

**Draft Study Material**

# **Small Poultry Farmer**

(QUALIFICATION PACK: Ref. Id. AGR/Q4306)

**SECTOR: AGRICULTURE**

**Grade 12**



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NCERT

**PSS CENTRAL INSTITUTE OF VOCATIONAL EDUCATION**

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## **Preface**

Vocational Education is a dynamic and evolving field, and ensuring that every student has access to quality learning materials is of paramount importance. The journey of the PSS Central Institute of Vocational Education (PSSCIVE) toward producing comprehensive and inclusive study material is rigorous and time-consuming, requiring thorough research, expert consultation, and publication by the National Council of Educational Research and Training (NCERT). However, the absence of finalized study material should not impede the educational progress of our students. In response to this necessity, we present the draft study material, a provisional yet comprehensive guide, designed to bridge the gap between teaching and learning, until the official version of the study material is made available by the NCERT. The draft study material provides a structured and accessible set of materials for teachers and students to utilize in the interim period. The content is aligned with the prescribed curriculum to ensure that students remain on track with their learning objectives. The contents of the modules are curated to provide continuity in education and maintain the momentum of teaching-learning in vocational education. It encompasses essential concepts and skills aligned with the curriculum and educational standards. We extend our gratitude to the academicians, vocational educators, subject matter experts, industry experts, academic consultants, and all other people who contributed their expertise and insights to the creation of the draft study material. Teachers are encouraged to use the draft modules of the study material as a guide and supplement their teaching with additional resources and activities that cater to their students' unique learning styles and needs. Collaboration and feedback are vital; therefore, we welcome suggestions for improvement, especially by the teachers, in improving upon the content of the study material. This material is copyrighted and should not be printed without the permission of the NCERT-PSSCIVE.

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# Module 1

## Egg Collection, Storage, Cleaning, Packaging and Transportation

### Module Overview

Egg is the cheapest and best source of animal protein suitable for people of all ages. Thus, it is important to maintain the quality of eggs from production to the consumption. The tropical climate of our country is one of the main factors responsible for the deterioration of quality and consequently spoilage. It has been estimated that about 10 to 20% of eggs get damaged during transit and a fairly large percentage reaches the consumer with a poor edible quality.

### Learning Outcomes

After completing this module, you will be able to:

- Describe the key parameters for judging the quality of eggs.
- Demonstrate the best practices for the storage, cleaning, packaging, and transportation of eggs.

### Module Structure

Session 1: Parameters for Judging the Quality of Eggs

Session 2: Storage, Cleaning, Packaging and Transportation

## SESSION 1: PARAMETERS FOR JUDGING THE QUALITY OF EGGS

There are different factors which determine the quality of eggs. The quality of eggs is examined by studying the different external and internal parameters of different parts of an egg.

## Parts of an egg

The hen's egg is a specialized structure wherein the development of the embryo takes place outside the body of the hen. Nature has made provision for sufficient food material in the egg itself to meet the nutritional requirements of the growing embryo. The egg thus protects and provides a complete diet for the developing embryo and supplies nutritious food for the hatched chicks for the first few days of their life. A fully formed egg has a shell, two shell membranes, albumen or egg white and yolk as shown in Fig. 1.1.

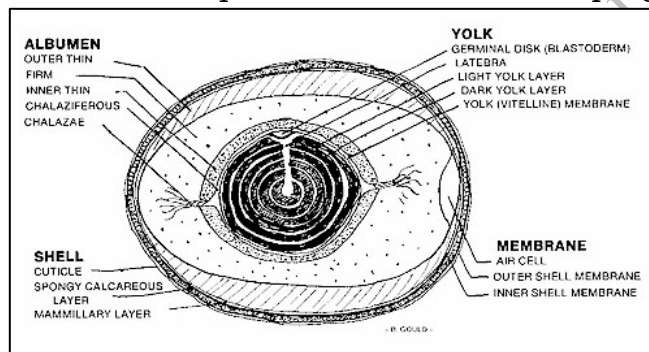


Fig.1.1: Different parts of a chicken egg

### i. Shell

The shell is the outermost part of the egg, forming a protective covering for the inner contents. The shell is covered with a thin waxy cuticle that provides sheen to the egg and also protects the entry of microorganisms in the egg. Any damage to the cuticle and shell result in loss of quality.

The shell is porous and largely made up of calcium carbonate. The pores in the shell allow gaseous exchange for the developing embryo. The shell along with shell membranes makes about 11 % of the total weight of the egg.

### ii. Shell membrane

Next to the shell are two membranes: the outer one and the inner one. They along with the shell, give good protection to the inner contents of the egg. Both the membranes are porous and composed of fibres.

There is no air-cell in an egg at the moment it is laid. Inside the hen's body, the egg is at a temperature of around 41° C. After being laid, it is exposed to a lower temperature. The moist coating of the cuticle on the egg shell dries up due to evaporation, as soon as the egg comes in contact with outside air. Both, the evaporation and the exposure to a lower temperature result in contraction of its contents. Air cell is located at the broad end of the egg, where the beak of the embryo points during the last stage of incubation when it needs air for breathing.

### iii. Albumen



Next to the shell membranes, is a clear, translucent colourless viscous mass with a yellowish tint known as albumen or egg white. Albumen consists of two distinct parts, a thick viscous portion (dense white) and a thinner portion (liquid white). Albumen makes up about 58% of the total weight of the egg. Of this, about 34% is the dense portion and the remaining is thin white.

## iv. Yolk

The yolk is a mass of yellow coloured material enclosed in the vitelline membrane. The yolk carries the germinal disc, which under suitable conditions, develops into a chick. The colour of the yolk varies from pale yellow to deep orange due to the carotenoid pigments. There are dark and light-yellow concentric rings in the yolk. In a newly laid egg, the yolk is at the centre of the egg surrounded by the albumen all around. The yolk makes up about one-third of the weight of the egg.

