



Poultry Production For Short Term Training



**Based on October 2019, Version 2 OS and March
2021, V1 Curriculum**

**Module Title: Identifying Poultry Production
systems and activities**

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LG #1**LO #1- Identify poultry production systems and their requirement****Instruction Sheet**

- This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics –
- Identifying and Characterizing poultry production systems
- Identifying materials, tools and equipment's
- Recommending Suitable and feasible production system
- Identifying Information on the availability of demanded breeds and flock size
- Co-ordinating and Monitoring poultry production systems
- This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, you will be able to –
- Identify and Characterized poultry production systems
- Identify required materials, tools and equipment's in each production Systems
- Recommend Suitable and feasible production system
- Identify Information regarding the availability of demanded breeds and flock size
- Co-ordinate and Monitoring poultry production systems

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the "Information Sheets".
4. Accomplish the "Self-checks" which are placed following all information sheets.
5. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work
6. If you earned a satisfactory evaluation proceed to "Operation sheets
7. Perform "the Learning activity performance test"



1.1 Introduction to poultry production systems

In Ethiopia chickens are the most widespread and almost every rural family owns chickens, which provide a valuable source of family protein and income

The most dominant chicken types reared in Ethiopia are local ecotypes, which show a large variation in body position, plumage color, comb type and productivity. However, the economic contribution of the sector is not still proportional to the huge chicken numbers, attributed to the presence of many productions, reproduction and infrastructural constraints.

The chicken production system in Ethiopia can be characterized by not market oriented, low input, scavenging and traditional management system consisting of local breeds. The indigenous birds are small in body size and low producers of meat and egg. For example; the productivity of scavenging hens is 40-60 small-sized eggs/bird/year

The most dominant (75%) chicken production system in Amhara region is free range /scavenging type/ using a majority (95.8%) of local chicken ecotypes, with only seasonal feed supplementation, scavenging only (2.5%), scavenging with regular feed supplementation (21.9%) and intensive production system (0.63%)

1.2 Definition of Terminology

Poultry: refers to all birds kept for the production of eggs and meat for human consumption.

Layers: chickens reared to be egg-layers

Broilers: chickens kept for meat production

Chicks: young chicken between 0-8 weeks

Hens: female chickens in their second year of lay, or after their first molt

Feedstuff: is synonymous with feed, food or fodder although it is broader, covering all materials included in the diet because of their nutritional properties. It includes natural feeds of animal origin, synthetic and other pure nutrients which are added in the natural feeds.

Feed: is a mixture of feedstuff blended/processed in a form which is acceptable to animals.



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1.3 Importance of chicken production and Consumption

Chicken production and consumption provide different functions for the producer as compared to the other livestock production. Among the different functions, the following are the main ones:

- Immediate source of cash income
- Provides meat and egg for household consumption
- Contributes for food security and creates employment
- Source of organic fertilizer
- Requires low initial capital investment, small land and low labour input
- Efficient feed converters and have a wide range of adaptability for different agro-ecologies
- Their product is acceptable by most of the community and the meat and eggs contain special proteins that allow children to grow strong and their brain to develop

1.4 Characterizing poultry production systems

Chicken characterization is the method of distinguishing each production systems based on chicken holding scale, management systems and inputs. There are three types of poultry production systems. Each production system has their own characteristics which differentiate them from each other which are listed below.

I) Free-range chicken production system

This chicken production system is practiced in most rural areas of the country and objectives of production are for household consumption and as source of additional income for the household. It covers 95-98% of the chicken production system of the country and it is not profitable since it is not market oriented. It contains small flock size (5-20 chickens per household) which is indigenous breed types mostly depend on locally available feed material as supplement with low health services and other management practices.

The chicken does not have their own constructed chicken house rather maintained in the main house with the family. Chicken brooding and rearing is only the care they obtain from their mother/hen. Because of these there is high mortality of chicken and long broody periods and there is risk of exposure for different chicken diseases and predators.

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The major feed sources for chicken are worms obtained from free scavenging, legumes, and cereals and sometimes there is supplemental feed during feed shortage. The amount given is small and do not fulfill their nutrient requirement. Because of this their productivity is low.

Indigenous poultry breed in this system of production does not produce more than 60 eggs per hen per year

a. Advantages of free-range chicken production system

The advantages of free-range chicken production system include, the chickens are healthy since they exercise in the open air freely, there is minimal infection with parasites if enough space available, there is little or no labor input, the chickens in this type of production system help to limit the amount of rubbish in a productive way and the direct costs of the system are low.

b. Disadvantages of free-range chicken production system

The disadvantages of free-range chicken production system include, it is difficult to control and manage the chicken especially the young chicks are easily exposed for predators and unfavorable weather conditions, the chickens eat sown seed when looking for feed, a large percentage of the eggs can be lost as the laying hens are not accustomed to laying nests, high diseases transmission and occurrence of high death, chickens are less productive.



Figure 2. Traditional/scavenging system

ii) Semi- intensive chicken production system

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This type of chicken production system is better than free ranging production system since it uses inputs like supplemental feed, vaccine, etc (Figure 2). It has a small house which accommodate laying nest and feeders which serves as chicken house for night time.



Figure 2 semi-intensive production systems

The fence can be made from mesh wire or other materials and will not allow the chicken to escape above on it. The fenced area should be always clean and dry. Since the feed the chickens obtain from the scavenging is very low, they should be supplemented with energy and protein feeds. Since the main objective of the production is to get profit, they should get better health management practice like vaccination against NCD than free scavenging system. They are more productive than the chicken in free scavenging system. It contains flock size of 50-200 birds/chicken per household which are improved breeds.

a. Advantages of semi-intensive chicken production system

The advantage of this system include, complete control over operation, useful for record purposes, operational throughout the year, economic use of land (free range) and there is better protection during winter.



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b. Disadvantages of semi-intensive chicken production system

The disadvantage of this system of chicken production system include, high cost in fencing, danger of over stocking and exposure for different disease if the campus is not clean and dry.

1.5 Intensive chicken production system

This type of chicken production system use more inputs (feeds and feeding, breed, health, housing and other inputs) than the above two chicken production systems. It is market oriented and the main objective of production is to get better profit.

The number of chickens involved are relatively high (more than 200 chicken). The chicken breed used is specialized improved breeds (layer or broiler). They should provide the expected product within that time.

There are three types of intensive chicken production systems which include deep litter system, cage system and full slated rearing which is stated bellow in detail.

1.5.1 Deep litter system

It involves rearing of chickens on a floor littered by 5-10 cm thickness litter (Figure 3). The litter can be made from locally available material such as dry hay, teff straw, coffee pulp and sow dust. The litter should be dry at any time otherwise it can cause occurrence of different disease.

In addition to provision of comfort for the chicken, the litter absorbs any waste material excreted from the chicken and makes the house dry. It is possible to place the feeders and drinkers in the house on the litter.

But it is advisable to hang them as the age of the chickens increase. It is also important to place laying nest in the house. In this way it is possible to rear either layer or broiler. At least once a week, the litter should be sprayed with disinfectant chemicals. Deep litter is recommended for both meat birds and layers.

To keep healthy chicken in this type of system, the following points should be noted:

- ✓ The existing litter should be removed totally when the existing stock culled
- ✓ Before introduction of new stock, the house should be cleaned carefully and left free at least for two weeks
- ✓ Make sure that the litter should be dry at any time
- ✓ At any time the thickness of the litter should not be less than 5cm



Figure 3 deep litter systems

a. Advantage deep litter system

The advantages of the system included proper accommodation, prompt culling of unproductive birds, proper control of diseases and predators, good record keeping and high egg production. It has also advantageous in that land requirement is minimum, easy and economic management, scientific feeding and management, high degree of supervision, minimum labour, automation is possible and manure value is increased. Deep litter is a good insulation.

It protects chickens from cold weather, and during hot seasons they can nestle into it and reach the cool floor below. Studies show that when all other factors are equal, layers produce more eggs on deep litter than in cage systems. Chickens can be brooded and kept through their productive lives in the same house. Deep litter allows the bird to dust itself against lice and other parasites.

b. Disadvantage of deep litter system

The disadvantages of this intensive system of chicken production include high capital investment, problem of cannibalism and diseases outbreak. If the management is bad, liberation and accumulation of ammonia, wet litter problem dirty eggs, disease problems may result.

There is a greater chance of worm and tick infestation and coccidiosis (internal protozoan parasites) than with cages or raised floor systems. The deep-litter system is inappropriate for very humid areas (80 - 90% humidity) damp litter spreads diseases. The litter must be turned often, particularly in damp weather, and this requires more labor than other systems. Sometimes adequate litter is difficult to obtain.

1.5.2 Cage system

This type of intensive production system involves rearing of chicken in one house on the prepared cages or nests and it is more appropriate for layers (Figure 4). The egg produced is used only for food since there is no cock. The chicken has no any access

for free ranging. Therefore, the chicken should get the required nutrient through supplementation.

The ration can be formulated in the house using locally available materials like maize, noug seed cake and other materials. Even though the system requires high initial capital investment, it is profitable. The rearing cage can be made from locally available materials like timber and wood.

Cages are good for climates with high humidity, where labour costs are high, and when a farmer wants to keep a large flock of layers. Where ticks are a problem, cages are especially advantageous. Cages are recommended for layers, but not generally used for meat birds.



