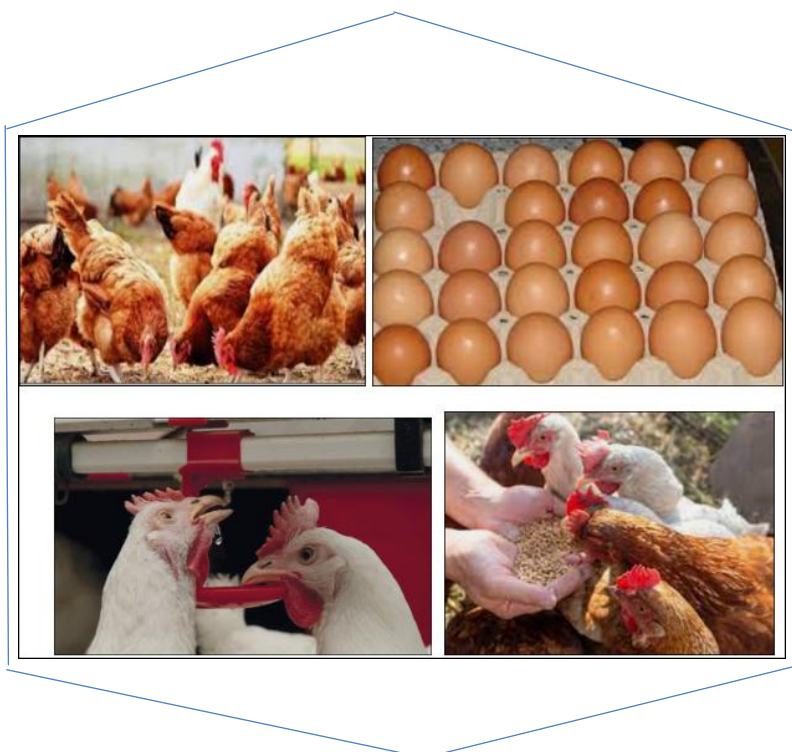


ANIMAL PRODUCTION

LEVEL-II

Based on March 2022, Version-4 Occupational Standard



Module Title: - Carrying Out Husbandry Practice of Poultry

LG Code: AGR ANP2 MO3 LO (1-4) LG (9-11)

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Introduction to the Module

This module covers the knowledge, skills and attitude required to carry out husbandry practice of poultry. It also requires the ability to Prepare for husbandry practices of poultry, undertake poultry raising activities and Handle and clean materials and equipment.

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LG#9	LO#1- Prepare for husbandry practices of poultry
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Instruction sheet
<p>This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:</p> <ul style="list-style-type: none"> • Identifying materials, tools and equipment • Conducting and checks on all materials, tools and equipment • Using correct manual handling techniques • Selecting and checking PPE • Providing work task and instructions <p>This guide will also assist you to attain the learning outcomes stated in the cover page.</p> <p>Specifically, upon completion of this learning guide, you will be able to:</p> <ul style="list-style-type: none"> • Identify materials, tools and equipment • Conduct and checks on all materials, tools and equipment • Use correct manual handling techniques • Select and check PPE • Provide work task and instructions
Learning Instructions:
<ol style="list-style-type: none"> 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 5. Perform Operation Sheets 6. Do the “LAP test”

Information Sheet1

1.1 Identifying required materials, tools and equipment




Definition of terminologies





- **Poultry:** refers to all birds kept for the production of eggs and meat for human consumption and for their feathers.
- **Layers:** chickens raised to be egg-layers
- **Broilers:** chickens kept for meat production
- **Chicks:** young chicken between 0-8 weeks
- **Pullets:** female chickens in their first year of lay, or prior to their first molt
- **Hens:** female chickens in their second year of lay, or after their first molt
- **Cockerels:** young male chicken before sexually matured
- **Cock:** sexually matured male chicken used for breeding purpose
- **Rearing:** is the care of chicks from about eight weeks of age to the point they begin to drop eggs, i.e., point of lay.
- **Egg:** a hard-shelled oval thing from which a young bird is born.
- **Candling:** is a process of examining fertile eggs against a strong beam of light preferably emerging through a small hole or a narrow slit
- **Incubation:** the management of fertilized egg to ensure the satisfactory development of the embryo inside it into a normal chick. It may be achieved by the natural method, with the hen sitting on eggs, or by using special machines known as incubator
- **Hatching:** - the bringing forth of young chicks from the egg by natural or artificial incubation
- **Brooding:** is the process of caring for young chicks from day-old to eight weeks of age.
- **De-beaking/Beak trimming:** a practice which involves partial removal of the points of beak to prevent vice habits such as pecking, feather-pulling, cannibalism and egg eating.

- **Feed:** is a mixture of feedstuff blended/processed in a form which is acceptable to animals. It is merely the carrier of nutrient and potential energy in a ration.




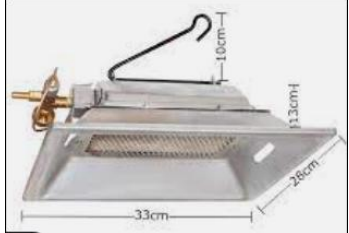

Materials, tools and equipment used for poultry raising activity may include;






Table 1.1. Tools and Equipment's used in poultry production





Name	Use of material, tools and equipment	Image
Bedding materials	are materials used in poultry house for covering the floor to overcome moisture and heat stresses. These are: old newspaper Saw dust, Rice hulls coffee pulp and etc.	
Disinfectants	are chemical substance that is used to kill harmful germs and bacteria: a substance used to disinfect something.	
Generator	a machine that produces electricity	



Heater	a device that imparts heat or holds something to be heated.	
Electric lamps	a device that produces light.	
Incubator	a device that is used to keep eggs warm before they hatch.	
Weighing scale	an instrument or machine used for weighing.	

Pail	a usually cylindrical container with handle.	
Wheel barrow	a cart with two handles, large bowl and usually one wheel that is used for carrying heavy loads	
Feed bin	a box that is used for storing or keeping of feeds.	
Feed cart	a heavy usually horse drawn 2 wheeled used for farming or transporting things	

Plastic drinking jars	are plastic materials used for watering chicks	
Egg trays	are thin, flat, and often rectangular piece of plastic, wood, etc that are used for holding or carrying of eggs.	
water pump	is material used to pump water from its source	
Infrared gas brooder	are materials used for producing rays of light during brooding	
Debeaker	is a manual or electrical materials used to cut the beak of bird to prevent cannibalism.	

Knapsacks sprayer	is a material used to spray liquid materials usually disinfectants	
Egg grader	is a material used to measure the quality of eggs	
Feed scoop	are something that are shaped like bowl or bucket used for pickup poultry feed	
Hover	material that floats in air without moving in any direction during heat supply.	
Chick guard	plastic, metal sheet or wood used to keep chickens in one area cohesively and protect them	

Curtains	hanging materials used to cover window to protect the entry of air, light and etc	
Rake	equipment used to for gathering of waste materials from poultry house	
Shovel	equipment used to for gathering of waste materials from poultry house	
Spade	equipment used for digging and gathering of waste materials from poultry house	

Portable coolers	movable materials that is used for cooling in poultry farm.	
Hay box	Used to brood chickens artificially	

1.2 Conducting and checks on all materials, tools and equipment

Finding the right materials, tools and equipment among different items is the most critical aspect in poultry raising activity. All the items should be checked before utilization for them

- safety; right material,
- no damage and
- Appropriate amount for a specific activity.

1.3 Selecting and checking PPE

There are different types of materials, tools and equipment and supplies to perform different activities in poultry raising activity. Therefore, identifying, selecting, using and preparing facilities, supplies according to the working activity are very important aspect in poultry work.