The germinal disc, also called as germ spot, is the reproductive nucleus. The disc is located on the surface of the yolk, immediately under vitelline membrane. Its size in a newly-laid egg varies depending upon whether the egg is infertile or fertile.

## Composition of chicken egg

The Composition of an egg is presented in Table 1.1.

**Table 1.1: Composition of egg**

Component	Total (%)	Water (%)	Protein (%)	Fat (%)	Ash (%)
Whole Egg	100	65.5	11.8	11.0	11.7
Albumen	58	88.0	11.0	0.2	0.8
Yolk	31	48.0	17.5	32.5	2.0
		Calcium Carbonate (%)	Calcium Phosphate (%)	Magnesium Phosphate (%)	Organic Matter (%)
Shell	11	94.0	1.0	1.0	4.0

## Nutritive value of edible portion of a chicken egg

The nutritional value of an egg is presented in Table 1.2.

**Table 1.2: Nutritional value of chicken egg**

Component	Whole	Fresh raw egg Albumen	Yolk
Weight (g)	50	33	17
Water (%)	73.7	87.6	51.1
Energy (Kcal)	81.5	16.83	59.16
Carbohydrate (g)	0.36	0.264	0.1
Protein (g)	6.45	3.60	2.72
Fat (total lipids, g)	5.75	Trace	5.65
Total saturated Fatty acids	1.65	-	1.65
Total unsaturated Fatty acids	3.30	-	3.30
Cholesterol (mg)	230	-	230

### Egg quality

Egg quality may be described as "consumer satisfaction" and includes appearance, colour and odour. Egg quality is determined by assessing its external and internal quality. The external and internal quality of eggs (is influenced by breed, age of bird, nutrition, management, health and environment. Some of these factors affect the quality even before the egg is laid.



### External egg qualities

An egg should possess normal external characteristics for transportation and merchandising of eggs. The external quality of an egg is assessed by the following parameters.

- Egg weight
- Shape
- Specific gravity
- Shell quality

The external quality can be determined without candling. However, the soundness of the shell is verified by candling.

### (a) Egg weight

Average weight of chicken eggs is 52-56 g, whereas the 'desi' hens usually lay eggs weighing less than 45 grams. Uniformity in weight is an important factor in handling eggs than small and large eggs in a lot. The weight of an egg depends on many factors such as breed, body size, stage of laying, season, age, diet, position of the egg in the clutch, health, action of drugs, feeding, availability of water and storage.

### (b) Shape of an egg

The normal shape of an egg is oval with one end broader than the other (Fig1.2).

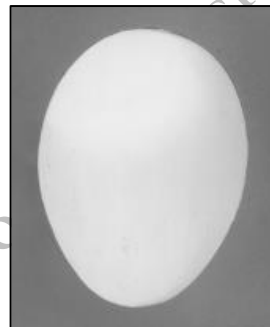


Fig 1.2: Normal shape of an egg

### (c) Specific Gravity

This gives an indication of the egg shell quality as well as its freshness. Fresh eggs have higher specific gravity than old eggs because there is loss of moisture in the old eggs which in turn is replaced by air. So, the air cell becomes bigger as the egg is stored for a longer time. Similarly, eggs having stronger shells will have higher specific gravity than thin shelled eggs.

### (d) Shell quality

Shell is an important part of the egg. Though it is not consumed, it provides protection to the edible portion of the egg. In hatching eggs also, the importance of shell is in no way less as poor egg shells do not give good hatching results.

#### 1. Shell strength and thickness

The strength of the egg shell is directly proportional to its thickness. Relatively thicker shells are stronger than thinner ones and are therefore, better for maintaining the quality of the edible portion.

#### 2. Shell colour and texture

It indicates smoothness and roughness of shell surface and also indicates shell quality. Shell colour is due to the presence of pigments. Ooporphyrin gives the

brownish colouration to the egg shell which is normally seen in eggs laid by Asian, English and American class of chicken.

### 3. Cleanliness of the egg shell

Only clean eggs can fetch good prices in the market. Eggs usually get soiled by the droppings of the hens, wet litter, mud, dirt, etc. Occasionally, eggs are stained with blood due to bleeding in the cloaca of the hen.

#### Internal egg qualities

The internal quality of egg is best ascertained by candling and breaking open the egg and studying the following parameters.

##### (a) Shell percent

Shell constitutes about 11-12% of the egg. Smaller eggs have a greater percentage of shell as compared to large eggs.

##### (b) Shell thickness

A good quality chicken egg has a shell thickness of 0.33 mm.

##### (c) Albumen quality

The proportion of the thick and thin albumen is measured as the percentage of total weight of the egg. A good quality egg has 55% thick and 45% thin albumen. A sieve of 1/16<sup>th</sup> inch size is used to separate the thick and thin albumen.

##### (d) Yolk quality

It is determined by yolk colour. The normal yolk colour is yellow to orange. Even though the yolk colour is not a direct indication of its absolute quality, abnormal colours of the yolk indicate chemical spoilage or microbial spoilage. The colour of yolk is measured by Roche colour fan shown in Fig.1.3.



Fig.1.3: Roche colour fan

### Determination of egg quality by candling

Candling is visual examination of contents of the egg by holding and twirling it in front of a source of lighting a dark room. Instrument required for candling is known as candler.

#### Candler

It consists of an ordinary electric bulb enclosed in a metal or wooden box. The box is closed from all sides. An aperture (hole) of about 2.5-2.9 cm diameter is provided on one side facing the bulb. The beam of light emerges from this aperture and passes through the egg which is held against it. A reflector is fixed behind the bulb so that a brighter beam is reflected to pass through the aperture and the egg, and illuminate the egg contents better (Fig 1.4).