Figure 4.cage system

a. Advantages of cage system

The advantages of the system include cages can be placed under existing roofs; thus, a special building may not be required. With cages more birds can be kept in a building than on deep litter. Less labour per bird is needed than other systems. Poor layers can be identified immediately and culled, thus saving feed. Problems with parasites, particularly ticks, are reduced, but nutrition may be a problem. When properly constructed, cages can last many years. Fewer disease problems are caused by transmission through faecal matter. Cages are a cheaper investment in the long run due to ease in care and feeding of the birds.

c. Disadvantage of cage system

The disadvantages of the system include, high cost of installation, breeding is not possible unless artificial insemination is practiced, cage layer fatigue or s a problem if not attended to, cages are hard to construct properly, they involve very high initial paralysis investment per



bird. There must be constant and excellent ventilation. There are more broken eggs than with deep litter. The feed must contain all necessary vitamins and minerals needed by birds.

1.6 Requirements for poultry production

i) Feed

Nutrients, the chemical substances found in feed material are needed by birds in definite amount, with the quantities varying according to the kind of birds and the purpose for which it is being fed. A deficiency in a nutrient can be a limiting factor in egg production or growth.

The feed, which the chicken consumes, is composed of the following different nutrients: water, carbohydrate, fats, proteins, minerals, and vitamins. Each of the nutrients in feeds serves a particular purpose. A brief discussion of the different nutrients follows

ii) Carbohydrates

Carbohydrates provide the major energy required by all animals including poultry.

- ✓ Maize
- ✓ Millet
- ✓ Sorghum
- ✓ Rice
- ✓ Root crops and starchy fruits
- ✓ Seeds

iii) Fats

Fats are another energy sources and are highly concentrated in energy. An insufficient supply of both carbohydrates and fats results in reduced growth rate or egg production in poultry.

iv) Protein

Grain and mill feeds supply approximately one half of the protein needs for most poultry rations. Additional protein is supplied from high protein concentrates.

Form the standpoint of poultry nutrition; the amino acids that make up proteins are really the essential nutrients, rather than the protein molecules itself.

In poultry nutrition, special attention needs to be given to supplying the amino acids lysine, methionine, cysteine and tryptophan. These are sometimes referred to as the critical amino acids in poultry nutrition. An amino acid deficiency always results in show growth or poor egg production.

v). Minerals

The minerals, which have been shown to be essential for chickens, are sodium, chlorine, potassium, calcium phosphorus etc.

vi). Water

Poultry should have free access to clean, fresh water at all times.

vii). Vitamins

In addition to the nutrients mentioned above numerous vitamins are required in relatively small amount

1.7 Poultry health management

The best fed and housed stock with the best genetic potential will not grow and produce efficiently if they become diseased or infested with parasites. Therefore good poultry health management is an important component of poultry production. Infectious disease causing agents will spread through a flock very quickly because of the high stocking densities of commercially housed poultry. For poultry health management to be effective a primary aim must be to prevent the onset of disease or parasites, to recognize at an early stage the presence of disease or parasites, and to treat all flocks that are diseased or infested with parasites as soon as possible and before they develop into a serious condition or spread to other flocks.

To be able to do this it is necessary to know how to recognize that the birds are diseased, the action required for preventing or minimizing disease and how to monitor for signs that the prevention program is working.

1.7.1 Principles of health management

The key principles of poultry health management are:

- ✓ Prevention of disease
- ✓ Early recognition of disease
- ✓ Early treatment of disease

1.7.2 Poultry housing system

The importance of the type of poultry housing system employed for chicken production cannot be over emphasized. It protects the birds from the harsh environmental climatic conditions, which may have adverse effect on the chickens' performance and productivity. In a poultry house, the overall heat generated is the sum of heat generated by the birds, the surrounding environment and biodegradation of fecal material. Thus, the type of housing system to be used is a major determinant factor in the type of management to be adopted in the poultry farm. The poultry house should be constructed based on the climatic condition of the area.

In poultry house construction, one should have to consider:

- ✓ Building orientation
- ✓ House width, length and height
- ✓ Cooling system
- ✓ Air exchange
- ✓ Space



Self-Check -1 Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. The extensive system of poultry production is commonly named as (4pts)
A) Intensive B) semi-intensive C) free-range
2. ____ is a production system that chickens are fully confined either in houses or in cages throughout their lives. (4pts)
A) Extensive B) semi-intensive C) intensive
3. The disadvantages of the cage system include(4pts) A) low cost of installation B) breeding is not possible if artificial insemination is practiced C) cages are hard to construct properly D) all
- 4) Poultry production requirement includes (2pts)
A) Feed B) health management C) housing D) all

Note: Satisfactory rating - 7 points

Unsatisfactory - below 7 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

1. _____
2. _____



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Information Sheet-2

Identifying required materials, tools and equipment's in each production Systems.

2.1 Materials, tools and Equipment's and their importance for intensive poultry production

2.1.1 Water equipment's

- **Pan and jar type:** This type of waterer is circular in nature, having two compartments i.e. jar for filling water and pan for delivering water. **Water basin made of plastic / wood/GI with grill.** Basins of different diameters are available (10", 12", 14" and 16" diameter). A separate grill is available to prevent the entry of birds inside the water.



Figure 2.1 Pan and jar type waterier

- **Nipple drinker; It** can be used both in deep-litter and in cage system. When used in deep-litter system, it is attached with cup under the nipple to prevent wetting of litter material. These drinkers look like a nipple and water drops comes out when they are pressed. They can be used for all types and classes of birds, but most commonly used in laying cages. One nipple drinkers in each cage housing 3 layers is sufficient.



fig.2.2 Nipple drinker

- **Bell type automatic waterer:** These are made of high-impact plastic in a bell shape usually suspended from separate pipeline for the purpose. This type of waterers has control over the water flow and maintains the required water level always. There will be a continuous flow of water so as to ensure water available for the birds throughout the day. Height at which the water is available can be easily adjusted by simple clamp mechanism and rate of flow water is adjustable

by a valve (spring-mounted). Plastic drinkers will be brightly colored (red, blue) and hence are expected to attract layers, especially chicks to water



Figure2.2 Bell type automatic waterer

- **Manual drinker:**

In case of chicks during first week of brooding, manual drinkers are popularly used. They also referred as “fountain drinkers” because water comes out of the holes like that in case of a fountain.

The main advantage of manual drinkers is the ease of giving vitamins and other probiotics/medicines/vaccines through water.

Manual drinkers with stand made of high-impact plastic in bright colors (red or blue) are available.

Arrangement of drinkers at an equal distance of 0.6m between any two feeders and feeder and a drinker.



Figure 2.3. Manual drinker

2.1.2 Feeding equipment's

Feeders are equipment's used in feeding poultry birds. The food is deposited in the feeder and the birds feed from it. The amount of feeders provided for a poultry farm should be according to amount of birds available. It is important that you always keep the feeders clean to ensure the health safety of the birds.

A .Linear feeder: is chicken feeding equipment having a rectangular shape which usually made of Galvanized Iron. Also locally available material like wood and bamboo etc.



Figure 2.4. Linear feeder

B. Circular feeder: These are semi-automatic feeders and can hold 5 to 7 kg feed in its cone at a time. These are made of high plastic and usually suspended from roof/ roof-truss or from separate pipeline for the purpose. These are also called as ‘hanging feeders’. These feeders are available in different capacity and when completely full, the feed will suffice 4 to 7 days, depending upon the age and number feeding on them.



Figure 2.5. Chicken circular feeder

C. Automatic feeder: These are operated with electricity and the height of the feeder can be adjusted depending upon the age of the birds.



Figure 2.6 automatic chicken feeders

D. Heaters or Brooders: The heater or brooder is equipment used in regulating and increasing the temperature of the poultry farm. These helps to keep the birds warm when the weather is cold



Figure 2.7. Day old chicken heater

2.2 Materials and tools

- Some of poultry farm tools
 - ✓ Tape measure: used for measuring
 - ✓ Hammer:
 - ✓ Spade: used to collect animal droppings and manure
 - ✓ shovel: used in digging, moving soil, other granular materials, cleaning ditches, leveling base for sill rocks and steps
- Some of farm materials may include:
 - ✓ Overall:
 - ✓ Rubber boots
 - ✓ Foot bath
 - ✓ Respiratory mask
 - ✓ Wood shivering/grass/ teff straw
 - ✓ Dis-infectants

Dis-infectants include:-

- ✓ (Alcohol)
 - ✓ Chlorine and Chlorine Compounds.
 - ✓ Formaldehyde.
 - ✓ Glutaraldehyde.
 - ✓ Hydrogen Peroxide.
 - ✓ Iodophors.
 - ✓ Ortho-phthalaldehyde (OPA).
 - ✓ Different broad spectrum drugs (eg. Vita chicks, Oxy-tetracycline, etc)
- **Other Poultry Farming Equipment's and their Uses**
 - **Incubator:** This is an instrument used in hatching eggs. Egg hatchery with an incubator can be described as a means of hatching of eggs in an unnatural way. These means can be employed when there are many eggs to be hatched.
 - **Chick box:** The chick box is equipment where the poultry birds are kept for egg laying. It has a roll away egg tray attached to it so that when eggs are laid, they roll away and the birds will not trample on the eggs. This particular equipment help in preventing egg damage
 - **Fly Tray:** Fly trap is an equipment's used in controlling the number of flies around a poultry farm. It helps to poultry farmer reduce the number of flies in the poultry
 - **Egg Tray:** This is equipment's used in setting the eggs. Just like the name, it is tray-like equipment where the eggs are place for sampling.
 - **Poultry Incubator Controller:** Poultry incubator controller is equipment used for controlling the incubator and timer counter. It displays the temperature and humidity condition of the incubator

- **Ventilation Fan:** The ventilation fan is equipment used for ensuring maximum ventilation in the poultry farm. It is also equipment used in reducing the temperature of the poultry farm during a hot weather.
- **Laying Nest:** Laying nest is equipment that helps the birds for laying of eggs. One of the advantages of this equipment is that it increases the egg productivity of the poultry birds
- **Egg Scale:** This is equipment used in weighing the weight of the eggs. It helps the poultry farmer know the eggs that are fertile enough for hatchery because it is assumed that an underweight egg does not have what it take to form a chick.
- **Egg Washer:** Egg washer is equipment that makes use of a powder called the egg washing powder. Water is added into the egg washer and then the egg washing powder is added also. It is used for washing the eggs before delivery.