Personal protective equipment includes:

- Overalls
- Gloves
- Safety goggles
- plastic boots/shoes
- Sunhats
- Respiratory mask
- Aprons,

Protective clothing should be selected to prevent skin contact with contaminated materials or environments. Consideration should be given to the type of work being performed by the worker when selecting personal protective clothing.

1.4 Using correct manual handling techniques

Loading and unloading facilities are a critical in the process of transport. When loading materials care should take not to break and make damage the items. Appropriate handling of materials, tools and equipment to minimize damage self, others, load and vehicle. Suitable training will normally need to be given on correct lifting, Loading& techniques of materials & poultry.

During loading and unloading of materials, tools, equipment and poultry the following points should be considered:

- Poultry should be healthy and in good condition while transporting
- Separate different classes of poultry (day old, pullet, layer...) during transport.
- Isolate diseased or suspected poultry during transportation.
- Heavier materials should be loaded at the bottom of the vehicle.
- Flammable material should be given a precaution.
- When loading different material, the same material should be loaded at the same sides
- Use ramps when loading and unloading of materials, tools and equipment.

Procedures for loading & unloading materials:

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- Properly design loading/unloading areas
- Park vehicles and conduct loading/unloading only in designated loading/unloading areas
- Clean loading/unloading areas regularly to remove potential sources of pollutants.
- Reduce exposure of materials to rain.
- Use drip pans underneath hose and pipe connections and other leak-prone spots during liquid transfer operations, and when making and breaking connections.
- Inspect equipment regularly
- If possible, conduct loading and unloading in dry weather.

1.5 Providing work task and instructions

5.1 OHS Hazards in raising poultry

Personnel working in the poultry industry are permanently exposed to hazards. These have either a physical, chemical or biological nature. Proper management is needed to avoid accidents and to keep the staff motivated.

According to the International Labor Organization (ILO), health hazards in poultry working environments are categorized as accidental, physical, chemical, and biological. Here are just a few examples for each category mentioned by this organization.

- **Physical**
 - ✓ Exposure to high levels of noise.
 - ✓ Long-time exposure to heat and cold.
 - ✓ Skeletal problems resulting from lifting and moving of animals, feed bins (bags), egg collection.
- **Chemical**
 - ✓ Respiratory problems resulting from exposure to dust, which is composed of feathers, dander, micro-organisms, etc.

- ✓ Respiratory, skin, and eye diseases due to exposure to gaseous chemicals.(e.g. NH₃, H₂S, CO₂, CO, and CH₄).
- ✓ Exposure to disinfectants, detergents, formaldehyde and pesticides.
- **Biological**
 - ✓ Zoonotic infections. These diseases are transmitted between birds and humans & they also are transmitted from animals to humans and include bacterial, viral, fungal, and parasitic diseases. Salmonellosis, campylobacteriosis, chlamydiosis, tuberculosis, Newcastle Disease, and avian influenza are amongst the most common zoonotic diseases transmitted from poultry to humans. Poultry workers are at a greater risk of being affected by these diseases.

1.5.2. OHS requirements

Work task is provided according to Occupational Health and Safety (OHS) requirements. This may include:

- Using of relevant protective clothing and equipment,
- Use of tooling and equipment,
- Creating conducive working environment and safety handling of material,
- Using First aid kit to provide aid services
- Hazard control and hazardous materials and substances,
- Following Occupational health and safety procedure designated for the task
- Checking and fulfilling required safety devices before starting operation

Self-check 1	Written test
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Name..... ID..... Date.....

Directions: Answer all the questions listed below.

1. List down the necessary materials used as a bedding poultry house? (4 points)
2. Mention 8 materials and their use. (8 points)
3. What are points to be considered during loading and unloading of materials, tools, equipment and poultry? (6pts)
4. List down PPE used in poultry raising (6pts)
5. List down the three types of hazards (3pts)
6. Write the Occupational Health and Safety (OHS) requirements in work place. (5pts)

Note: Satisfactory rating 16 points Unsatisfactory – below 16points

You can ask you teacher for the copy of the correct answers.

LG#10	LO#2- Undertake poultry raising activities
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Instruction sheet
<p>This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:</p> <ul style="list-style-type: none"> • Following instructions and directions • Undertaking poultry raising activities • Observing policies and procedures • Observing handling and disposal of waste materials <p>This guide will also assist you to attain the learning outcomes stated in the cover page.</p> <p>Specifically, upon completion of this learning guide, you will be able to:</p> <ul style="list-style-type: none"> • Follow instructions and directions • Undertake poultry raising activities • Observe policies and procedures • Observe handle and disposal of waste materials
Learning Instructions:
<ol style="list-style-type: none"> 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 5. Perform Operation Sheets 6. Do the “LAP test”

Information Sheet 2

2.1 Following instructions and directions

Instructions and directions provided by supervisor are followed and clarification is sought when necessary. Any employee who works in industry which raises poultry or any farmer who raises his own stock must follow the following instruction and direction: -

- Enterprise policies and procedure.
- Manufacturer instructions
- Material safety data sheets (MSDS)

The MSDS is a detailed informational document prepared by the manufacturer or importer of a hazardous chemical. It describes the physical and chemical properties of the product.

MSDS's contain useful information such as:

- ✓ Flash point,
- ✓ Toxicity,
- ✓ Procedures for spills and leaks and
- ✓ Storage guidelines.

Information included in a Material Safety Data Sheet aids in the selection of safe products, helps you understand the potential health and physical hazards of a chemical and describes how to respond effectively to exposure situations OHS standards and procedures Specifications for tools, equipment and materials

- **Standard Operating Procedures (SOP)**

It is a set of step-by-step instructions compiled by an organization to help workers carry out complex routine operations. SOPs aim to achieve efficiency, quality output and uniformity of performance, while reducing miscommunication and failure to comply with industry regulations Verbal directions from manager or supervisor Work instructions and standards Work notes.

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Instructions and directions provided by supervisor must be followed and if we have any question we can ask when necessary. And also, employee must observe and follow Enterprise policies and procedures in relation to workplace practices in the handling and disposal of materials

2.2 Undertaking poultry raising activities

2.2.1 Cleaning and disinfecting poultry shed

Majority of the disease in poultry farm are raised from improper cleaning and disinfecting

I. Cleaning

The first requirement for good hygiene is effective cleaning.

II. Disinfection

During disinfecting the poultry farm the following important points should be considered. These are:

- They should kill all pathogens.
- Should not be poisonous to birds and persons operating.
- With minimum of corrosive action on poultry equipment.
- Should be long lasting.
- Easy to use and must be cheap.
- No irritating or objectionable smell or bleaching effect.

Factors affecting the action of disinfectants

- ✓ Concentration: follow manufacturer's directions.
- ✓ Time of application.
- ✓ Temperature: important in the tropics since disinfectants work best with warmth.
- ✓ Presence of organic matter, faeces and other protein materials counteract the activity of disinfectants.
- ✓ Distance

The Recommended types of disinfectants

A. Formaldehyde (formalin and potassium permanganate)

It is in gaseous state used for fumigation of hatchery.

B. Caustic soda (soda lime)

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Use a 2% solution in water. Since it corrodes most materials, its use should be limited to serious virus disease situation.

C. Chlorine

Use 1% solution of chlorine quaternary ammonium compounds
it is effective when used as a 1% solution in water.

2.2.2 Feeding poultry

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.

Nutrition is a critical part of a bird's environment, and a good ration is the foundation of chicken and turkey growth. No matter what a bird is fed, it will only grow as well as you feed it, and it cannot grow beyond its maximal potential.

There are four important principles in developing an appropriate nutrition program for show broilers and turkeys.

Principle 1: To grow, birds must eat and drink. Inadequate feed stunts development and prevents birds from growing to their potential.

Several factors can cause birds to eat less than they should. These factors are:

- feed availability
- water availability
- feed competition
- water competition
- environmental temperature
- personal attention

Principle 2: To grow well, birds must eat the right things.