Fig.1.4: Candling of egg

#### Procedure for candling

- Place the working table at a convenient place in a clean and dark room.
- Place the candling lamp in a central place on the table. Keep the trays containing the eggs on the left side of the candling lamp and five empty trays for receiving eggs of different grades on the right side.
- Bring the egg in front of the aperture just close to it with its broad end uppermost and its long axis at an angle of about  $45^\circ$  to the aperture. Place your thumb and index finger on opposite sides of the egg in such a way that there is no obstruction in viewing.
- Examine the quality of egg and keep the candled egg in the appropriate tray on the right side according to the grade. Other eggs are also examined in the same manner. Use your left hand for taking eggs from the egg tray and your right hand for candling.

#### Observation

Make the following observation while viewing through the egg in front of the candler.

##### a. Egg shell

Quality of the shell is indicated as follows:

### ***Shape and texture of shell***

- Practically normal shape and texture
- Slightly abnormal: shows definite ridges but not pronounced thin spots or rough areas.
- Abnormal

### ***Soundness of shell***

- Sound shell
- Checked or cracked
- Blind checks (hair-cracks)
- Leaker: Shell and shell membranes are broken and the contents are free to exude or leak out from the shell.

### ***Cleanliness of shell***

- Clean eggs
- Slight stains: Stains that cover about 1/32 of the shell surface if localized or 1/16th of the shell surface if scattered.
- Slight to moderate stains: Stains that are readily detectable but not prominent and that cover not more than 1/4th of the shell surface, provided there is no adhering dirt.
- Dirty eggs: Adhering dirt and stains covering more than 1/4th of the shell surface.

### **b. Air cell**

During candling, the air cell looks somewhat darker than the rest of the contents. See the location, size and mobility. Also look for the presence of air bubbles in the albumen.

### **c. Albumen**

#### ***i. Clearness of albumen:***

Albumen should be free from discoloration and shadows of foreign materials. Turbidity in the white indicates rots.

#### ***ii. Shadows of blood and meat spots***

The shadows of blood and meat spots are seen in the albumen or attached to the surface of the yolk. These spots are differentiated from the shadows caused by chalazae.

#### ***iii. Viscosity of the albumen***



Give a twirl to the egg by turning your hand with a snap on the wrist in an angle or arc of about 180 degrees. Stop the hand motion at the end of the arc without moving your arm or the body. This will cause the egg contents to twirl within the shell. To obtain uniformity in the observations, standardize the method of turning the egg and give the same amount of twirling to each egg.

The viscosity of the albumen is indicated as follows:

- Firm white
- Reasonably firm white
- Slightly weak white
- Weak and watery white

### **d. Yolk**

The quality of the yolk is determined by the shadow that it casts upon the shell. Observe the position of the yolk, the depth of its shadow, the size and shape of the yolk and freedom from defects.

#### ***i. Position of the yolk***

The following terms are used to indicate the position of the yolk in the egg.

- Well centered
- Fairly well centered
- Off-centre
- Stuck yolk

#### ***ii. Depth of the yolk shadow***

The distinctness of the outline of the yolk shadow, as the egg is twirled before the candling lamp, is of the following degrees.

- Outline slightly defined
- Outlines fairly well defined
- Outline well defined
- Outline plainly visible

#### ***iii. Size and shape of the yolk***

See if the yolk is of normal size and nearly spherical in shape. The changes in the size and shape are described by the following terms:

- Slightly enlarged and slightly flattened yolk
- Enlarged and flattened yolk

#### ***iv. Germ development defects***

The germ development is seen as a circular dark area near the centre of the yolk shadow. The development of blood vessels is detected by the red colour of the vessels. Degree of germ development and defects in the yolk are as follows:

- Free from defects
- Radically free from defects
- Definite but not serious defects
- Other serious defects
- Clearly visible germ development
- Blood due to germ development

### Grading of Eggs

Grading means sorting the eggs into different categories of comparable quality. Once having determined the quality of eggs, one should always sort them out into different grades. Grading serves the following purposes:




1. Lots of eggs of comparable quality can be pooled together.
2. The market prices are fixed and uniformity is brought in the fixation of prices.
3. It helps in advertising the product.
4. Production guides for the poultry farmers, selling guides for the dealers and the buying guides for the consumers can be prepared on the basis of accepted standards.
5. Bargains are better negotiated on the basis of standard grades.
6. Disputes are easily settled on the basis of these standards.


**Table 1.3: Grade designations of table eggs as recommended by AGMARK**

S. No.	Grade	Weight per egg in gm	Shell	Air Cell	Albumin	Yolk
1	A extra large	60 and above	Clean, unbroken and sound shape, normal	Up to 4 mm in depths, practically regular or better	Clear, reasonably firm	Fairly well centred, practically free from defects, outline indistinct
2	A Large	53-59				
3	A Medium	45-52				
4	A Small	38-44				
5	B Extra large	60 and above	Clean to moderately	8 mm in depth; may		May be slightly off-

6	B Large	53-59	stained and sound, shape slightly abnormal	be free and slightly bubbly	Clear may be slightly week	centred, outline slightly visible
7	B Medium	45-52				
8	B Small	38-44				

**Table 1.4: Equipment used in grading and candling of eggs**

Equipment	Uses	Figure
Individual candler	Candling of a single egg at a time	
Mass candler	Candling of many egg at a time	
Pan weighing balance	Weighing of eggs	

Digital weighing balance	Weighing of eggs	
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### Activities

**Activity 1:** Visit to a poultry farm to study the process of candling and grading of eggs.

**Material required**

Candler, Eggs, and Notebook

**Procedure**

1. Perform the visual examination of eggs using candler.
2. Note down the different observations seen during candling.
3. Determine the grade of eggs based on the observations recorded in candling process.