2.3. Materials, tools and Equipment's and their uses for semi-intensive chicken production system

Under this production system, the most important materials, tools and equipment may include:

- **Federer** it may include both rectangular and rounded federer



Figure 2.8. Chicken Federer

- **Waterer:** it may include both automatic and manual waterer



Figure 2.9. Chicken waterer

- **Laying nest**



Figure 2.10. Laying nest

2.4. Materials, tools and Equipment's and their uses for extensive chicken production system

Under this production, the chickens are kept free-range for part or all of their production cycle. Thus, there are no materials, tools and equipment's used under this production systems. The chickens search for feeds, water and shelter by themselves.



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Self-Check -2	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Discuss the reason for why materials ,tools and equipments are not required for extensive poultry production system ?(5pts)
2. List out the materials, tools and equipments required for the three categories of chicken production systems separately with their function (7pts).

Note: Satisfactory rating - 6 points

Unsatisfactory - below 6 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

1. _____

Information Sheet-3**Recommending suitable and feasible production system****3.1. Feasibility and suitability production system**

Suitable and feasible production system that is helpful to achieve pre-determined farm objective and in line with environmental legislations is recommended. Which management system is more appropriate to local and improved or both breed as to run the production successfully and make it profitable? Based on this question you should plan the most applicable production system during running the operations. The suitability and feasibility of the three production systems are discussed below.

3.1.1 Extensive chicken production system

This system is most suitable if you have a lot of space, preferably covered with grass. At night, the chickens can be kept in any kind of shelter which should be as roomy, airy and clean as possible. Disease concerns increase when birds have access to the outdoors and interact with wild birds. The poultry can encounter more predators (including theft by neighbors). In this system local breed works best.

3.1.2 Semi- intensive chicken production system

This type of chicken production system is better is partially supplemented with inputs like supplemental feed, vaccine, etc. In this production systems Local, modern breeds or a mixture of the two work best. The house must be accommodating laying nest and feeders which serves as chicken house for night time. The house should have one or two side open door for easy movement of the chicken to the fenced area during the day time. The fence can be made from mesh wire or other materials and will not allow the chicken to escape above on it. The fenced area should be always clean and dry. The feed the chickens obtain from the scavenging is very low, they should be supplemented with energy and protein feeds.

3.1.3 Intensive chicken production system

This system requires high management systems (feeding, housing and health care services) with more inputs (feeds and feeding, breed, health, housing and other inputs) than the above two chicken production systems. It is market oriented and should provide the expected product within that time. In this production systems improved breeds (layer or broiler) works best. They should provide the expected product within that time



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Self-Check -3

Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Discuss about the feasibility of three production systems? (10pts)

Note: Satisfactory rating - 5 points

Unsatisfactory - below 5 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

1. _____



4.1 Introduction to chicken breeds

4.1.1 What are local chickens?

There is no legal or universally accepted definition of local chickens. Local or indigenous chickens represent a group of birds that were originated in an area and were adapted to its local environmental conditions. These birds have survived for long period of time through a process of natural selection, the result of this selection is a heterogeneous population which differs in its morphology and its adaptive traits to the local environment. These chickens are known to be highly resistant to local diseases and stressful conditions.

The local chickens, sometimes called native, are considered to be dual-purpose birds that can be used for both meat and egg production. They are generally characterized of producing high quality eggs with different Milky colors. These birds are known for their low production rate and small egg sizes.

4.1.2 Importance of local chickens

Poultry meat and eggs, especially those for chickens are considered as most popular food items all over the world. During the past decade, many countries have increased their commercial production of these essential products to meet the increased demand by consumers.

According to the World Resources Institute, global per capita food production has been increasing substantially for the past several decades. However, there are several factors that could affect the rapid growth of agricultural market production, including poultry production. These factors include: export restrictions, currency depreciation, world oil prices, global population growth, climate change, loss of agricultural lands.

There are numerous chicken breeds available around the world with a wide variety of color, size, feathers, comb and body shape. So, it's very important to learn about how to identify chickens from those different breeds. All chicken breeds have some special characteristics and nature which can help you identifying them. But for positive identification you will need some knowledge about chicken breeds, images, charts or other ways of distinguishing them from various breeds of similar colors, size and types. Gender, color, raising purpose and some other characteristics can also be helpful for identifying specific breed from a wide variety of available breeds.

Purpose of keeping poultry:

- ✓ Meat type
- ✓ Egg type and
- ✓ Dual purpose
- ✓ Exhibition type

4.1.3 How to Identify Chickens?

There are parameters to identify and select the demanding chicken breeds for the required purpose (for meat, egg, dual purpose and exhibition type). The common ways of identifying breeds are listed as below.

A .Body Shape

Generally meat producing breeds (broilers) have heavy bodies and large bones so that it can support their weight. On the other hand egg producing breeds (layer) have typically smaller bodies. Small sized body helps them to put all of their resources into egg production. General or dual purpose chicken breeds are lighter than meat producing breeds and slightly larger than layer breeds. So, you can identify chickens by their body shape.

B. Comb& Wattles

Different chicken breeds have different combs and wattles. Combs and wattles have a great importance for identifying chickens breed. With some breeds of chicken combs and wattles are almost entirely associated.

C. Size

Different sized chicken breeds can be seen around the globe. They can be both large sized and small size. Bovine chickens are large chicken breed and local breeds are small sized chicken breed

D. Feathers

Every chicken breed has special types of feathers. Feathers of chickens provide a lot of information about their breed and origin. Chickens can have both loose-fitting and close-lying feathers. But it depends on their purpose and the environment form where their ancestors came from.

E. Shanks

We can get valuable information about a chicken breed by their leg shanks color. Most of the chicken breeds have yellow shanks.. Some chicken breed also have hair on their shanks that provide a clue for identifying them. Cochin is such a chicken breed which has feathers on their legs but some are not.



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Self-Check -4	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What are the common ways of identifying chicken breeds(10pts)

Note: Satisfactory rating - 5 points

Unsatisfactory - below 5 points

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

1. _____



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information Sheet-5

Coordinating and Monitoring poultry production systems

5.1 INTRODUCTION

The total chicken population in the country is estimated at 51 million .The majority (98%) of these chickens are maintained under traditional system with little or no input for feeding .

The primary objective in feeding poultry is to secure the most economical gains in weight during growth and fattening, and the most economical production of eggs throughout the laying period .

The feed resource for rural chicken production in Ethiopia is scavenged, and consists of household waste, anything edible found in the immediate environment, and small amounts of grain supplements provided by the women.

Village chicken production fits quite well with the conditions of rural households due small feed cost, space requirement and low price of the animals.

about 99% of chicken owners of North-West Amhara provided supplementary feed to village birds once per day, mainly during feed shortage seasons.. on village chickens shows the major feed is grains produced on-farm, and feed availability is high during the dry season and harvesting period from December to March, and from November to January.

Poultry of all types require housing that will protect them from the predator, wind and rain, as well as the effects of rapid changes in temperature. The house should be dry at all times, and provide good ventilation while being free from draughts. Village chicken housing system in Ethiopia is mostly perch in the house, perch in the kitchen, perch in the veranda and separate shelter).

5.2 Coordinating and Monitoring

Achieving good chicken, barn and health are attained through coordinating and monitoring of daily operational excellence and attention to detail. A combination of quality nutrition, veterinary guidance, and increased consideration of barn and chicken management will help to ensure chickens have the best possible chance to perform at their maximum potential.

Some critical focus areas needs to be coordinated and monitored in poultry production systems are as follows:

1. Biosecurity:

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- Well-defined biosecurity practices throughout broiler production (pre-, during and post placement) are crucial to successful poultry production.
- Effective biosecurity can aid hygiene, vermin and insect control on-farm and help to limit disease transmission within and between barns.

2. Pre-placement preparation

- Pre-placement preparation is needed before the new flock arrives to help prevent losses during brooding and the rest of grow out.
- Checkpoints to keep in mind: heaters, floor temperature, temperature and relative humidity probes, ventilation, drinkers, feeders, etc.

3. Brooding management

- With today's improved genetic capabilities and the fast growth of birds, more time is being spent during the critical brooding phase. As a result, ensuring a good start in poultry production can have a significant impact on the future health and performance of the birds.

4. Litter management

- The litter in a poultry house acts as bedding for the birds. In addition to standing and resting on the bedding, birds will naturally peck at the litter. Litter condition and quality have an impact on broiler intestinal health and profitability, starting from when the chicks are placed all the way through production.

5. Water management

- Drinking water accounts for 70–80 percent of the bird's daily drinking needs. Poultry will generally consume more water than feed. As a result, water is the most critical nutrient for poultry. An abundance of clean water will reduce challenges and maximize performance.

