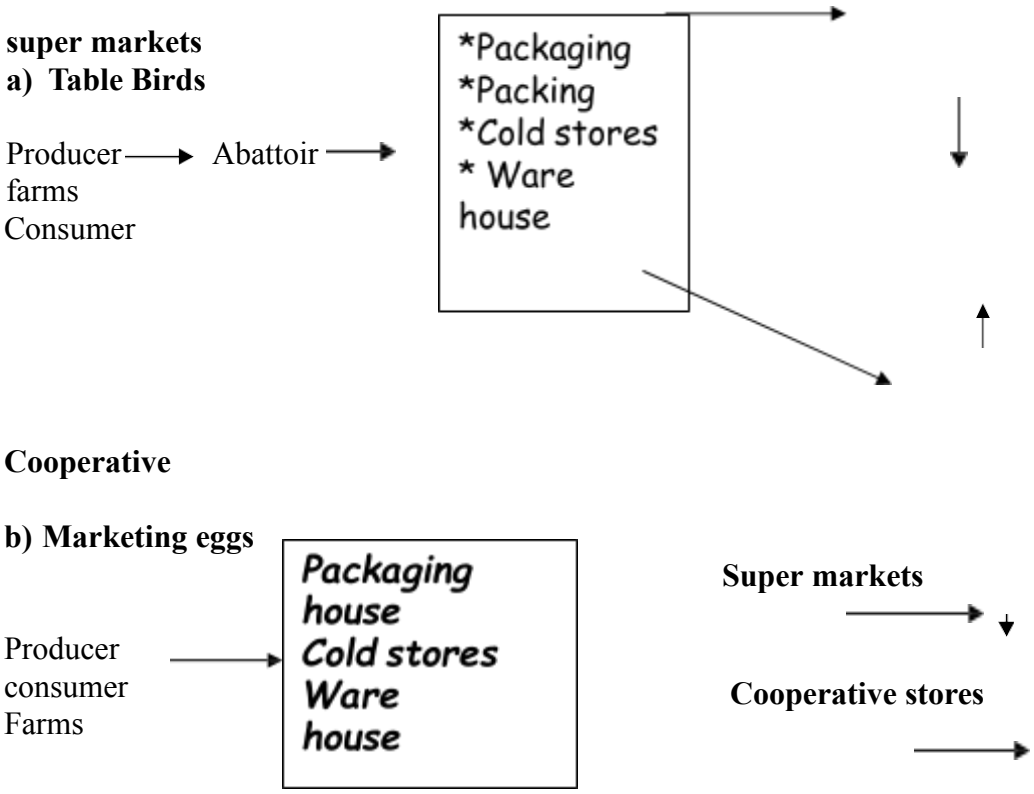

Fig. 7.2 Diagrammatic representation of marketing table birds and eggs

In underdeveloped economy like Nigeria, the scheme represented above does not operate. Consequently there are no accurate trends on production, supply and demand; price changes are violent and difficult to control. Couple with this , the poor cold storage facilities makes the handling of poultry products precarious and the prices unstable.

SELF-ASSESSMENT EXERCISE

Your tutor should organize a visit to a poultry farm where you will have the opportunity to enrich your knowledge on the practical aspect of

poultry management.

1a) Briefly explain how table birds are processed and marketed.

4.0 CONCLUSION

In developing countries like Nigeria, where there is shortage of animal protein, marketing of broilers depend on their market price. For farmers near a town or a city, setting the market price at a level which the consumer will be prepared to pay , will be met with people eager to buy and disposal of products will not be a problem. For farmers from rural areas that are away from the main market, the cost of transporting his product to the market may make his product more expensive with no profit.
It is therefore of no value to produce poultry commodities (egg and Meat) without serious effort to secure a market for them.

5.0 SUMMARY

In this unit we learnt that:

- Egg shelf life deteriorates over time causing gross changes in weight, flavour and odour changes, relative changes in size and form also inter conversion of minerals and organic contents.
- Methods of prolonging edible life of an egg are prevention of contamination with faeces and dirt, chilling at -0.5˚C and -2˚C and relative humidity of 88%, sealing the hell pores with vegetable oil or vaseline, heat treatment etc.
- Exterior qualities used for egg grading are soundness of shell, cleanliness, size, shape and texture while interior qualities include conditions of yolk, shell and air cell.
- Table birds can be marketed live or dressed and they are processed by killing, bleeding, scalding, plucking, dressing and evisceration.

6.0 TUTOR-MARKED ASSIGNMENT

1a) Explain how the avian egg is processed and preserved over time.
b) List all the interior and exterior egg qualities used for grading eggs.

7.0 REFERENCES/FURTHER READING

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