### Check Your Progress

**A. Multiple Choice Questions**

1. Standard weight of chicken egg is \_\_\_\_\_.  
 (a) 52-56 gm (b) 75-85 gm  
 (c) 10-12 gm (d) 40-45 gm.
2. Normal shape of an egg is \_\_\_\_\_.  
 (a) Oval (b) Round  
 (c) Flat (d) Spherical
3. Shell constitutes about \_\_\_\_\_ of the egg  
 (a) 32% (b) 54%  
 (c) 11-12% (d) 1%
4. The cholesterol content in edible part of an egg is  
 (a) 50 mg (b) 100 mg  
 (c) 150 mg (d) 230 mg
5. 'Desi' hens usually lay eggs weighing less than \_\_\_\_\_.

- (a) 10 gm  
(c) 65 gm

- (b) 45 gm  
(d) 80 gm

**B. Fill in the Blanks**

- \_\_\_\_\_ gives the brownish colouration to the egg shell.
- Albumin also known as \_\_\_\_\_
- The colour of yolk is measured by \_\_\_\_\_
- The percentage of albumin in a standard egg is \_\_\_\_\_%.
- A good quality chicken egg has a shell thickness of \_\_\_\_\_mm.

**C. Mark True or False**

- A fully formed egg has shell, two shell membranes, albumen and yolk.
- Air cell becomes smaller as the egg is stored for a longer time.
- The strength of the egg shell is inversely proportional to its thickness.
- Egg quality is determined by assessing its external and internal quality.
- Grading means sorting out eggs into different categories of comparable quality.

## **SESSION 2: STORAGE, CLEANING, PACKAGING AND TRANSPORTATION**

**INTRODUCTION**

Proper and frequent collection of eggs ensures minimizing egg losses due to cracking or spoilage of eggs. In this session, we are going to learn about the arrangements and activities involved in egg collection, storage, cleaning, packaging and transportation of eggs.

**2.1 Laying of eggs by layers**

Layer is a sexually matured female bird reared for egg production. Earlier the layers were reared in deep litter system but during the past 2-3 decades, they are reared mostly in cage system. The hen starts laying at the age of 20 weeks and continues laying eggs up to 72 weeks of age or above. The rate of laying increases with time and reaches at a level of 90% or more at 28 weeks of age. The egg production is maintained at this level up to 42 weeks of age. Thereafter, it starts decreasing slowly to reach 70% or lower by 72 weeks of age. As the egg production decreases below 65%, it becomes uneconomical to keep the layers,

unless the market prices of eggs are exceptionally high or the layers have excellent genetic properties.

### **2.2 Factors affecting egg production**

#### **i. Age of birds at first egg laying**

It is an important indicator of future egg laying performance of birds. The age at first egg laying is 20 weeks of age. If the egg laying starts too early, i.e. 15-16 weeks of age, it leads to decreased egg size and weight along with reduction in total egg production.

#### **ii. Age at sexual maturity**

The sexual maturity is the age of birds at which the flock reaches at 50% egg production. It is attained at 24-25 weeks of age.

#### **iii. Body weight**

The pullets attain the optimum body weight as per the breed. The egg production is adversely affected in overweight birds.

#### **iv. Nutrition**

Nutrition plays an important role in egg production. The layers should be provided the recommended level of nutrients in the feed.

#### **v. Photoperiod**

Light is a critical factor for egg production. The duration and intensity of light is maintained at 16 hours in a day with 1 foot candle intensity during the entire laying period. The photoperiod and intensity are never decreased during the laying period.

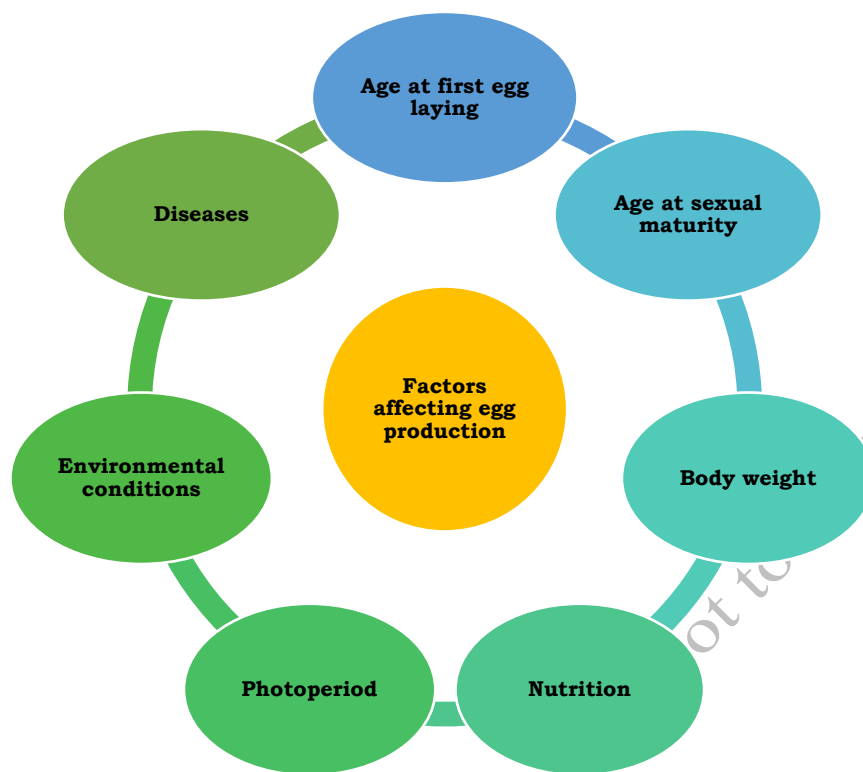
#### **vi. Environmental conditions**

Environmental conditions include macro and micro environment. Macro environment includes environmental temperature, relative humidity etc. where as micro environment includes temperature, relative humidity, ventilation and hygiene inside poultry shed.