Bird feed should contain all nutrients needed to grow: -muscle, bone, internal organs, fat and feathers.

Principle 3: To win, birds must eat and grow in a balanced way.

A ration is the amount of food that a bird will eat in a day.

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- Birds will eat this much and no more, so everything they need must be in this amount of feed. Several balances of ingredients must be maintained: -
 - ✓ energy and protein
 - ✓ amino acids (complete protein)
 - ✓ minerals
 - ✓ essential fats (and fat-soluble vitamins)

Principle 4: To unbalance a balanced ration with supplements is destructive. If you have a good ration that fulfills all of the dietary needs of the broiler or turkey, do not alter it. Sometimes a little more of a good thing upsets a balanced ration.

Pullet growth initially most sensitive to dietary protein and amino acids whereas energy intake becomes more critical as the bird approaches maturity. Energy intake may be the limiting factor for growth of egg strain birds. Manipulation of energy intake is there for best considered in relation to feeding management and in particular method of stimulating feed intake. Minute quantities of vitamins and minerals should be added for the well-being of the layer because deficiency may cause a drop of egg production.

- **Kinds of feed**
 - ✓ **Chicks:** A ration that is fed up to the age 8 weeks.
 - ✓ **Growers:** A ration to be fed to growing chicks 8 to 20 weeks or until laying commences.
 - ✓ **Layers:** A ration to be fed to laying birds 20 weeks on ward or after laying commences.
 - ✓ **Broiler starter:** is fed from day-old until 4 weeks of age.
 - ✓ **Broiler finisher:** is fed from 5 weeks until market

Nutrient Requirements: Poultry diets must be formulated to provide all of the bird's nutrient requirements if optimum growth and production is to be achieved.

Table 2.1 Nutrient Requirement of birds at different class

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Class of Poultry	Protein %	Energy kj/g	Ca %	P %	Lys %	Met %	Vit %
Chick starters (0-8weeks)	20	11	1	0.5			
Growers (9-20weeks)	18	10.5	1	0.43			
Broiler starter (0-8weeks)	23	12.5	1	0.43			
Broiler finisher (8-12 weeks)	20	13	0.8	0.40			
Pullet (8-22wks)	12	10.5	0.8	0.40			
Layer (>22wks)	16	11.5	3.5	0.50			

- **There are six classes of nutrients: protein, CHO, Fats, Minerals, vitamins**

A. Proteins – required for the synthesis of body tissue (particularly muscle), physiological molecules (such as enzymes and hormones), feathers and for egg production. Proteins also provide a small amount of energy **Eg.** soybean meal, meat products, amino acids (methionine, lysine)

B. Carbohydrates – the major source of energy for poultry. Most of the carbohydrate in poultry diets is provided by cereal grains.eg. corn, sorghum, other grains

C. Fats – provide energy and essential fatty acids that are required for some body processes **Eg** corn oil, blended fat products

D. Vitamins – organic chemicals (chemicals containing carbon) which help control body processes and are required in small amounts for normal health and growth. **Eg** vitamin mix, other ingredients

E. Minerals - inorganic chemicals (chemicals not containing carbon) which help control body processes and are required for normal health and growth. **Eg** salt, limestone, calcium carbonate, calcium phosphate, trace mineral mix

- **Factors affecting the nutrient requirements of poultry**

The nutrient requirements of poultry are affected by a large number of factors, including:

- ✓ Genetics
- ✓ Age

- ✓ Sex
- ✓ Reproductive state
- ✓ Ambient temperature
- ✓ Housing system
- ✓ Health status
- ✓ Production status
- **Feed consumption**

There are a number of factors that influence voluntary feed intake. These are discussed in the section on Feed intake. Table 1 provides data on typical feed consumption for modern brown-egg laying hens in relation to target body weight. From Week **18**, hens start to enter their laying period, reaching peak of lay around 32 weeks of age, and typically maintaining egg production until 65-68 weeks of age. Feed intake will increase to a steady level of 100-105g per day and hen body weight will reach a mature level of 1700-1800g.

2.2.3 Poultry housing

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.

In selecting the site for the chicken house, one should be guided by the following factors

- ✓ The site should preferably be on a level ground.
- ✓ The soil must be well-drained so that during rain there is no water clogging
- ✓ The area must have plenty of natural air movement in order to aid ventilation.
- ✓ The house should be oriented on an east-west axis to reduce the effect of direct sunlight on the sidewalls during the hottest part of the day.
- ✓ The ground must be big enough to accommodate the number of birds one wants to keep. This is guided by the stocking density of adult birds which should be **10 -12** birds per m².

- ✓ The broiler house should be at least **1.5 km** away from other types of poultry production

- **Poultry Housing Specifications**

- ✓ The width of the house should not exceed 12 m in open sided houses
- ✓ Height should be at least 2.4 – 2.6 m on the higher side of a flat roofed house
- ✓ Brick wall on length side should be 40 - 50 cm and a 25-mm chick mesh wire to cover the gap between the wall and the roof.
- ✓ Roofing material should have a reflective surface on the outside to help reduce the conduction of solar heat and should be well insulated.
- ✓ Heating systems should have ample heating capacity in accordance with the climate.
- ✓ Ventilation systems should be designed to provide ample oxygen and to maintain optimum temperature and relative humidity conditions for the birds.
- ✓ Lighting should be oriented to provide an even distribution of light at the floor level.
- ✓ It is important provide winches in order to facilitate the curtain management.
- ✓ The material of outside curtain can be sacs, but must be well sealed.
- ✓ All holes and tears in sidewall and/or inlet curtains must be repaired.
- ✓ Curtains need to be sealed at the bas

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:

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

The following point should be considered during poultry house construction.

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- **Location against wind direction:** The house should be placed at the back faces the direction from which wind and storms usually come
- **Orientation of poultry house:** is an important consideration in order
 - ✓ to protect poultry from wind and rain storms
 - ✓ to prevent direct sunlight from entering the house and stressing the birds
 - ✓ to have good drainage around the house to protect it from flooding
 - ✓ to avail of the prevailing wind to cool the house in a warm climate
- **Adequate space according to the number of poultry:**
 - ✓ The size of poultry house depends on the number of fowls
 - ✓ 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:**
- **Adequate aeration:**

Ventilation in the poultry house is necessary to provide the birds with fresh air and to carry off moisture.
- **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.
- **Space requirement.** Stocking densities (maximum)
 - ✓ Chickens 0-6 weeks old: 10-12 birds/m² Floor size 5m x 2m /100 birds
 - ✓ Pullets to 16 weeks old: 5-7 birds/m² Floor size 2m x 2m / 25 birds
 - ✓ Laying hens: 5 birds/m² Floor size 5m x 2m / 25 hens
 - ✓ Hens in layer cages, floor space may be 12-15 birds/ m²
 - ✓ Cage size for 3 hens: 40 cm long x 30 cm wide x 45 cm high, for 5 hens: 50 cm

- ✓ long x 30 cm wide x 45 cm high

Feeding space, watering space, housing space and laying nest requirements for chickens at different ages

Table 2.2 house space requirement of chicken

Housing space requirement (number of birds in 1m²)			
Housing type			
Full slats	15	7	-
2/3 slats, 1/3 litter	-	6	4
1/2 slats, ½ litter	-	5	-
Full litter	10	4	3

There are three types of poultry House

- A. Open-side Poultry house
- B. Front and Back sides
- C. Controlled Environment house

A. Open-Sided Poultry House

- **Width of house.** It should be about 30 ft. (9.8 m) and no more than 40 ft. (12.2 m) wide
- **Height of house.** Most open-sided houses have a stud that is 8 ft. (2.4 m) long.
- **Length of house.** Poultry houses may be almost any convenient length.
- **Shape of roof.** Practically all poultry houses built today have a gable roof, the pitch varying from one-quarter to one-third.
- **Roof exhausts.** Houses should be equipped with a covered exhaust area at the peak of the roof to allow excess heat to escape.
- **Insulation.** Even with the conventional poultry house, it is well to provide some type of insulation.