6. Feed management

- Birds must have easy access to feed. Proper feeder line height corresponding to the height of the birds helps to reduce feed wastage and mixing feed with litter, and it ensures that all birds have access to feed. Adequate feed access is also achieved by following the feed line manufacturer's recommendations for the number of birds per feed pan or line of trough feeder.
- Birds will naturally peck at litter but avoiding "out-of-feed" events helps to reduce the potential for birds to peck excessively at the litter. Simple measures like activating trigger feed pans and monitoring feed bin levels during barn checks can help to prevent such events.
- Good feed quality that avoids contaminants like mycotoxins is important to ensure performance.

7. Stocking density



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- A higher stocking density of poultry in addition to crowded housing conditions has been shown to have a negative impact on performance, causing stress to the birds
 - Lowering stocking density throughout the overall production of the birds may help to reduce challenges.
- 8. Environmental management**
- General environmental management of the barn includes many components, such as temperature, relative humidity, ventilation and lighting.
- 9. Keeping an eye on equipment**
- Walking the barns routinely will also help to ensure equipment remains in working order
- 10. Mortality checks:** Cull diseased birds as early as possible.

5.2 Monitoring during times of transition

- Increasing the frequency at which barns are walked and examining the activity of the flock can help with early disease detection.
- Daily monitoring of temperature, humidity and ventilation inside the barn as well as outside temperature is recommended.
- Monitoring transition times can help with understanding what is happening in the barn (e.g., from day to night, when birds are placed, during half-house brooding, feed changes, etc.).
- Monitoring feed and water consumption helps to monitor the flocks' progress

5.3 Communication and provide feedback to staff and management

Based on the monitoring results, the workers should have to communicate and discuss as to:-

- ✓ Ensuring strong communication and coordination between all those involved in helping your farm run smoothly will ensure a stronger and more successful gut health management program for your birds.
- ✓ Feedback is provided to staff and management on request, or as necessary in accordance with established industry standards.

Feedback is given to each worker either orally or in written form.

Feedback includes:

- ✓ Regular staff discussion in groups,
- ✓ Reviews of performance with each staff member,
- ✓ Management encouraging comment on their own performance,
- ✓ Clearly defining responsibilities for each position,

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- ✓ notices,
- ✓ Providing information on unit performance - good and bad.

5.4 Allocate work optimises resources

While doing any work related with intensive poultry production system we have to allocate the necessary resources which are proper and suitable to undertake the general work activities. It is usually done within routines, methods and procedures where some discretion and judgment is required in the selection of equipment and materials, organization of work, services, and actions to achieve outcomes within time and budgetary constraints should be properly allocated. The resource which has to be allocated is used to achieve the work. Some of the resources are, materials, tools and equipments, financials, labors, machinery, personal protective equipments, etc, have to be allocated so as to run the work properly.



Self-Check -5	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Discuss the activities that should be coordinated and monitored in chicken production systems (10pts)

Note: Satisfactory rating –5 points

Unsatisfactory - below 5 points

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

1. _____



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Operation Sheet #1

Preparing for Bird Arrival or Pre-placement preparation

Preparing for chicken arrival or pre-placement preparation

Step 1- Remove all old litter.

Step 2- Clean the house

Step 3- Disinfect house and equipment using an approved disinfectant.

Step 3- Fumigate if possible

Step 4- Let house lie empty and air out for two weeks

Step 5- Place about four inches of clean, dry litter such as pine shavings or sawdust

Step 6- Use chick guards to keep birds close to heat, feed and water.

Step 7- Bring house up to brooding temperature one day before delivery.

Step 8- Fill waterer 4 hours before arrival.



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LAP Test #1

Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within 4 hour.

Task 1. Remove old litter from poultry house and preparing for chicken arrival

LG #2**LO #2- Identify and select poultry breed****Instruction Sheet**

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics:

- Identifying and characterizing common poultry breeds
- Identifying and deciding criteria for selection
 - ✓ Identification of egg laying hens
 - ✓ Classification of fertile and non-fertile eggs
- Selection of appropriate breeds for production purpose

This guide will also assist you to attain the learning outcome stated in the cover page.

Specifically, upon completion of this Learning Guide, **you will be able to:**

- Identify and characterize common poultry breeds
- Identify and decide criteria for selection
- Select appropriate breeds for production purpose

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the “Information Sheets”.
4. Accomplish the “Self-checks” which are placed following all information sheets.
5. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work
6. If you earned a satisfactory evaluation proceed to “Operation sheets
7. Perform “the Learning activity performance test”



1.1 Introduction

Indigenous breeds which vary in color, comb type, body Conformation and weight still contribute meaningfully to poultry meat and egg production and consumption in the country, Where they make up to 90% of the total poultry products of the country. There has been a substantial effort to introduce improved exotic chickens particularly introduction of Isa Brown (IB), Bovan Brown (BB), broilers, Babcock and dual-purpose hybrid Potchefstroom Koekoek (PK) breeds to the country by government and some Non-Governmental Organization (NGO).

With the aim of improving poultry productivity, different breeds of exotic chickens (Rhode Island Red, Australorp, New Hampshire and White Leghorns) were imported to Ethiopia since **the 1950's**.

1.2 Types of Poultry Breeds in Ethiopia

Poultry include all domestic birds kept to human food (meat and eggs) production including chickens, ducks, ostrich, guinea fowl, doves and pigeons, of these chickens are the only domestic birds in Ethiopia. All over the world, more than 300 breeds of the domestic chicken species (*Gallus domesticus*) exist.

There are three: pure commercial breeds, hybrid breeds resulting from cross-breeding and local breeds or land races. However, among the three chicken breed types indigenous chickens are dominant having large population size.

1.3 Concepts of characterizing common poultry breeds

There are hundreds of highly productive poultry breeds available around the world in general and Ethiopia in particular. Some of them are very famous for egg production, some are popular for meat production and some breeds are famous and popular for both meat and egg production. However, majority or all of the household farmers found in the country are not well informed the productive chicken breed specifically for egg, meat, dual purpose chicken breed and for game and ornamental purpose. These chicken breed may be indigenous breed or improved breed. Therefore, to be successful and profitable, identifying and selecting the productive breed for required purpose is the key. Accordingly, the common productive poultry breed are described the name and characteristics of some productive poultry breeds below.

1.3.1 Commercial or Exotic Breeds

Commercial breeds are developed based on the demand of consumers. Currently the commercial breeds are either layers or broilers. There are also pure, exotic breeds but currently they are not available in the commercial markets of Ethiopia. Formerly Rhode Island Red and White Leghorns were available in Ethiopia.

We can roughly divide commercial breeds according to their main production aim as egg laying, mainly with lightweight laying breeds or layers; meat production, mainly by heavyweight breeds or broilers; both egg-laying and meat production by so-called dual-purpose breeds.

- **Layers:-**These breeds are used primarily for egg production. Most of the time, the eggs of the parent stock are imported. Then the generations are used for their egg production while the parent stock is used for hatchery purposes. Previously, several layer breeds were imported to Ethiopia, but currently there are just three of them used for egg production .

i) Bovans Brown

This breed was formerly known as BovansGoldline and is a hybrid of Rhode Island Red (cock) and Light Sussex (hen). Bovans Brown is a brown feathered, brown egg layer which can meet the expectations of a variety of egg producers with different objectives

ii) Issa Brown

Like Bovans Brown, Issa Brown is also available in Ethiopia.

iii) White Leghorn

White Leghorns are known for laying lots of white eggs.

They need less feed, due to their small size.

A) Rod Island Red

- These chooks normally have hard rust colored feathers, but may be darker or almost black.
- The Rhode Island Red is an American breed of domestic chicken
- Rhode Island Reds are large: roosters weigh in at around 8.5 lb (3.8 kg), the hens 6.5 lb. (3 kg)
- They are generally good pets to keep. However sometimes hens, can be quite aggressive.
- They are a tough utility bird, raised for meat and eggs. Indeed they are among the best laying types of chickens with good feeding their egg production is excellent, being from 250 to 300 large, light brown eggs a year. They are moderately early maturing. Rhode Island Reds are also used for creating many modern hybrid types of chickens. However, their large comb makes them susceptible to frost bite.They remain productive with good management.



Figure 1. RIR chicken

B) White leghorn

- Most Leghorn chickens have single combs but there are several color varieties that have rose combs.
- Recognized colors are white, red, black tailed red, light brown, dark brown, black, blue, buff, Columbian, buff Columbian, barred, exchequer and silver.
- The Leghorn breed was developed in Livorno, Italy

Leghorns mature into smallish chooks, weighing from 3 lbs (1.4kg) to 4 lbs (1.8kg)

- Leghorns are nervous types of chickens around humans and can fly, making them less popular as a homestead breed.
- Uses of the Leghorn Chickens
- Leghorns are **fantastic egg producers**, laying around 280 white eggs a year. They are the world's top breed behind commercial egg producing lines. The leghorn breeds are most selective breed in poultry industry and they are white in colour



Figure 2. Leghorn chicken

C) Cock hock

- This chicken breed honestly doesn't have amazing annual production
- Average egg production of this chicken ranges between 160-180 eggs per year.
- They are large breed; they can make decent birds for meat
- They have a mixture of black and red or white and black color
- They consume more feed and Slow growth rate
- They are not good egg layer



Fig. cock hock

D) Bovine chickens

They are a superior chicken breed. The Bovines Brown and white are a highly versatile and tough bird. Combined traits include high peak production, great laying persistency, and a flat egg weight curve, resulting in top quality dark brown (bovine brown) and white eggs(bovine white) . The Bovines Brown and white have excellent feed intake capacity and robustness so that it fully expresses genetic potential in multi-age and free range environments. This is an attractive looking bird that maintains great feather cover. The Bovines Brown and white are an ideal bird for the commercial egg producer looking for overall solid performance. The can laid 300-330 eggs per year per hen.