#### **vii. Diseases**

There are many diseases which adversely affect egg laying like Ranikhet, Mycoplasmosis and Pullorum disease etc.





*Fig 1.5: Factors affecting egg production*

### **2.3 Care of eggs in the farm**

Immediately after it is laid, an egg begins to lose quality, even if it is removed from the nest, cooled, packed and marketed promptly. Keeping temperature and humidity conditions at an optimum level, minimizes the deterioration in egg quality. The following steps are necessary to maintain egg quality:

1. Collect eggs frequently, at least 3 times a day.
2. Handle the eggs carefully to prevent breakage.
3. Cool the eggs promptly and store them under the optimum temperature (65-75°F) and relative humidity (75%).
4. Pack the eggs in clean, cool packing materials.
5. Pack clean eggs separately from dirty eggs.



*Fig.1.6: Steps of egg processing*

## **2.4 Collection, cleaning, packaging and transportation of eggs**

There are various operations involved from production of eggs till marketing; these include collection, cleaning, grading, packaging and transportation. These operations are described below:

### **i. Collection of eggs**

Frequent collection of eggs minimizes loss in egg quality. During summer, eggs are collected at least 3 to 4 times a day and during winter, eggs are collected at least twice a day. Eggs are collected with broad end up in egg filler flats or egg collection trays to prevent them from breaking.

### **ii. Cleaning of eggs**

Soiled eggs are cleaned very carefully, because the egg shell is fragile. Secondly, the eggs should be cleaned gently and the cleaning confined to the soiled portion only as the cuticle is removed on cleaning resulting in escape of carbon dioxide and moisture and entry of odours and contaminating organisms. The eggs are cleaned either by dry method or washing.

The factors responsible for dirty eggs are shown in Fig1.7.

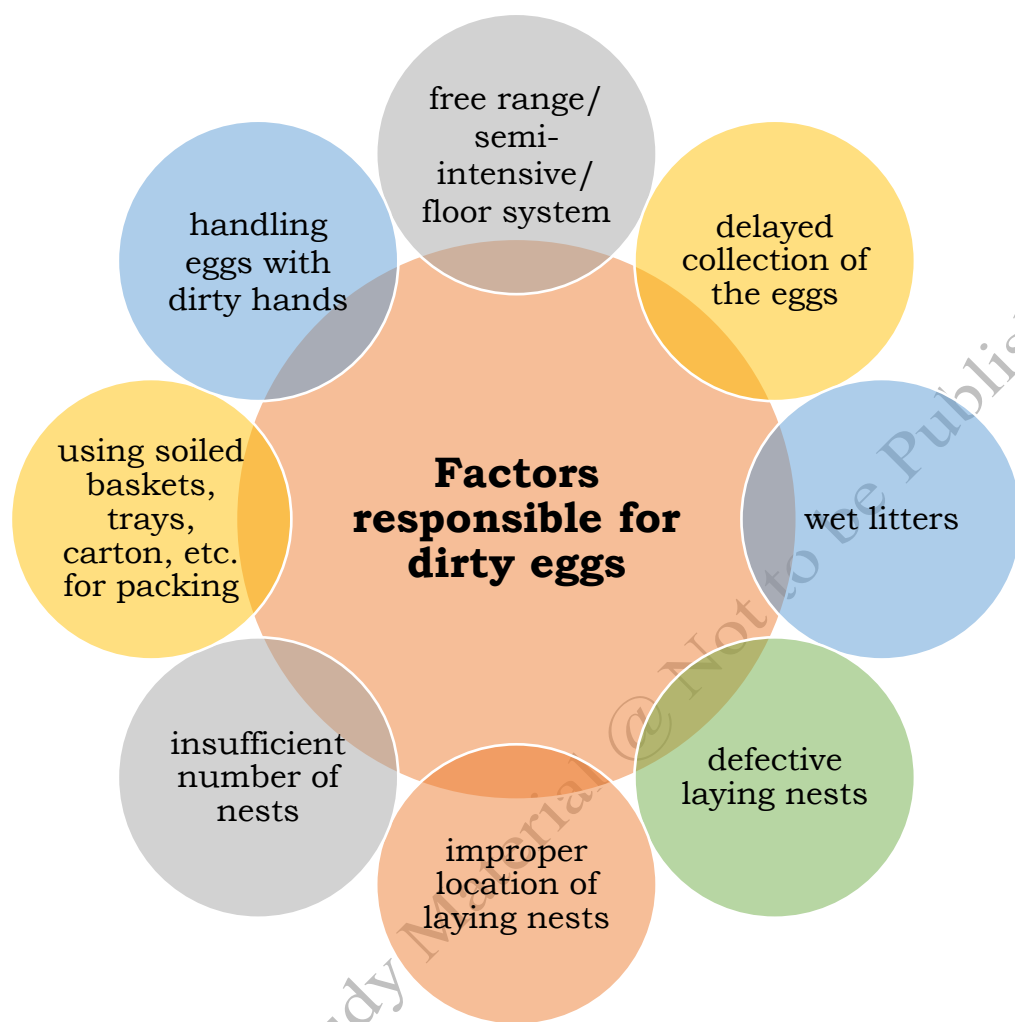


Fig. 1.7: Factors responsible for dirty eggs

### **a. Dry cleaning of eggs**

Dry cleaning is done if the eggs are slightly soiled and the dirt can be removed by slight rubbing or buffing, using a cloth pad, soft brush or paper. Do not rub hard or scratch while cleaning the egg shells.

### **b. Washing of eggs**

If the eggs are badly soiled or if the stains cannot be removed by soft rubbing or buffing, clean them by washing. The eggs are washed only when absolutely necessary by taking the following precautions:

1. Wash eggs with lukewarm water i.e. minimum of 90°F (32.2°C) as a washing solution cooler than the egg causes the egg contents to contract and thus allows polluted water to be drawn through the shell.