- **Building materials and construction.** Open-sided and environmentally controlled houses use a variety of building materials.
- **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.
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.

B. 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.

C. 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. so usually necessitates a Completely enclosed insulated house with no windows. 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.

2.2.4 Debeaking

De-beaking (beak trimming) is the cutting of the points of the beaks. It needs precision and must be done very carefully. When there is bleeding wound must be cauterized. It causes enormous stress to the birds and for this reason everything must be done to reduce stress before, during and after de-beaking.

- **Recommended Age for Debeaking**

The age for beak trimming is 14 weeks or younger, after week 14 it starts to interfere with the maturing process. It is also more difficult to prevent bleeding at an older age. In emergencies, slight trimming can be carried out at any age, even during lay. The best age at which to debeak is approx. 8 weeks. Trimming before 6 weeks of age is less effective because the beak grows again and further beak trimming is often required. Pecking, however, may start so early that a first trim between 7 and 10 days is necessary. A second trimming is then commonly practised at 10 weeks for most birds. In extreme cases, a top notch is applied on the first day.

- **Debeaking Procedure**

Field results illustrate the need for skilled and accurate labour, combined with good and clean instruments for trimming. The sharp top of the beak can be melted away by heat in d.o.c.'s.

Debeaking on day one is rarely practiced, its main purpose being to prevent the pecking at the first week and feather pecking in the first 6 to 8 weeks.

There are also farmers that trim beaks again at 7 to 10 days. At 7 to 10 days, it is a precision job to ensure proper use of the hole in the lower blades when normal trimming instruments are used. Upper and lower parts of the beak are trimmed simultaneously. The blades are hot, resulting in a dark red colour of the cutting area on the blades. Immediately after trimming, the cut is cauterized by pressing it against the knife for 2½ seconds. After every 10.000 chicks, the blades should be cleaned using sandpaper. Blades must be renewed regularly, depending on their quality. When trimming, the distance between nostrils and the end of the beak should be about 2mm. No more than 700 chicks should be debeaked per man per hour.

Because the lower part of the beak grows faster than the upper one, and to prevent it from becoming the longer part, trimming at an angle of 90 degrees or slightly less is recommended.

In dark houses, debeaking can be delayed until between 8 and 10 weeks when it is often combined with a vaccination. In open houses, birds trimmed at 7 to 10 days should have another trimming at 10 weeks. The procedure can be more stressful then and use of the holes is impossible, though the beak is bigger and it is easier to see where to trim.

Red to white hot blades are needed for cauterization. Eating afterwards prevents loss of blood. During and after trimming vitamin K should be added to drinking water to stimulate faster clotting of the blood. Giving 24 hours of light reduces the bodyweight loss due to lower feed intake after trimming. The level of feed in the feeders is generally doubled to avoid contact between the freshly trimmed beak and the bottom of the feeding trough. Some growers get good results by rounding the corners of the trimmed beak off using the heat of the knife. Blades must be cleaned after 10.000 birds and should be renewed after 20.000 to 30.000. At the age of 8 to 10 weeks, upper and lower beak are debeaked simultaneously. The lower beak is pulled back a little

by the forefinger to prevent cutting the tongue. This results in a slightly longer lower beak, necessary for proper nipple drinking.

- **Required care at de-beaking**

- ✓ Cut beaks in appropriate size,
- ✓ don't burn tongue of birds,
- ✓ don't cut with junk or very slowly,
- ✓ check for bleeding after de-beaking,
- ✓ Provide sufficient feed in feeders immediately

2.2.5 Egg selection criteria

Eggs laid by hens without mating the cock will not hatch since they are sterile and lack a germ to develop into a chick. By rapid development and transformation within an egg, a minute germ can be converted into a chick in 21 days. All of a hen's eggs are unfit for hatching. Suitable eggs for hatching should be carefully picked on the following criteria.

- **Fertility**

Fresh eggs collected from healthy and well-matured hens between 5- 7 days after mating and within 2 days of separating the cock will be fertile enough to hatch. Eggs taken quickly after letting in the cock for mating or long after the cock has been separated may not be fertile.

- **Egg size and shape**

The size of the eggs used for hatching is important since the size of the hatched chick is strongly dependent on the size of the egg. Depending on the breed, the eggs for setting should be neither too large nor too small. It is always preferable to choose eggs weighing about 58 g each. Eggs that are uniform in size and shape are preferable.

- **Eggshell**

The eggshell should be equal in thickness, texture, and color so that warmth can spread uniformly throughout incubation. In the case of white-shelled eggs, all eggs for incubation should be tint-free. Medium and dark brown eggs hatch faster than light brown eggs when it comes to brown eggs. Low hatchability occurs when the shell texture is poor due to a calcium or

vitamin D deficit. All eggs should be checked for cracked shells before being utilized for incubation.

- **Egg quality**

Eggs should be gathered as soon as possible after laying, preferably within a week of lying, to ensure that they are fresh and not stale. Fresh eggs laid on the day of setting should not be set unless they have reached room temperature before being set. Eggs that are 2 to 4 days old are ideal.

- **Deformity**

Eggs with ridges, encrustations, projections, depressions, cracks, or stains should not be chosen. Very thin shells may break during rotating and fail to maintain a consistent temperature for the embryo's development. If the shell is too thick, the chick will struggle to chip it with its fragile beak and escape.

- **Soiled egg**

Soiled eggs should not be washed in water before setting since doing so opens up the pores and interferes with the hatching process. If the dirt is not too thick, it should be removed with a knife. Eggs that have been heavily stained should not be utilized.

- **Storage**

To achieve the best results, eggs collected for setting should be kept in a dry, cold, and airy environment. Eggs should not be kept for more than three days in hot temperatures, although they can be maintained for up to ten days in cold weather or on hillsides.

As eggs absorb odor very easily, it is not good to store them near smelly substances like onion, garlic, kerosene, etc. Eggs should be stored in a cool place with the broad ends up. Eggs shaken very much during transport will not be good for hatching.

2.2.6 Candling Eggs

Candling is a method used to observe the growth and development of an embryo inside an egg which uses a bright light source behind the egg to show details through the shell. It is so called because the original sources of light used were candles.

Modern egg candlers or candling lamps are lights with a concentrated beam. LEDs are now preferred because they are very bright, very efficient and have an extremely long life - so no bulbs to replace and the convenience of compact, portable battery powered units which can be used right in the nest. They also put out a cool light rather than a lot of heat that might damage the embryos.

And candling does not harm your eggs. Just as the mother would naturally leave the nest for a short time each day, you can safely take your incubating eggs out of the incubator for the few times you will be candling them. During incubation the air sac size should increase as moisture evaporates from the egg. Eggs need to lose about 13% of their original weight during incubation. If your humidity level is about right, the air sac should increase at different days of incubation.

Eggs may be candled after 5 days of incubation and every few days thereafter. For best results you should candle eggs in a darkened room or in dimly lit conditions. The candler should be held right against the shell at the larger end of the egg where the air sac is located. The egg can be rotated to observe blood vessel growth and embryo development. In fertile eggs you will initially see a small spot (the embryo) with a web of blood vessels radiating from it.

Candling on the 7th day of incubation is done to remove infertile eggs and dead embryos.