Fig.5 bovine chicken

E) ISA brown

- Is Improve breed
- Country origin france
- Isa brown is prolific egg layers. Mostly used in commercial layer farming purpose to produce large size brown color eggs.
- They lay more than 300 eggs in a year by a single hen. The weight of the single egg is 60 g.
- Meat production: It is light in weight the meat production is quite less



Fig.3 Isa Brown

F) Sussex Chickens

- The most famous Sussex chooks are the Light Sussex. These are very distinctive types of chickens having a white body with a black tail and black wing tips, neck being white striped over with black. Other colors include Brown, Buff, Light, Red, Speckled, Silver, White and Coronation.



Figure 4.sussex chicken

- The Sussex chicken was created over a century ago in the county of Sussex, England.



- Cocks should weigh approximately 9lbs (4.0 kg), and the hens (females) 7lbs (3.2 kg)
- The Sussex chicken is an alert, docile breed that can adapt to any surrounding, comfortable in both free range and confined spaces
- Sussex is dual purpose
- Types of chickens that are good foragers, and understandably

1.3.2 Indigenous (local) Breeds

The Ethiopian indigenous chickens are non-descriptive breeds closely related to the Jungle fowl. They vary in color, comb type, body conformation, weight and may or may not possess shank feathers. Broodiness (maternal instinct) is pronounced.

Indigenous chickens have an inherent scavenging and nesting habit, they are more resistant to diseases, less prone to predator attacks and can survive under harsh nutritional and environmental conditions.

Hence, selection in local breeds is targeted at adaptation to harsh environments and resistance to disease rather than enhanced production. They are characterized by slow growth, late maturity and low production performance.

The mean annual egg production of indigenous chickens is estimated at 60 small eggs with thick shells and a deep yellow yolk color. Most of the urban and Peri-urban community keeps these indigenous breeds because they are well adapted to the current environmental condition. The egg laying period and number of eggs laid per period are to some extent higher in urban than in rural areas. The carcass weight of local chickens The general characteristics of the indigenous chicken breeds summarized as:

- Non-descriptive breeds closely related to the Jungle fowl.
- They vary in color, comb type, body conformation
- Vary in weight and may or may not possess shank feathers.
- Broodiness (maternal instinct) is pronounced.
- Slow growth
- Late maturity
- Relatively resistant to disease than exotic breeds
- Low egg production,
- Small sized eggs
- Low survivability of chicks
- Low feed utilization efficiency

Some of the Ethiopian indigenous chicken ecotypes are:-

1. Farta indigenous chicken breed

- Found in the Amhara regional state in northern Ethiopia.

- They are maintained under scavenging regimens with occasional supplementation and sheltered in the family house.
- The chickens have predominantly white body plumage that occurs at similar frequency in both sexes.



Fig.5. Leghorn chicken

- Wheaten strips on a black background are the typical plumage colors in males but are not observed in females. The other peculiar feature in males is a black breast which is almost absent in females

2. Horro indigenous chicken breed

- Found in Horro GuduruWollega Zone,
- Improved local chicken breed
- Horro is good for meat and eggs
- capable of hatching 180 eggs per year
- High-production under low-input systems
- Medium sized chicken



Fig .6 horro local breed

3. Sheka indigenous chicken breed

- Egg production potential of local chicken is 30 to 60 eggs/year/hen
- They are not good layer, but good for meat production
- They are medium sized chicken
- The chickens are disease resistant and
- productive under low-input systems



Figure 7: sheka local chicken

4. Mandura indigenous chicken breed :

- Found in the BenshangulGumuz regional state in northwest Ethiopia
 - They are reared by mixed communities of Amhara, Gumuz and Agaw
 - Brown is the most predominant plumage in the population followed by red, white and white or grayish strips on brown or reddish background
- Fig. 8: sheka chicken
- Complete red is typical of males' plumage but absent in females



Fig. 8: sheka chicken

5. Konso indigenous chicken breed

Found in the Southern Nations, Nationalities and Peoples Regional State in south Ethiopia. Most of the cocks have different color: red body plumage, brown, zigirima and black are the prominent plumage colors in hens. Few hens have naked necks.



Figure 9: Konso local chicken



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Self-Check -1	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. _____ is the indigenous chicken breed of Ethiopia (3pts)
a) Horro b) Bovine brown c) RIR d) all
2. Which of the following poultry breed is improved?(3pts)
a. Mandura chicken breed b. Farta chicken breed c. Sussex Chickens

Note: Satisfactory rating - 3 points

Unsatisfactory - below 3 points

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

1. _____
2. -----

Information Sheet-2

Identifying and deciding criteria for selection

2.1 Breeding goals

All breeding plans for commercial breeding companies have one major objective in Common: to increase the genetic potential of the stock to produce saleable, high quality products at minimum cost in a given production system.

Breeders of egg-type chickens concentrate on four major objectives. They are:

- ✓ Maximum number of saleable eggs per hen housed
- ✓ Low feed cost per egg or per kg egg mass
- ✓ optimal internal and external egg quality
- ✓ Low mortality and high adaptability to different environments

Layer breeding companies apply selection to improve over 30 traits important for Commercial egg production. In general, there are no worldwide or country wise Standardized breeding goals set. Differences in economic, social and ecological production environments give rise to different approaches and needs in terms of human welfare and well-being.

Breeders today select for (or at least monitor) the ageLayer breeding strategies: at sexual maturity, rate of lay, liveability, egg weight, body weight, feed conversion, shell colour, shell strength, albumen height, egg inclusions (blood and meat spots) and temperament. From the early 1980s percentage of solids and lipids in eggs have been added as additional traits.

2.2 Selection strategies for egg production

Egg production has always been the cornerstone of the selection criteria applied to egg laying stock. A variety of measures are known to contribute to lifetime egg production. Because all hens placed in the laying house contribute to the cost of the flock, many commercial operations base their judgments on hen-housed egg production data. This is the total number of eggs produced divided by the number of hens placed.

Hen-housed egg production is a combination of age at first egg, rate of egg production and viability. However, emphasis has been shifting to persistency of lay. As flocks maintain high rates of lay for longer periods of time, they can be kept for advanced ages without being moulted. In recent years there has been an increase in the use of induced moulting to extend the laying life of the hen in many parts of the world.

Traditionally, 'part production record' selection has been advocated by several authors (Bohren et al., 1970) as a means of shortening generation interval to increase genetic

Progress.

Because part record is an integral piece of annual egg production, resulting in a substantial built-in correlation, greater genetic progress in annual egg production has been generally predicted and, in some cases, observed.

2.1 Identify egg laying hens

There are some common criteria that are used to identify and select good layer or hens. These are:

2.1.1 Looking wattle



Good layer



Poor layer

Figure 8. Layer identification by their wattle

3. Vent shape



Poor layer



Good layer

Figure 2 Layer identification by their vent

4. Shank color



Poor layer



Good layer

Figure 3 Layer identification by their shank color

2.1.2 Toes color



Poor layer



Good layer

Figure 4. Layer identification by their toes color

2.1.3 Measure how many fingers fit between the pubic bones

If you can't fit 3 fingers or more then she is not good laying



Good layer



Poor layer

Figure 5. Identification layer by measuring pubic bones

Generally the main characteristic for distinguishing a layer from a non-layer is given below.

Good Layer

1. Head small, lean and well proportionate
2. Beak strong, shining and well curved
3. Comb and wattles warm; brightly red and full
4. Eyes bright, well opened and alert
5. Neck short and strong
6. Body long, deep and proportionate
7. Back broad and straight
8. Skin thin, smooth and oily

Bad Layer

1. Head large and thick
2. Beak long, thin and dull coloured
3. Comb cold, shrunken and dull coloured
4. Eyes dull and sleepy
5. Neck long and thin
6. Body short, weak and thin
7. Back long and curved
8. Skin coarse and thick
9. Abdomen small and hard

9. Abdomen large and soft

10. Ventral small, dry and narrow

10. Ventral oval, soft and moist

11. Feathers moult early

11. Feathers moult late

12. Shank hard on back

12. Shank thin and soft on back

gg13. Poor appetite

13. Good appetite

2.2 classifying fertile and none fertile egg

Candling: refers to the passing of light through the egg in a dark room so that the interior can be seen to detect infertility and dead embryos. When eggs are tested through candling three groups of eggs can be identified as:

- ✓ Infertile egg or clears: These eggs appear completely clear
- ✓ Dead embryos: If the embryo is dead the blood settles away from the embryo towards the edge of the yolk forming in some cases an irregular circle of blood known as blood ring. The air cell in eggs with a dead embryo will be ill defined (not clear). Such eggs should be disposed off
- ✓ Live embryo: A live embryo at this stage will fill most of the egg, apart from the air cell, which is large and clear. Such eggs are transferred to the hatching compartment

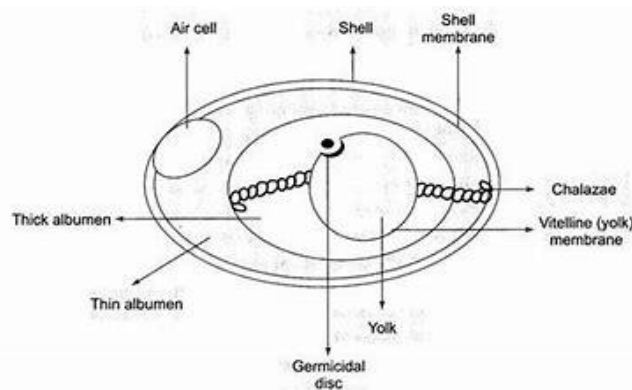


Fig. 14.1 Structure of an egg



Figure 6. Egg candling



Self-Check -2	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1) List at least four characteristics of good layer? (4pts)

2) What is Candling? (10pts)

Note: Satisfactory rating - 7 points

Unsatisfactory - below 7 points

Answer Sheet

Name: _____

Date: _____

Score = _____

Rating: _____

Short Answer Questions

1. _____

2. _____



Information Sheet-3	Selection of appropriate breeds for production purpose
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2.1 Production Performance of Dual Purpose Crosses

Poultry is the largest group of livestock species in the world in which chickens largely dominate the flock composition. The poultry sector in Ethiopia can be characterized into three major production systems based on selected parameters like breed, flock size, housing, feeding, health, technology, bio-security and others.