2. Select a detergent compatible with wash water and without any odors.
3. Use only potable water for washing.
4. Dry the eggs to remove any excess moisture prior to packaging.
5. The strength of the sanitizing spray is 50-200 ppm of available chlorine or its equivalent.

### iii. Packaging of eggs

Eggs are placed and packed in packaging material and transported to the market. These packaging materials are properly cleaned and sundried to avoid microbial contamination. Different types of packaging materials used for packaging of eggs are as follows:

#### a. Containers

The container may be a basket or a box.

- **Egg baskets:** For packing eggs, the baskets of bamboo or twigs of mulberry, arhar, jhaoo, etc. are used. Flat bottom baskets are used for this purpose.
- **Egg boxes:** A box is a better container than a basket. Box may be of paper pulp, cardboard, fibre, wood or plywood. A box 60 cm long, 30 cm wide and 33 cm height holds about 30 dozen hen eggs.



Fig.1.8: Egg boxes for a dozen of egg

Fig.1.9:

Egg boxes for half dozens of eggs

#### b. Inner packaging materials

For packing, saw dust, rice husk, straw, wood shavings, etc. are generally used.

In the modern system of packing eggs, the inner packing materials such as sawdust, rice husk, etc. are replaced by fabricated materials like paper-pulp or plastic filler flats and 'egg cartons'. A maximum of thirty eggs can be carried in standard filler flats.

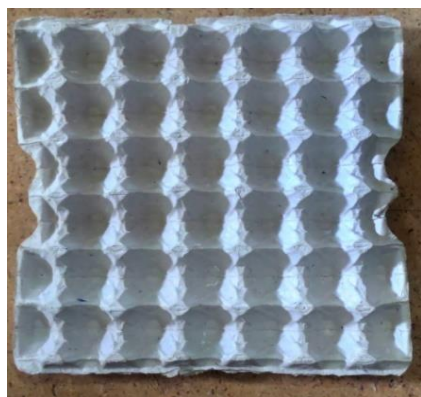


Fig.1.10: Paper pulp filler flat



Fig.1.11: Plastic filler flat

#### iv. Transportation of eggs

Normally the eggs produced in small poultry farms are sold locally. However, if the eggs have to be transported over short or long distances before being consumed, eggs are carried in refrigerated vehicles to maintain their quality during transportation. These vehicles are well insulated and a temperature of 2-3°C is maintained inside the vehicle. Before loading, vehicles are checked to ensure that the interior is clean and free from odors. The loss of moisture during transportation is minimized by pre-cooling the transport vehicle prior to loading the eggs.

#### Health risk associated with egg handlers

Employees handling eggs must take every precaution to prevent cross-contamination between production and marketing areas. Traffic patterns of employees are monitored to avoid cross-contamination. Employees in production areas are not allowed to work in marketing areas and vice versa. Personal hygiene and sanitation must be practiced by all employees in the poultry farm.

Persons with discharging or infected wounds, sores, lesions on hands, arms and other exposed portions of the body or suffering from any communicable diseases like tuberculosis, covid-19 etc. are not permitted in poultry farms.

#### Egg-processing Facilities (Automatic system)

The high-quality egg produced under today's large-scale integrated flock system lends itself well to handling and processing by automatic equipment. In fact, most new complexes are in-line systems designed to carry eggs from the hen house to the carton in one continuous operation.

Eggs must be handled properly throughout each phase of production, processing and transportation to maintain quality. Washing equipment washes, sanitizes and dries eggs automatically. Grading equipment uses mass scanners to help operators detect and remove eggs which are dirty, cracked and irregularly shaped and eggs with meat and blood spots. Automatic weighing equipment individually weighs each egg and sorts the eggs according to the official weight classes. Automatic packaging equipment places the eggs into cartons, closes the cartons and stamps the cartons with a production code. Coolers reduce the temperature of the eggs and maintain humidity levels that minimize quality deterioration. Fig. 1.12-1.17 portray an automatic egg grading facility.

	
<p><i>Fig. 1.12: Cross conveyer for conveying of eggs to grading machine</i></p>	<p><i>Fig. 1.13: Sorting of eggs for soiled and cracked eggs</i></p>
	
<p><i>Fig. 1.14: Sorting of eggs for shape abnormality</i></p>	<p><i>Fig. 1.15: Placing of egg filler flats</i></p>
	
<p><i>Fig. 1.16: Filler flats filled with graded eggs</i></p>	<p><i>Fig. 1.17: Transportation of graded to cooling facility/ transport vehicle</i></p>

*Fig. 1.12-1.17: Automatic facility for grading of eggs*



## Activities

**Activity 1:** Visit a Layer poultry farm to study the tools, equipment and materials required for egg collection, storage, cleaning, packaging and transportation

**Material required-** Camera, Pencil and Notebook

### Procedure

1. Visit a nearby poultry farm.
2. Note down the various tools, equipment and materials necessary for egg collection, storage, cleaning, packaging and transportation
3. Draw a sketch of tools and equipment used for collection, storage, cleaning, packaging and transportation.