- Infertile egg: transparent and clean when light is passed through it, yellowish spot near the center (yolk) and much less evident air cell
- Early dead embryo: small, non motile black spot fixed at the side of the egg indicate early dead embryo, Absence of blood vessel, adhering to the shell and Presence of pink ring or blood ring surrounding the embryo
- Live embryo: is spider like with red legs, Are large end floats and clean air cell and blood vessel

Candling the 14th day of incubation is to remove late dead embryo. Live embryo fills the egg with clearly seen blood vessel and moving motile embryo



Fig.2.1 a Day 5 - developing embryo with healthy blood vessel Day



Fig. 2.2. Day 10 - growing embryo and healthy spreading vein growth - larger air sac



Fig. 2.3 Day 14 – growing embryo with fully spread vein system - larger air cell

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Fig. 2.4 Day 19 – almost fully developed embryo dark mass with larger yet air cell

Candling of eggs

A simple candling device:

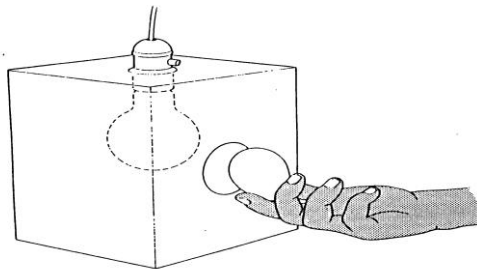


Fig.2.5: A simple candling device

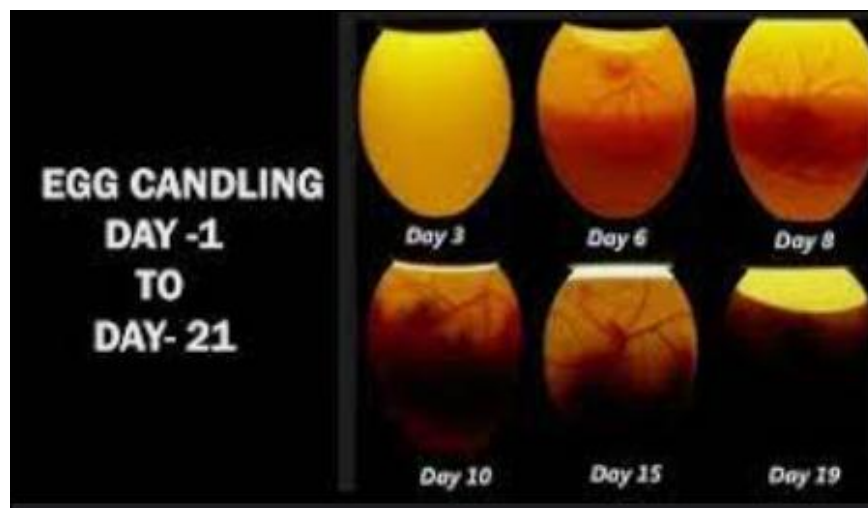


Fig 2.6 stage of embryo from day 1 to day 21.

2.2.7 Incubation of eggs

Incubation is the art of bring eggs from laying to successful hatching. It is the process of placing eggs under optimum environmental condition for hatching. Incubation can be achieved either by natural means using broody hen or by artificial means through incubator. Incubation period is a time period or interval between incubation and successful hatching. It is 21days for chicken egg.

- **Fertile egg quality**

A fertile egg is alive; each egg contains living cells that can become a viable embryo and then a chick. Eggs are fragile and a successful hatch begins with undamaged eggs that are fresh, clean, and fertile. Hatchability will decrease if eggs are handled poorly or get too hot or too cold in transit.

Egg quality and embryo survival are influenced by hen and sire's:

- ✓ Age
 - ✓ Health
 - ✓ Nutrition
 - ✓ Ratio
 - ✓ Genetics
 - ✓ Stress
- **Collecting and storing fertile eggs**

Fertile eggs must be collected carefully and stored properly until they are incubated. Keeping the eggs at proper storage temperatures keeps the embryo from starting and stopping development, which increases embryo mortality. Collecting eggs frequently and storing them properly delays embryo development until you are ready to incubate them.

- **Egg storage reminders**
 - ✓ Store less than 10 days
 - ✓ Maintain temperature between 55 to 65°F
 - ✓ Keep relative humidity at 75 percent

✓ Turn eggs stored more than a week

✓ Handle eggs with care!

- **Cleaning and culling**

Do not incubate eggs that are cracked, misshapen, soiled, or unusually small or large. These rarely hatch and can potentially contaminate the good eggs. Do not wash or wipe eggs with a damp cloth. Doing so can remove the egg's protective layer and allow disease and bacteria to enter. It can also spread bacteria from one dirty egg to others.

- **Positioning and turning eggs during storage**

If you plan to store eggs for less than ten days before incubating, place them on flats with the large end up. You do not need to turn the eggs if they will be incubated within a week of being laid. You should cover the eggs with a loose material to keep them clean. If you plan to store eggs for more than 10 days, tilt them from side to side over a 90-degree angle once or twice daily. You can do this by placing a six-inch block under one end of the flat, switching the end of the flat each day until incubation.

- **Incubation**

An incubator is basically a box that holds eggs while maintaining an appropriate temperature, humidity, and oxygen level. Incubators have varying capacities and adapters for eggs from different species. Popular incubator models often include automatic turners, humidifiers, and temperature controllers. Egg turners can usually be purchased separately for incubators that do not include them. Humidifiers can be the type that disperses water vapor as needed or many smaller incubators use a simple water reservoir.

Temperature is controlled by older wafer systems or the newer digital thermostats. Incubators come in forced air or still air versions. The temperature and humidity in a forced air incubator is more consistent. They also return to desired temperature and humidity more quickly after being opened. Still air incubators can give inaccurate humidity and temperature readings and the temperature in them can vary considerably. Whenever possible, use a forced air incubator. Regardless of incubator type, for a successful hatch you must turn the eggs and monitor the temperature, humidity, and ventilation. The incubator should be in a room that has no drafts or

direct sunlight; the temperature and humidity should be controlled and stable. The incubator and hatcher should also be isolated from the growing facilities.

Newly hatched chicks can be contaminated by older birds and the dust created by growing birds. Take biosecurity measures to ensure the incubator area is not contaminated by older birds. Chicks may be hatched in the incubator depending on what type it is; however, hatching creates large amounts of dust and down. Hatching in a separate unit will keep dust and down from contaminating the incubator. Temperature and humidity can also be controlled more easily if you use separate units for incubating and hatching. Regardless of method, you must properly clean and disinfect the incubator and hatcher between batches.

- **Two to three days before incubation**

Sanitize the incubator and run it for several days before setting the eggs. This will ensure that the incubator is maintaining the proper temperature and relative humidity before the eggs are set. Adjusting the temperature and humidity after the eggs are set can decrease hatchability. If you are using an automatic turner, test it completely before setting the eggs. The temperature and humidity of the incubation room should be correct and stable when you set the eggs. Do not set the eggs until the temperature and humidity in the incubators and the room are correct and stable.

- **Cleaning and fumigation**

Microbes in an incubator can significantly reduce hatchability. Cleaning and disinfecting equipment must be standard operating procedures. Disinfect, incubators, hatchers and their racks with quaternary ammonia or a commercial disinfectant after each hatch.

- **The day eggs are set**

Let stored eggs warm to room temperature for 4 hours to 8 hours before setting them in the incubator. If you place cold eggs in a warm, humid incubator, condensation will form on them and lead to possible contamination or suffocation. Once the eggs are in the incubator, do not adjust the temperature or humidity for a few hours, unless the temperature exceeds 102°F. After 4 hours, make proper adjustments. The final temperature should vary only .5 degree above or below 99.5°F. The temperature of incubators without circulating fans fluctuates more than incubators with circulating fans. If the temperature does not exceed 102°F, the hatch should not

be harmed. Set the small end of the egg lower than the large end in the incubator. A developing embryo orients so that the head develops toward the air cell, which is in the large end of the egg. If the small end is higher than the large end during incubation, a chick's head can orient away from the air cell of the egg and not hatch.