These are large scale commercial, small scale commercial and village poultry production systems.

The majority of chicken production systems remain as village production which consists of the indigenous breeds widely. Attempts have been made to introduce different exotic poultry breeds to small holder farming systems of Ethiopia to improve the existing low performance of indigenous chickens.

The egg production potential of local chickens is between 30-60 eggs per year/hen with an average weight of 38g each under village management condition.

However, exotic breeds produce around 250 eggs per year/hen each weighing around 60g in Ethiopia. Evidences indicate that all the imported breeds of chickens performed well under the intensive management system.

However, the contribution of exotic chicken to the Ethiopian economy is still significantly lower than that of other African countries due to dominance by village production systems. In general, poultry egg and meat production is the most environmentally efficient animal protein production system.

Therefore, feed shortage, disease and other critical gaps need to be filled by research institutions and development agencies to improve the productive performance of exotic chicken breeds in Ethiopia.

An ongoing crossbreeding experiment is being conducted with the objective of producing dual-purpose synthetic chicken for village poultry production in Ethiopia. The two exotic chicken breeds used were the Fayoumi (F) and Rhode Island Red (R) as dam line, whereas the two indigenous chicken breeds used were the Naked neck (N) and local Netch (W); a white feathered chicken.

The indigenous breeds were used as sire line to produce the hybrids FN and RW. Growth and egg production performance of the crosses were compared with each other and with the exotic pure line performance. Both body and egg weight of FN was

improved while body weight of RW was reduced, and age at first egg was significantly reduced, compared to their respective dam line.

Egg production for the crosses was lower than for their maternal lines. Although cross chicks weighed more and grew faster than RW chicks during the brooding period, the difference became insignificant as they grew older.

However, the higher overall average bodyweight gain of RW crosses that was observed was mainly due to higher weight gain for the RW cocks. No significant differences were observed in overall egg production and quality traits between the two crosses, but significant age effect within crosses was found. Mortality in the FN cross was lower than in the RW cross. These F1 crosses will be used as parents to produce a 4-way synthetic crossbred chicken



Figure 1.crossbreeds

2.2 Exotic Chicken Breeds:

The most important thing is the introduction of exotic breed of chicken . Even if there is no record or evidence indicating the exact time and locations of introduction of the first batch of exotic breeds of chickens into the country for genetic improvement, it is widely believed that the importation of exotic breeds of chicken goes back to the early 1950s . It has been reported that many exotic breeds of chicken (White and brown Leghorns, Rhode Island Red, Bovans, New Hampshire, Cornish, Australoup and Light Sussex) were introduced over the past years.

The most important inputs have been the introduction of improved (exotic) breed, improved feed, vaccine and medicaments and credit aiming at increased productivity . Most of the urban and Peri-urban community keeps indigenous breeds because they are well adapted to the current environmental condition.

The egg laying period and number of eggs laid per period are to some extent higher in urban than in rural areas. The carcass weight of local chickens at 6 months of age was



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559g which was significantly lower than that of the 875g found for Leghorn but higher in dressing percentage than exotic chickens .

Though productivity of the local chicken breed was reported to be low these chickens can survive well with low input and the taste of their eggs and meats is flavorful. Therefore, breed improvement and subsequent proper utilization of these local chicken genotypes strongly demands comprehensive characterization including, production system and breeding practice.



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Self-Check -3

Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

- 1) Which one is exotic breed of chicken A)White and brown Leghorns B) Rhode Island Red, C) Bovans, D) all? (10pts)

Note: Satisfactory rating - 5 points

Unsatisfactory - below 5 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions



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Operation Sheet #1

Identify laying hens

Identify laying hens

Step 1- Wear appropriate workplace PPE

Step 2- Use footbath

Step 3- Enter the chicken house

Step 4- Catch the hen

Step 5- check the wattle, vent shape, shank color, under foot color and measure pubic bones by your finger

Step 6- judge and identify whether the hen is good or bad lay



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LAP Test #1

Practical Demonstration

Name: _____ Date: _____

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within --- hour.

Task 1. Identify the poor and good layer following its procedures

LG #3**LO #3-Identify poultry house and facility requirements****Instruction Sheet**

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics –

- requirements for poultry house construction
- site Selection for poultry house establishment
- space requirement for different poultry classes
- Planning farm layout and chicken houses
- Selecting Farm design
- internal environment requirements

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, upon completion of this Learning Guide, **you will be able to –**

- Identify required poultry house construction
- Select appropriate site for poultry house establishment
- Determine space required for different poultry class
- Plan farm layout and chicken houses
- Select Farm design
- Identify and obtain internal environment requirements

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the “Information Sheets”.
4. Accomplish the “Self-checks” which are placed following all information sheets.
5. Ask from your trainer the key to correction (key answers) or you can request your trainer to correct your work
6. If you earned a satisfactory evaluation proceed to “Operation sheets
7. Perform “the Learning activity performance test”

Information Sheet-1**requirements for poultry house construction****3.1 introduction of poultry house construction for each production system**

Poultry house is the structure/building that protects birds from external harsh environments and provides them with suitable situation for their health and productivity. Poultry production systems should provide fresh air, clean feed and water, protection against predators, shelter from cold, rain, wind, sun and excessive heat; as well as a source of heat when birds are young. Basically, the birds need a good house to be able to grow, sleep, and lay eggs in comfort, free from stress and disease.

A properly constructed poultry house, regardless of its size and the materials used, has certain essential features. The basic requirements for poultry housing are:

- ✓ A watertight roof
- ✓ Proper ventilation
- ✓ Inner surfaces which are easy to clean
- ✓ Protect rat and wild bird
- ✓ A clean environment
- ✓ proof floor, walls and roof
- ✓ Correct location

The following point should be considered during poultry house construction.

- **Location against wind direction:** The house should be placed at the back faces the direction from which wind and storms usually come, and so that it receives as much sunshine as possible.
- **Orientation of poultry house:** The poultry house should face south or east in most localities. A southern exposure permits more sunlight in the house than any of the other possible exposures. An eastern exposure is almost as good as a southern one; birds prefer morning sunlight to that of the afternoon. The birds are more active in the morning and will spend more time in the sunlight.
- **Adequate space according to the number of poultry:** The size of poultry house depends on the number of fowls, and on whether they are to remain indoors all day, or are allowed to roam about and are shut up at night only. The measurement varies according to the production purpose, growth stage of the poultry. The main aim should be to provide a type of house that has plenty of space.
- **Need for specifying foundation, well- drained area and good drainage system:** The ground should be dry, well drained (i.e. provide with ditches or pipes for carrying away a rain water) and fairly level if possible the poultry house should be placed on a sloping hillside rather than a hill top or in the bottom of valley. A sloping hillside provides good drainage



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- **Adequate aeration:** Ventilation in the poultry house is necessary to provide the birds with fresh air and to carry off moisture. Since the fowl is a small animal with a rapid metabolism, its air requirements per unit of body are light in comparison with other animals. So the presence of fresh air around the site should be preferred.
- **Adequate light:** Day light in the house is desirable for the comfort of birds. Sunlight in the house is desirable not only because of the destruction of disease and for supplying vitamin-D but also makes poultry happy.

All the aforementioned poultry house construction guidelines must be implemented to achieve success in the poultry business. Feeding alone does not determine the success of a poultry farm; these are structural and environmental aids to poultry birds.



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Self-Check -1	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What are the basic requirements for poultry housing?(10pts)

Note: Satisfactory rating - 5 points

Unsatisfactory - below 5 points

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Questions

- 1.



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Information sheet 2

Site Selection For Poultry House Establishment

2.1 Introduction

Today, poultry farmers must be aware of concerns related to

- 1) Environmental issues like water quality, odors and flies, litter applications on fields and high soil phosphorous levels;
- 2) Nearby neighbors and public areas like churches, parks and businesses; and
- 3) Laws and regulations that affect farming operations.

Future poultry farmers must place greater emphasis on farmstead planning than has been done in the past. Considerations in site selection for buildings must include utilities, roads, topography, prevailing winds, existing buildings, neighbors, public areas, setbacks, and state and federal government laws and regulations.