## Check Your Progress

### A. Multiple Choice Questions

1. Layers continue laying eggs up to \_\_\_\_\_ of age.
  - (a) 20 weeks
  - (b) 52 weeks
  - (c) 72 weeks
  - (d) 10 weeks
2. Wash the eggs with water having minimum of \_\_\_\_\_ °F.
  - (a) 60
  - (b) 70
  - (c) 80
  - (d) 90
3. The strength of the sanitizing spray is \_\_\_\_\_ of available chlorine or its equivalent.
  - (a) 10-15 ppm
  - (b) 20-25 ppm
  - (c) 50-200 ppm
  - (d) 250-500 ppm
4. A maximum of \_\_\_\_\_ eggs can be carried in standard filler flat.
  - (a) 20
  - (b) 30
  - (c) 40
  - (d) 50
5. A temperature of \_\_\_\_\_ °C is maintained inside the egg transportation vehicle.
  - (a) 2-3
  - (b) 20-30
  - (c) 35-45
  - (d) 45-55

### B. Fill in the Blanks

1. Hen starts laying at the age of \_\_\_\_\_ weeks
2. Sexual maturity is attained at \_\_\_\_\_ of age.
3. Light is maintained at \_\_\_\_\_ in a day with \_\_\_\_\_ intensity during the entire laying period
4. Eggs are collected frequently, at least \_\_\_\_\_ times a day
5. Optimum temperature for storage of eggs is \_\_\_\_\_ °F

### C. Mark True or False

1. Layer is a sexually matured female bird reared for egg production.
2. The sexual maturity is the age of birds at which the flock reaches at 100% egg production
3. The egg production is adversely affected in overweight birds.

4. Micro environment includes temperature, relative humidity, ventilation and hygiene inside poultry shed
5. Egg laying is not affected adversely by Ranikhet disease.

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## Module 2

# Cleaning and Disinfecting Poultry Farm

### Module Overview

In this unit, we will discuss cleaning, disinfection and bio-security measures in a poultry farm. Cleaning and disinfection are necessary for effective control of diseases at a poultry farm. It is essential to follow an effective disease control program to optimize egg and meat production.

### Learning Outcomes

After completing this module, you will be able to:

- Explain the strategies to maintain cleanliness in poultry sheds.
- Demonstrate the process of disinfecting poultry sheds.

### Module Structure

Session 1: Maintain Cleanliness in Poultry Sheds

Session 2: The Process of Disinfection of Poultry Sheds and Bio-security Measures to minimize risk of Pests and Disease





## SESSION 1: MAINTAIN CLEANLINESS IN POULTRY SHEDS






In this session, we will study the equipment used for cleaning and the maintenance of poultry farms. Different equipment is used to maintain cleanliness in poultry sheds. A successful small poultry farmer makes a provision of funds for purchasing the required equipment for maintaining the cleanliness at the farm. Depending upon the type and quality of the equipment, the cost varies from 5 to 25% of the total cost of equipment used in a poultry farm.

### 1.1 Cleaning equipment

The important equipment used for cleaning purpose at the farm is depicted in Table 2.1.

**Table 2.1: Equipment used for cleaning of a poultry farm**

S. No.	Equipment	Uses	Image
1.	Sprayer	To spray disinfectants	
2.	Litter racker	For raking of litter	
3.	Shovel	Spreading and removing litter	
4.	Spade	Collection of used litter	

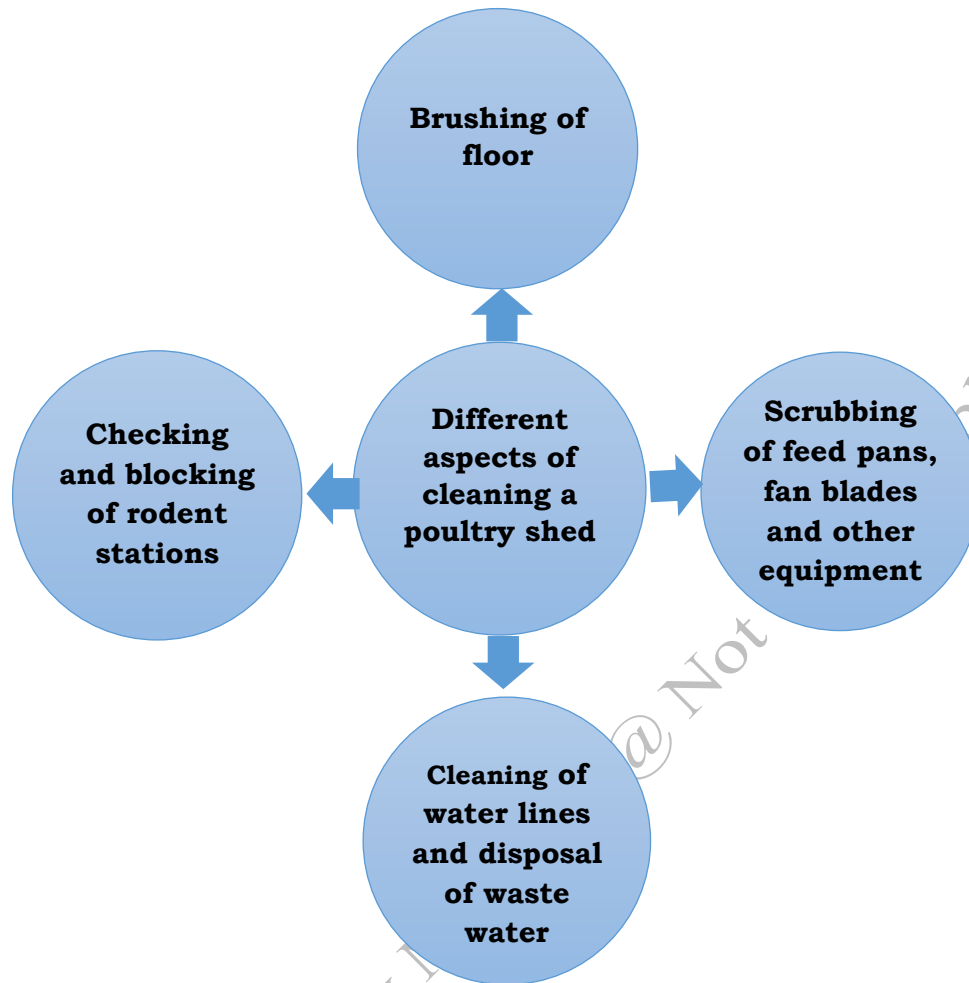
5.	Basket	Collection and dumping of litter, farm waste etc.	
6.	Brooms	To sweep the floor	
7.	Spider web broom	To remove the spider webs	
8.	Flame gun / Blow lamp	To kill the lice and mites living in cracks and crevices	
9.	Scrappers	To remove the stuck litter, dirt etc.	