- **Set stage**

The set stage refers to incubation period up until 2 or 3 days before a hatch. Different species have different incubation periods. Incubating different species together in the same incubator is not recommended, especially if the incubator is also used as hatcher. Turning the eggs during incubation prevents embryo death and unhealthy hatches. Eggs must be turned at least five times every 24 hours. Turning more frequently is better and once per hour is best. Keep accurate records to ensure the eggs are turned three to five times each 24-hour period. Failure to turn eggs appropriately results in embryo death. Turning must continue even through weekends. An automatic turner simplifies this task and decreases human error during the incubation process.

- **Temperature, humidity, and ventilation of incubator**

During the set stage, temperature in the incubator should be 99.5°F to 100°F for chickens. Other species have different requirements. If the temperature deviates more than 1/2 degree from 100°F, a poor hatch is likely. Check the temperature at least twice a day.

Relative humidity should be set at 55 to 60 percent. If the incubator uses a passive humidity control system, add water to the pan or trough daily to maintain correct humidity levels. If the humidity in the incubator is too low or too high, the hatch will fail.

Insufficient humidity causes:

- ✓ The air cell to be too large at the time of hatch
- ✓ The contents of the egg be too viscous for the chick to turn
- ✓ The membranes to be too tough to break
- ✓ The navel to not close properly

Excess humidity will cause:

- ✓ Too little water to evaporate from the egg
- ✓ The air cell to be too small for the chick to reach during the hatching process
- ✓ The chick to drown or be too swollen with water to turn in the egg

- ✓ The yolk sac to be too large for the navel to close completely

The air cell of the egg should become larger as incubation progresses because of the balance between temperature and humidity during incubation. Chicken eggs lose 12 percent to 14 percent of their total weight to evaporation during incubation. You can weigh racks of eggs during incubation to detect problems with humidity and evaporative loss before a hatch is destroyed.

The chick embryo uses oxygen and produces carbon dioxide. This gas exchange is insignificant during early incubation or when a small number of eggs are incubated; however, follow the manufacturer's recommendations to assure that developing chicks have adequate oxygen available. Near the end of the incubation period, the shell nearly filled with the embryo and a full incubator requires large amounts of oxygen. Ensure adequate ventilation and monitor wet and dry bulb temperatures very carefully during the last third of incubation.

- **Candling**

Shining a light through the egg to observe embryo development is called candling. White or pale eggs are easier to candle than dark or speckled eggs. In a dark room, hold the egg to the light of the Candler to observe the contents of the egg. Cooling that occurs for less than 10 minutes during candling does not harm the embryo. However, even a brief period at 104°F kills embryos—expose the egg to the hot light sources only briefly.

Embryos can be confirmed easily after 8 to 12 days of incubation. The living embryo will appear as a dark spot in the large end of the egg surrounded by a faint outline of blood vessels. The blood vessels will appear firm and distinct. The embryo appears as dark spot that becomes larger as incubation progresses. Eventually you will see only a dark mass and the air cell.

In comparison, an infertile or unincubated egg transmits light brightly. Dead embryos will sometimes appear as a ring or a smear of blood in the egg or a dark spot dried to the inside of the shell. Once it dies, the embryo no longer grows and the blood system fades. You should expect some mortality; however, unusual mortality or certain characteristics of the mortality can be indicators that you need to correct certain practices to improve hatchability.

Keep records of egg infertility or embryo death for reference. Ten percent or more of incubated eggs are infertile. Identifying and removing eggs that are infertile or dead eliminates possible sources of contamination from the incubator. If you have doubts about candling, seek expert advice.

- **Hatch stage**

This stage refers to final 2 to 3 days of incubation when chicks hatch out of the shell. Transfer eggs to a dedicated hatcher for the last 3 days to 4 days of incubation and do not turn them. If a hatcher is not available, remove the eggs from the turner and lay them in the hatching basket or place them on cloth or rough paper (not newspaper) in the incubator. Make sure the cloth or paper do not cover vent holes, or touch the water or the heating element. During this stage, decrease the temperature 1°F and increase the relative humidity to 65 to 70 percent. You can increase the humidity by adding a wet sponge or wet paper towels to the incubator. The chicks should start to pip within a day of the incubation period



Fig.2.7: Incubator

2.2.8. Brooding

Brooding is the process of caring for young chicks from day-old to eight weeks of age. It entails essentially, the provision of factors like heat, light, humidity, ventilation, feed, water and disease control measures for the survival and rapid growth of chicks.

There are two methods of brooding chicks namely

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- Natural brooding
- Artificial brooding

A. Natural brooding: -is chick raising with the help of broody hen (mother), which:

- Provide the heat required
- Communicate feed and water source
- Alert danger conditions
- Provide protection against predation

Disadvantages of Natural Brooding

- Broody hen ceases laying during the incubation period of 21 days
- Few numbers of chicks are raised at a time and it does not fit to market-oriented production system
- Success depends on the maternal instinct of broody hen and prevalence of predators in the area.

B. Artificial Brooding: - involves the use of special appliances which provide conditions similar to those of the broody hen such as adequate warmth, protection from harsh external factors of weather (wind, rain, temperature) and predators. It also allows good feeding, watering and disease control. Artificial brooding is the best method for the commercial producer. Artificial brooding has some advantages over the natural method namely:

- Chicks may be reared at any time of the year.
- Thousands of chicks may be brooded at once depending on the capacity of the farmer.
- Sanitary conditions may be controlled.
- Temperature may be regulated and
- Feeding may be controlled to meet the production objective

2.2.9 Watering of poultry

Provide a one-gallon water fountain per 50 chicks during the first 2 weeks. Increase the number or size of waterers from 2 to 10 weeks to provide 40 inches of watering space per 100 birds or 1 gallon capacity per 10 birds if using fountains. Use a platform under waterers to avoid wet litter. Automatic waterers can save you labor, even with small flocks. Make sure chicks and pullets always have access to fresh, clean water.

- **Factors affecting water intake**

A. Feed intake

- ✓ Chickens consume twice (2x) as much water as fed /body weight ($WI = 2FI$)
- ✓ It also depends on salt content of feed increases water intake also increases
- ✓ Feed intake decrease if birds are restricted not to drink water for some hours; if water intake of birds is restricted for long period; production declines and birds do not recover with in short periods.

B. Environmental temperature: - Birds consume more water at high ambient temp than at lower ambient temperature

C. Age: -Adult birds like Layers/breeders need more water than very young chicks.

Table 2.3 feeder and waterer space requirement of poultry

Feeding and watering space requirement in cm/bird					
Feeder/ Drinker type	Chicks 0-8 weeks	Layer growers 8-18 weeks	Broilers	Layers	Breeders
Long feeder	7	9	5	12	18
Round feeder	3	4	2	5	7
Long drinker	1.5	2	1	2.5	3.5
Round drinker	1.5	2	1	2.5	3.5

Table 2.4 Water allocation should meet these requirements for layers

100 chicks	0-3 weeks	10 litres/day
100 chicks 3	3-7 weeks	25 litres/day
30layers	Adult	15 litres/day

2.2.10 Selection of poultry breeds

I. Breeds of poultry

A. Exotic Breeds

- **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

- **Bovine chickens**

- ✓ They are a superior chicken breed.
- ✓ The Bovines Brown and white are a highly versatile
- ✓ Combined traits include high peak production, great laying persistency
- ✓ The Bovines Brown and white have excellent feed intake capacity
- ✓ The Bovines Brown and white are an ideal bird for the commercial egg producer looking for overall solid performance.
- ✓ They can lay 300-330 eggs per year per hen.



Fig.2.8 bovine brown (left) and bovine goldline (right) chicken

- **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.2.9 ISA brown chicken

- **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
- ✓ 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



Fig.2.10 Sussex chicken

B. Indigenous (local) Breed

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.