Neighbors – The location of nearby homes should be the number one consideration when evaluating potential locations for poultry facilities. Good neighbors can quickly become enemies if the building site is too close to nearby homes. Some poultry companies require prospective poultry farmers to discuss building plans with their neighbors before construction starts. Even if discussions with neighbors are not required, this practice is recommended. Reaction from neighbors may force alternate sites to be chosen.

2.2 Site selection

If one is seriously considering the establishment of a special poultry business, it will be well for him to study the various sections of the different site in order to determine just which offers best opportunities for poultry rising. Sometimes there is no choice, but if there is a choice features for a good location are:

- ✓ Well drained land, this is especially important where litter systems are used.
- ✓ Within sight of owner / supervising personnel.
- ✓ Away from other chicken houses to reduce the spread of diseases, generally the more the distance the better.
- ✓ Noisy areas should be avoided.
- ✓ Especially in hot climates, having tall trees which cast shade on the roof is an advantage however; the natural air flow (wind) should not be hindered.

- ✓ No direct sunshine entering the house, placing the house in an east-west direction is best.
- ✓ Residential areas should be considered.
- ✓ The most desirable temperature for a poultry house is 11 to 26 °C in tropics. The use of insulation with straw pack or other materials can keep house warmer during cold time & cooler during the hot time.
- ✓ The house site should be near to feed sources especially green feeds. Farm site with enough space for green feed establishment is preferable.
- ✓ The house should be near for veterinary service.
- ✓ The site must have adequate and clean water supply to satisfy the needs of entire flock or should be near a water source & the water have no disease causing germ, bacteria & poison.
- ✓ Identifying the presence or the absence of predators around the area is essential to protect the bird from risk.
- ✓ The site should be closer to the market and there must high market accessibility.
- ✓ Year round road access is necessary to transport the inputs and the outputs easily

Setbacks – How far should poultry houses be set back from residences, property lines, public areas, public roads, streams, wells, sinkholes and flood plains?

Currently, Tennessee does not have any laws or regulations that govern setbacks for agricultural building sites. However, most poultry industry companies have self-imposed setback guidelines that need to be considered. These guidelines will help reduce problems associated with odors, dust, feathers, noise and water quality.

Proper siting of new poultry facilities is extremely important. Problems can result if facilities are built in unfavorable locations. The best time to handle potential problems is before they occur. Proper planning will help prevent environmental problems from occurring, and will save time, money and headaches in the long run.

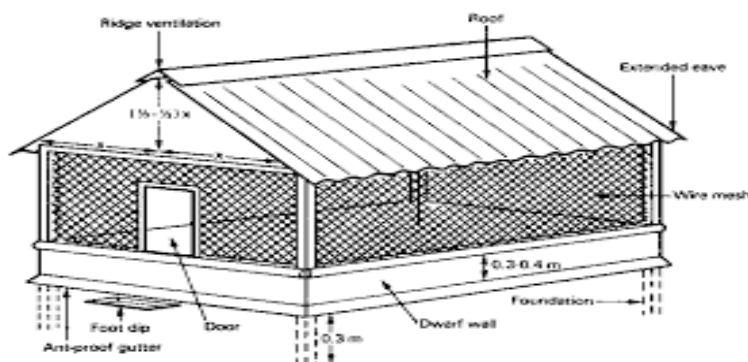


Figure. 1 poultry house design



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Self-Check -2	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. What are the important parameters used for site selection for establishing chicken house (at least five)? (10pts)

Note: Satisfactory rating - 5 points

Unsatisfactory - below 5 points

Answer Sheet

Score = _____
Rating: _____

Name: _____

Date: _____

Short Answer Question

1. _____

Information sheet 3
space requirement for different poultry classes

3.1 Space requirement

Floor space requirements for free-run, indoor systems vary considerably depending on breed, ambient temperature and whether any or the entire floor consists of wire or wooden slats. In general, the most space is required in systems with 100% litter floors, and the least where the floor is entirely wire or slats. Producers should interpolate between the extremes in the following table based on individual circumstances.

This is the most important basic principle in housing, as the space available determines the number and type of poultry that can be kept. Linear space or length of perch per bird is measured in centimetre. The recommended floor and perching space for the three main types of chicken is shown in below

Table 3.1 space required for the types of chicken

Chicken type	Floor space (birds/m ²)	Perch Space (per bird)
Layer	3	25cm
Dual purpose	4	20cm
Meat	4-5	15-20cm

Hen groups are comfortable at a stock density of three to four birds per square meter. If more space is allowed, a greater variety of behaviour can be expressed. Less space creates stressed social behavior, allowing disease vulnerability and cannibalism and leaving weaker birds deprived of feed or perch space. Individual birds need more room for normal behavior and adequate exercise than the 22 birds/m² density currently used in commercial laying cages.

Table 3.2 Feed and feeder space requirements for chickens

Age (weeks)	Feeder space (m)
1-4	2.5
4-6	3.8
6-9	6.1
10-14	9.6
15 and above	12.7

Table 3.3 minimum water and watering space requirements for in hot dry conditions

Age (weeks)	Water space (m)
0-1	0.7
2-4	1
4-9	1.5
9 or more	2.0
Layer	2.5

Nests

To avoid excessive competition and minimize eggs laid on the floor, one nest should be provided for every five hens. If larger communal nests are used, at least one square meter per 50 birds should be allowed. Nest boxes for individual hens should measure approximately 30 cm on all sides, with a nest floor area of about 0.1 m².



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Self-Check -3	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Write the floor space requirement of layer, meat and dual purpose chickens?(10pts)

Note: Satisfactory rating - 5 points

Unsatisfactory - below 5 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

1. _____

4.1. Design farm lay out and chickens' houses

Farm lay out and chickens' houses are designed according to farm objectives and standards

Design of poultry housing must consider production and environmental aspects such as wind, heat and cold, predator risk and also their impact on production.

The construction materials that are used should be:

- ▲ Durable (long lasting)
- ▲ Easy to handle and easy to repair if damaged
- ▲ Readily available and as cheap as possible.

The width of the house if only natural ventilation is used should not generally exceed 9m. The length depends on the number of chickens that are going to be kept and availability of building space.

The height should not be less than 2 m anywhere in order to make the house easily accessible everywhere. Moreover, it provides more volume to the house resulting in a better air quality.

The floor should be made of concrete for easy cleaning or be filled with 50cm sand. Wire netting should be placed under and around a floor made of sand in order to keep rats and other predators out.

In hot climates at least 3 sides should be open (wire netting) in order to have enough fresh air (ventilation). By means of boards or mats the sides may be temporarily and partially closed when there are young chickens in side.

The roof should protect the birds against direct sun light and rain for that reason it should extend the walls for about 50cm beyond the wall. Poultry house should have elevated ceiling to keep heat away from birds. The roof may be ridged or slope to one side. If the roof is ridged this ridge should be open to permit heat to escape.

Technical specifications to be considered during construction of broilers house

- ✓ Maximum width = 8-9m
- ✓ Maximum length = up to 30m(it depends on the number of flock)
- ✓ Centre height = 2.5-3m at eaves and 4-5m at ridge roof is preferable in tropics.
- ✓ Over hang = 2.5-3 feet
- ✓ Width sides built /solid walls

- ✓ Length sides built wall up to 0.5m from floor and remaining covered with ¾-1inch wire nets
- ✓ Raised platform of 2.5-3feet from surrounding lands

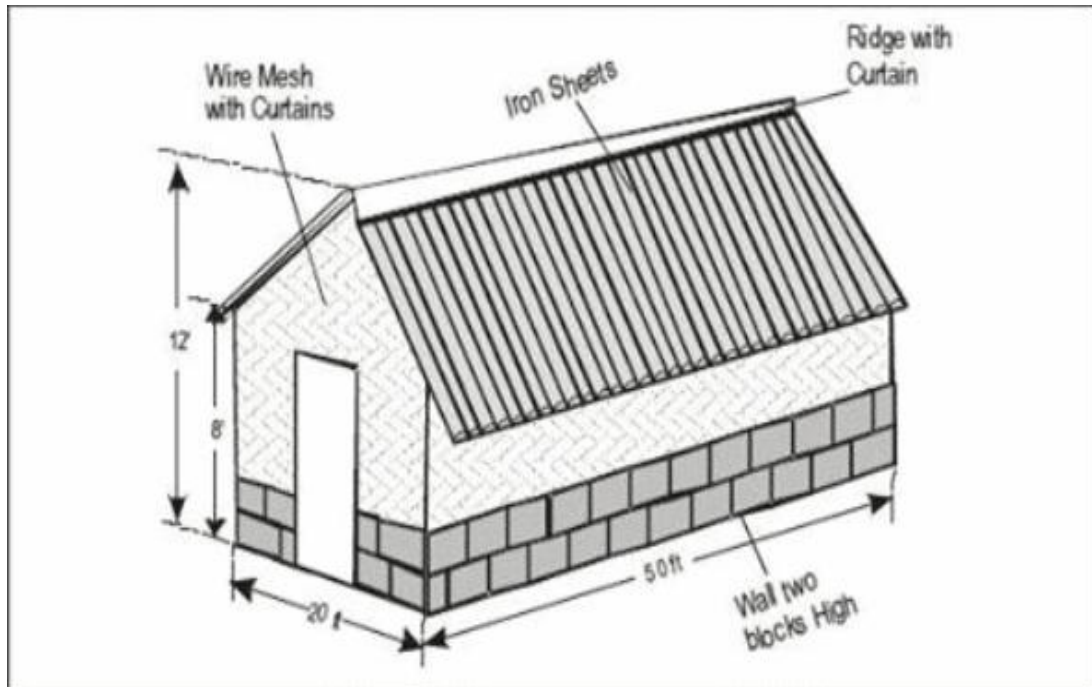


Figure: 4.1 Poultry house design

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Self-Check -4	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. The poultry house construction materials that are used should be? (10pts)

- A) Durable (long lasting)
- B) Easy to handle and easy to repair if damaged
- C) Readily available and as cheap as possible.