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- Slow growth rate
- 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:-

- **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 2.11 farta indigenous chicken

- **Horro indigenous chicken breed**
 - ✓ Found in Horro Guduru Wollega 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,2.12 horro improved chicken

- **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

- **Mandura indigenous chicken breed:**

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



Fig.2.13 Mandura indigenous chicken

- **Konso indigenous chicken breed**
 - ✓ Found in the Southern NNRS in south Ethiopia.
 - ✓ Few hens have naked necks
 - ✓ Most of the cocks have different color: red body plumage, brown, zigrima and black are the prominent plumage colors in hens



Fig. 2.14 konso indigenous chicken

II. Breed Selection

Selecting high quality poultry is a skill that is important to egg and meat production. By evaluating and selecting the most productive birds, overall improvement of the flock is achieved. It is important for commercial operations to develop and produce quality poultry in order to remain profitable and to maintain a positive reputation in the industry

- **Selecting Broiler Breeder**

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Poultry Broiler breeders are the parent stock used to produce hatching eggs for commercial broiler production. When selecting broiler breeders, look for evidence of a healthy, productive bird. The criteria include general health, body weight, conformation, and performance data. Conformation is the type, form, and shape of the broiler. It includes feathering, fleshing, fat, and freedom from defects. Performance data is used to determine the genetic superiority of the breeding flock.

- ✓ **Health:** refers to indications of disease or other abnormalities that may indicate that the bird is not fit for humans to eat. In general, a bird in good condition has no severe abnormalities such as unusual growths or lumps, bloody diarrhea or yellow to green-tinted feces, bodily discharges, lameness, or fever. A healthy bird is very vocal. Its rounded, bright eyes are very alert. The comb and wattles are bright red, with a smooth, sturdy, and waxy texture. The feathers around the vent (posterior opening, anus) are clean and dry as the rest of the body plumage is close-fitting and clean. An unhealthy bird may exhibit sluggish behavior. The comb may be coarse, discolored, and darker or lighter than normal. The feathers around the vent may be dirty and damp, and the body feathers may be disarranged.

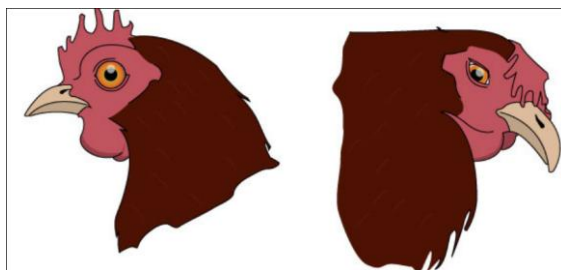


Fig. 2.15 head of healthy (left) and un healthy (right) hen.

- ✓ **Body weight:** of offspring is closely related to the weight of the broiler's parents at seven weeks. Evaluate birds at seven weeks and select only the larger birds.
- ✓ **Conformation:** refers to the general shape of the bird. The preferred shape of a broiler includes a crescent shaped back, broad breast, and upright head. A bird with poor conformation has a wedge-shaped body, hunched back, crooked breasts, backs, and legs. The feathers should lay well, be close fitting, smooth, and unbroken. A chicken with

poor feathering may have twisted feathers, broken quills, or bare spots on the skin, which may result in sunburns. The most important factor when evaluating feathering is the presence of pinfeathers. These are the feathers just coming through, or still under the skin. The less pinfeathers, the better the quality of the bird. Pinfeathers are difficult to remove during processing.

- ✓ **Fleshing:** refers to the commercially important muscles that make up the shape of the bird. Quality meat poultry will have thick, rounded breasts that are wide through to the keel. The back will be toned all the way down the length of the vertebrae. The legs are thick and meaty. A bird with poor fleshing may have a breast that is inverted instead of protruding. Also, the legs and back may be thin.

The most common problem associated with fat coverage in broilers is a lack of the healthy layer of subcutaneous fat. Evidence of little fat can be seen by either thin skin over the abdominal area, the area where the skin over the thigh is connected to the breast, and under areas with heavy feathers. Fat can be easily measured by gently pinching the skin of the abdomen. Hardness indicates fat; softness indicates little fat.

Defects in broilers are damages caused to the bird that result in downgrading of the meat. When selecting birds, avoid those with defects that includes insect bites, bruises, calluses or watery blisters on the breast. Discoloration and bare areas, a result of the bird picking, are also considered defects.

- **Selection of Commercial Layers and Pullets**

Commercial layers are selected and evaluated by their pigmentation, general health, and conformation.

Layers lose yellow pigmentation from the skin and shanks as they lay eggs. This loss of color is called “bleaching.” The pigment bleaches from the pigmented areas in a definite order according to the approximate number of eggs she has laid. When a hen ceases to produce, the pigments return to the body. Bleaching occurs in the following order: vent, eye ring, ear lobe, beak (corner of the mouth toward the tip), bottom of the feet, loss from front, back, and sides of shank, and the hock and top of toes.

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A highly productive hen will have good general health. The comb and wattles of a productive bird are bright red, waxy, smooth, and full. The eyes are bright and round, and the eyelids and eye ring are bleached. The beak should be in the process of bleaching or already bleached.

The vent should be fully bleached, supple, and moist. An unproductive laying hen will have small, scaly, discolored wattles and comb. The eyes will be droopy and sunk in, the beak will be yellow, and the vent will be dry and yellow.

The conformation of a quality hen with a high rate of lay will have a broad head, smooth face, large body capacity, soft and flexible abdomen, supple skin, and flat, smooth shanks. The pubic bones should be thin, flexible and spread wide enough to fit two to four fingers between them. A hen with a poor rate-of-lay will have a long, crow-shaped head, thin back, poor body capacity, hard abdomen, leathery skin, and round, scaly shanks. The pubic bones will be close together and not flexible.

Pullets are sexually immature chickens that are less than 22 weeks of age. The pullet should show signs of reaching sexual maturity by good comb and head development. They are evaluated for their potential to be highly productive layers. A healthy pullet shows no sign of disease. The eyes are round and prominent and the head should have smooth skin of a normal color associated with the breed. A strong, wide back, broad body, and roomy heart girth indicate quality body conformation. Pullets should have smooth feathers with no bare spots, and the skin color on the shanks should be of normal color for the breed. Legs should be straight and even with no abnormalities in the feet and toes.

2.2.11. poultry production systems

I. Free-range 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.

A. 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

B. Disadvantages of free-range chicken production system

- 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.

II. 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.

A. Advantages of semi-intensive chicken production system

- Is better than free ranging production system since
- it uses inputs like supplemental feed, vaccine, etc

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- It has a small house which accommodate laying nest and feeders which serves as chicken house for night
- 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 breed
- complete control over operation
- operational throughout the year
- economic use of land (free range)
- there is better protection during winter

A. Disadvantages of semi-intensive chicken production system

- high cost in fencing and danger of over stocking
- exposure for different disease if the campus is not clean and dry.

III. 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.

A. Deep litter system

It involves rearing of chickens on a floor littered by 5-10 cm thickness litter. 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
- **Advantage Of deep litter system**
 - ✓ prompt culling of unproductive birds

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- ✓ proper control of diseases and predators and 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.
- **Disadvantage of deep litter system.**
 - ✓ high capital investment
 - ✓ Problem of cannibalism and diseases outbreak.
 - ✓ 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.

B. Cage system

A single cage (120 cm long x 50 cm wide x 45 cm high) and divided into three compartments holding 12 hens (total). It can be constructed from bamboo with a thatched or other type of roof and is on poles or a stand about 1 m above the ground. Each compartment holds 4 layers.

- **Advantages of cage system**
 - ✓ cages can be placed under existing roofs
 - ✓ Less labour per bird is needed than other systems.
 - ✓ Poor layers can be identified immediately and culled
- **Disadvantage of cage system**
 - ✓ high cost of installation
 - ✓ cage layer fatigue
 - ✓ There are more broken eggs than with deep litter

2.2 Observing policies and procedures

Enterprise policies and procedures in relation to workplace practices in the handling and dispose materials are observed. Any employee who works in industry which raises poultry or any farmer

who raise his own stock and also employee must observe and follow Enterprise policies and procedures in relation to workplace practices in the handling and disposal of materials.

2.3 Observing handling and disposal of waste materials

- **Important points in handling and disposal of waste materials in poultry farm**

- ✓ treating, reusing, and disposing of wastewater using different methods
- ✓ safe and proper disposal of non-hazardous farm waste
- ✓ handle, collect, segregate, store, label and dispose of Human waste
- ✓ preventing the contingency site from being polluted
- ✓ storing, segregating, treating, disposing of farm waste
- ✓ store, secure, utilize and dispose of pesticides/equipment
- ✓ spill prevention, response, containment, and cleanup

Self-check 2	Written test
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Name..... ID..... Date.....

Directions: Answer all the questions listed below.

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

Note: Satisfactory rating 8 points Unsatisfactory – below 8 points

You can ask you teacher for the copy of the correct answers.

Operation Sheet -2

3.1 Techniques of Cleaning and disinfection of poultry Shed

A. Materials tools and equipment

- Disinfectants
- PPE
- Pail
- Rake
- Shovel
- Spade

B. Procedures

- Remove old litter
- Dry cleaning after removal of litter
- Wet cleaning with caustic soda/liquid soap/ bleaching powder and water under pressure
- Blow lamping of non-inflammable excess/material
- Spraying of disinfectant (fumigation)
- Repair of cracks and crevices
- White washing of house
- Cleaning and disinfection of water system, feeding system and all the equipment in use
- After cleaning the house must be left empty for at least 15 days.
- Preparation of brooders 24hrs before arrival of chicks
- Add at least 5 cm new litter material for the first time, the litter should be clean and dry.

3.2 Techniques of Egg selection

A. Materials tools and equipment

- Cleaning agents
- Egg
- Egg tray
- Candler
- PPE
- towel

B. Procedures

- Collect/ buy/ eggs
- Select hatching eggs by using egg selection criteria (size, shape, smoothness, shell thickness, etc)
- Take sample egg and break it to know whether it is fertile or not.
- Observe the broken egg and if there is spot (sperm) the egg is fertile.
- Finally, Incubate only the selected eggs

3.3 Techniques of Egg candling

A. Materials

- PPE
- Candler
- Egg
- Egg tray

B. Procedures

- Prepare necessary materials
- Set up your candling equipment in a dark room within close proximity to the incubator.

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- Select an egg from the incubator/nest
- Hold it above the light.
- Place the larger end of the egg (where the air sac is) directly against the light.
- Hold the egg near the top, between your thumb and forefinger.
- Tilt the egg slightly to one side and rotate until you get the best view.
- Look for signs that the egg is a winner
- Mark each egg with a number and take notes on your findings

2.4 Techniques of debeaking

A. Materials, tools and equipment

- PPE
- Debeaker (scissor or electric debeaker)
- Chicken
- Waste handling materials

B. Procedures

- Assemble all the required materials such as debeaker.
- Clean and disinfect debeaker.
- Handle the chicken properly (Handling is best achieved by two person)
- Cut the beaks of older birds separately; always cut the upper beak first.
- Cut 1/3 to 1/2 of the upper beak first.
- Cut the lower beak to the same length or make it (slightly) longer.
- Prevent stress as much as possible.
- Clean and sanitize the materials used during debeaking.



LAP TEST-2

Performance Test

Name..... ID.....

Date.....

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within **4** hour. The project is expected from each student to do it.

Task 1: Perform Cleaning and disinfection of poultry Shed

Task 2: Perform Egg selection

Task 3: Perform Egg candling

Task 4: Perform debeaking

LG#11	LO#3- Handle and clean materials and equipment
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Instruction sheet
<p>This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:</p> <ul style="list-style-type: none"> • Handling waste material • Handling materials, tools and equipment • Cleaning, maintaining and storing tools and equipment • Reporting problems or difficulties to supervisor • Reporting work outcomes <p>This guide will also assist you to attain the learning outcomes stated in the cover page.</p> <p>Specifically, upon completion of this learning guide, you will be able to:</p> <ul style="list-style-type: none"> • Handle waste material • Handle materials, tools and equipment • Clean, maintain and store tools and equipment • Report problems or difficulties supervisor • Report work outcomes
Learning Instructions:
<ol style="list-style-type: none"> 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 5. Perform Operation Sheets 6. Do the “LAP test”

Information Sheet 3

3.1 Handling waste material

There are different waste material or product which will be produced in work place but the main waste material which will produced at the poultry are the following

- litter and broken components
- plant debris
- plastic,
- metal and paper-based
- broken eggs
- dead chickens,

These waste materials which are produced in poultry have to be removed from the site on regular manure properly;

Disposable materials properly buried in deep enough trench and should be covered with quicklime and then with soil or use Burning. But burning is the most difficult because the Fumes and smoke may be a problem to the surrounding environment. Mud holes should be frequently filled or exclude the animals away from it quickly.

N.B. Never dispose waste materials everywhere.

3.2 Handling materials, tools and equipment

Materials used for raising poultry activity have to be handled and transported safely. Any Poultry farmer has to do this task safely because any damage will create inconvenience on the next use of the equipment, and also it will cause injury to our hens.

All the materials and equipment used in poultry farming should be handled and transported according.

Good handling measurements are: -

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- Provide sanitation services to the working devices after and before work
- Identification of the functional equipment from non-functional ones.
- Apply the kaizen principle according to the poultry farming disciplines
- Use safe and well-organized storage for tools, equipment and materials.
- Use recommended transportation system as the transported materials nature.
- Make of care during loading and unloading of materials, equipment and tools
- All materials, tools and equipment should be handled and transported according

3.3 Cleaning, maintaining and storing tools and equipment

Work site have to be clean and safe for efficient work of employee. So any poultry farmer or employee in poultry farm has to keep sanitation of his work site; which mean that he has to clean his work area after completing his task by doing these he can keep healthy himself and his staff members.

After completion of the work all materials, tools and equipment they has to be cleaned, sanitized, disinfected, maintained, and stored properly.

Cleaning refers to removal of dirt, filth or unwanted substances matter from the materials, tools and equipment.

The materials tools and equipment should be Stored in a safe, dry place/ ventilated and away from animals reach, and placed on wooden racks or shelve in order to prevent direct contact with soil.

3.4 Report problems or difficulties

There are many difficulties that may encounter in work place /poultry farm

Some of them are:

- Temperature –too cold and too hot temperatures require modification
- Disease out breaks/ disease transmission

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- Insufficiency of working facilities
- Contaminations (feed, water and feeding and watering trough)
- Mal functions of machines and equipment like incubator, debekear,
- Predator's problem
- Disposed materials and dead birds
- Theft and the others should be properly reported

3.5 Reporting work outcomes

After completing any work directed by supervisor any work outcome and work problem have to be reported to supervisor

Poultry activity should be reported daily, weekly, monthly and yearly to the concerned body as well as for documentation. It is important source of information and advice from someone who has collected and studied the farm profitability, in order to make decisions and take actions. Reports should be clear, understandable, and meaningful. The outcome measurement process has gone well, poorly reported information will discourage use or provide misleading information.

Some of the report in poultry farm includes

- Health analysis/out breaks
- Profitability of the farm
- Production record report
- Reproduction record report
- Feeds and feeding report and etc.

Self-check 3	Written test
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Name..... ID..... Date.....

Directions: Answer all the questions listed below.

Test 1. Give short answer

1. List down 5 waste material produced in poultry raising activity. (5pts)
2. What is good handling and transporting measurements of materials and equipment used in poultry farming (5pts)
3. What are the problems/difficulties that reported in poultry farm/work place (8pts)

Note: Satisfactory rating 8 points Unsatisfactory – below 8 points

You can ask you teacher for the copy of the correct answers.

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