D) all

Note: Satisfactory rating - 5 points

Unsatisfactory - below 5 points

Answer Sheet

Name: _____

Date: _____

Score = _____

Rating: _____

Short Answer Questions

1. _____

5.1. Introduction to Poultry farm Design

The economical growing of chickens starts from the correct and adequate design of the building for the appropriate breed and the environment of the location.

The design of the poultry house for hens or broilers in some countries does not always based on engineering and scientific foundation, but on some incorrect information, and practices or lack of accurate information. For these reasons and others there is a high mortality rate.

In absence of scientific and engineering aspects and rules in poultry housing design that led to different sizes and many non-standard types of sheds. In many situations it is not adequate for large production, or using standard mechanization (feeding, drinking systems) for poultry production.

Selecting the correct dimensions for the poultry house helps in use of standard mechanization and adequate design of the ventilation system. Not using scientific rules in poultry building design could create production problems, high production cost, lower returns, and wastage of different types of energy.

There are three types of poultry House

- i. Open-side Poultry house
- ii. Front and Back sides
- iii. Controlled Environment house

i) Open-Sided Poultry House

Most of the poultry houses in the world are conventional or open-sided they rely on the free flow of air through the house for ventilation. Certain requirements must be met if such a ventilated house is to provide an adequate environment. Care in following these rules during the course of construction will avoid pit falls later.

- **Width of house.** The width of the open-sided poultry house should be about 30 ft.(9.8 m) and no more than 40 ft. (12.2 m) wide. Houses that are wider will not provide ample ventilation during hot weather.

Wide houses also require additional interior Supports that may interfere with equipment or manure removal. This width recommendation is basic for growing birds, broilers, and laying hens.



An open- sided high-rise cage house with side curtains.

- **Height of house.** Most open-sided houses have a stud that is 8 ft. (2.4 m) long. The stud represents the distance from the foundation to the roofline. In areas where the temperature is exceptionally high throughout the year, the stud length should be to 10 ft (3 m). High-rise houses, with manure storage areas below the cages or slats, should be as high as 14 ft. (4.3 m) or more at the eaves.

- **Length of house.** Poultry houses may be almost any convenient length. The terrain on which they are to be built often determines the length; rolling land means more grading before construction can start. Because automatic feeding equipment will limit the length of the poultry house, the equipment manufacturer should be consulted about the optimum length of the feeding system. Many times the feed hopper is placed in the center of long houses to provide better use of automatic feeders.
- **Shape of roof.** Practically all poultry houses built today have a gable roof, the pitch varying from one-quarter to one-third. A good overhang should be provided to protect the inside from driving rains and to afford interior shade.
- **Roof exhausts.** Houses should be equipped with a covered exhaust area at the peak of the roof to allow excess heat to escape. Various systems are available to close the exhaust during the colder months in order to conserve heat.
- **Insulation.** Even with the conventional poultry house, it is well to provide some type of insulation. The roof may be insulated, using special products for this purpose, or an attic, or partial attic, may be installed. Attics should be ventilated with suction cupolas, or by vents.
- **Building materials and construction.** Open-sided and environmentally controlled houses use a variety of building materials. The choice is dependent on the structural strength required, the insulate characteristics of the material, material availability, and material cost. Galvanized steel or aluminum is most commonly used for roofing and siding. Framing is usually done with wood or steel and some houses constructed recently have used the tilt-up concrete wall method of construction. Cages and other equipment can be supported either from the roof trusses or from the ground. However, most of the newer multiple-deck cage units are supported from the ground because of their weight.
- **Foundation.** A solid and adequate foundation should support the building. Concrete, concrete blocks, bricks, or other permanent and termite-proof material should be used. Evenness of the foundation is important, for it will determine the Evenness of the completed structure.
- **Floor.** With certain disease-control programs, a concrete or similar floor is mandatory. It is also necessary when the soil is very dense and can absorb



and transfer moisture from lower subsoil, but in certain areas, where the soil is sandy, and where commercial broilers or commercial layers or breeders are kept, a concrete slab is not used when birds are placed on the floor. Cage houses usually have concrete walks to facilitate the movement of hand egg collection carts and mobile feed carts. The area beneath the cages may or may not be paved depending on the manure removal program and method.

- **Doors.** Doors at the end of the house
Should be large enough for a truck, tractor, or manure-handling equipment to pass through. Such equipment will be used when the house is cleaned.
- **Orientation.** Houses must be oriented in a direction to take advantage of prevailing airflow patterns. Orientation must also be considered relative to solar heat transfer into the building from exposed roofs or sidewalls. Pullet-rearing areas should always be located upwind from adult birds.

ii) Open Front and Back Sides

With this type of house most of the side areas are open. The height of the opening will be determined by climatic conditions, and by the type of bird being housed, as follows:

- ✓ **Broilers and young chicks.** From one-half to two-thirds of each side is left open, the

Exact amount being determined by summer and winter temperatures. When both heat and cold are to be dealt with; the size of the opening should be medium.

Where heat is continuous, the opening should be larger; sometimes almost all of the side is left open.

- ✓ **Growing birds and layers.** The opening size is greater for older birds. They should be provided with more air because bird density is greater and more ventilation is necessary.

- **Curtains during cold weather.** Young chicks and older birds should be given some protection during periods of cold weather and extreme winds. Curtains made of some durable and plastic like material usually provide this protection.

They are installed down the length of the building and hung so that the entire curtain may be rolled up or down by cables and a winch located at one end of the building or by thermostatically controlled automatic winches. This construction makes it easy to regulate the size of the opening according to weather conditions—an almost indispensable provision.

lii) Controlled environment house

A controlled-environment house is one in which inside conditions are maintained as near as possible to the bird's optimum requirements. Doing so usually necessitates a completely enclosed insulated house with no windows.



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Air is removed from the House by exhaust fans and fresh air is brought in through intake openings. Artificial Light, rather than natural daylight, is used to illuminate the interior. Where high Outside temperatures are involved, some method of controlling the temperature Inside of the house is provided. The houses are not heated except for brooders. The Heat from the birds is used to keep inside temperature within the range required for Maximum feed efficiencies.

Much of the structural makeup of the environmentally controlled poultry house is Similar to that of the house with open sides. It should have a good foundation and a Gable roof. Insulation is a must; both the sides and the top should be given Protection. The overhang of the roof need not be as great because the sides are Completely covered. But ventilating a completely enclosed house is difficult.



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Self-Check -5	Written Test
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Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. List types of poultry house?(10pts)

Note: Satisfactory rating - 5 points

Unsatisfactory - below 5 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

- 1) _____
- 2) _____
- 3) _____



6.1 Concepts of internal factors in chicken houses

The climate in poultry houses influences the wellbeing and health of humans as well as the birds. Respiratory, digestive and behavioral disorders are more likely to occur in houses in which the climatic conditions are not up to standard. The efficiency with which feed is utilized is related to the health status of the flock. Animals that are not healthy cannot be expected to perform optimally. The younger the animals are or the higher their production level, the more sensitive they become to the climatic conditions in the house. Climate can be defined as the sum of environmental factors which influence the functioning of man and animal.

6.2 Climatic factors

The following factors must be measured at animal level.

- ✓ Temperature
- ✓ Relative humidity
- ✓ Air composition
- ✓ Air speed and air movement
- ✓ Light

6.2.1 Temperature

Layers are warm blooded (homoeothermic) i.e. within a certain range; their body temperature is quite constant. On average, the body temperature of birds is between 41°C and 42.2°C. Body temperature is kept quite constant and is regulated by part of the chicken brain (the hypophyse). This part of the brain is comparable to a thermostat. Contraction and widening of blood vessels and the speed of respiration influence heat emission and retention which consequently influence the body temperature. It takes some time before heat regulating mechanisms start functioning in newborn animals and therefore they need a higher ambient temperature than adult animals do. Furthermore, the ratio between the surface area and weight of young animals is unfavourable and they do not have any fat reserves.

Table 5.1 Recommended temperatures for chickens

First day	32-34°C
1st week decrease	30°C
2nd week decrease	26°C
3rd week decrease	22°C
4th week decrease	20°C

5.2.2 Relative humidity

Relative humidity in poultry houses is measured to determine whether respiratory disorders are due to too high or too low relative humidity. If the relative humidity is too high, condensation can accumulate in the house. This has a direct effect on the growth of micro-organisms

5.2.3 Air movement and airspeed

Whether or not birds are comfortable is very much influenced by air velocity and air temperature. Young animals are more sensitive to these factors than older, heavier animals. Taking into consideration the recommended temperatures, the air velocity at animal level is allowed to vary between 0.1 and 0.2 m/second. If house temperatures are low, the animals experience higher air velocities as a (severe) draft which can lead to disease. A simple way of determining the (negative) effect of drafts is the 'draft value.



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Self-Check -6

Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

2. What are the internal factors in poultry housing?(10pts)

Note: Satisfactory rating - 5 points

Unsatisfactory - below 5 points

Answer Sheet

Score = _____

Rating: _____

Name: _____

Date: _____

Short Answer Questions

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