10.	Scoop	To collect waste	
11.	Trolleys	To carry waste from the shed to the disposal site	
12.	Bucket	To carry water	
13.	Scrubber dryer	Effective drying of floor	

### 1.2 Cleaning the poultry sheds

The process of cleaning and disinfection of the poultry sheds is carried out during the down time. 'Downtime' is the period between two subsequent batches of birds reared in the same house. An effective downtime must be a minimum of one week to break the disease cycle. The different aspects of cleaning poultry sheds are shown in Fig 2.1.





*Fig. 2.1: Different aspects of cleaning poultry sheds*

### **1.2.1 Removal of bedding material, dust and spider webs**

The different steps for removal of bedding material, dust and spider webs after selling the stock of birds kept in sheds are:

1. The residual feed is removed from the feeder.
2. Remove the feeders, waterers, brooders and used litter.
3. Avoid dustiness all through the cleaning operations.
4. Close the curtains to control spread of infection to adjacent sheds through dust.
5. If the bedding material is too dusty, sprinkle disinfectant mixed water over the bedding material.
6. The feathers and used litter etc. around the poultry shed are removed.
7. Scrub and clean the floor area, sidewalls, ceiling, curtains, wire mesh, electrical, water fittings, other immovable fittings like cages etc. to make

them dust free. The cobwebs, bedding material, adhered droppings etc. are also removed.

8. Any mold ring present in the feeder is removed by scrapping.
9. The stuck cobwebs, bedding material, feathers are burnt using a flame gun.
10. Use a high-pressure water jet to clean all the fixtures.
11. Dried stains or droppings on the wall, floor, cages and equipment are removed after soaking them in water or 1-2% caustic soda solution for 1-2 hours and scrubbing them using a hard bristled brush.

### 1.2.2 Cleaning of water lines and disposal of water after cleaning

Always provide clean potable water to birds. To avoid heating of water during summer, cover the water tanks using gunny bags or straw. Close the water tanks with an air-tight lid to avoid the contamination by migratory birds and rodents.

There are various steps for effective cleaning of water lines and disposal of the wastewater.

1. Clean the water tanks and flush the pipelines once a month or during downtime to reduce the microbial load and clear the clogs in the water line.
2. Use water sanitizer like chlorine, hydrogen peroxide to reduce the bacterial load. The best way to distribute the chlorine solution quickly throughout the drinking system is to remove the drain plug at the end of each line or temporarily disconnect the last drinker.
3. The cleaning operation is completed during the night hours, in the absence of light in poultry sheds or when the sheds are empty.
4. A weekly treatment of water lines with 1-2% of baking soda (sodium bicarbonate) reduces slime formation on drinkers, valves and pipes.
5. The wastewater generated from the cleaning operations is collected in a holding tank and used for the green belt after treatment.
6. Vegetative filters (Fig. 2.2) and surface water diversions are installed to direct clean run-offs to reduce spread of pollutants.
7. Pressure pumps are used in cleaning activities to improve sanitation and reduce the quantity of effluents.



Fig. 2.2: Vegetative filters

### 2.2.3 Checking and blocking of rodent hideouts

The common rodents found in the farm premises are mice, rats, bandicoots, mongoose and squirrels. They cause significant losses to the poultry farmers and thus it is necessary to check and block the rodent hide-outs regularly during downtime period. The problems faced by poultry farmers due to rodents are presented in Fig.2.3.

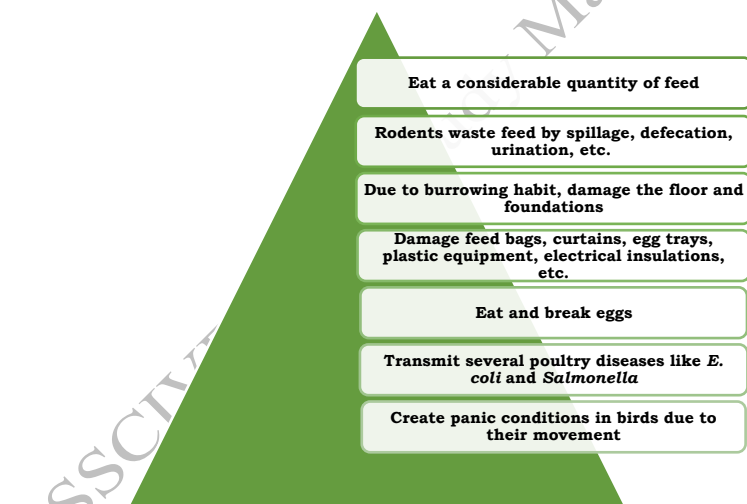


Fig. 2.3: Problems faced by poultry farmers due to rodents

Different fumigants are used to control rodents in feed godowns and burrows. Commercial preparations of fumigants are available in the form of powder, gas or liquid which are mostly effective in the initial control of rodent population. For

blocking the rodent hide-outs, chemicals like Aluminum phosphide/sulfur dioxide (tablets) are useful as underground smoke bomb under supervision.

## Activities

**Activity 1:** Visit a poultry farm to study the tools, equipment, and materials required for cleaning and disinfecting poultry sheds.

### Material required

Pen, notebook and camera

### Procedure

1. Visit a nearby poultry farm with your teacher.
2. Note down the various tools, equipment and materials necessary for cleaning and disinfection and take their pictures.
3. Discuss the different functions of the various tools and equipment.

## Check Your Progress

### A. Multiple Choice Questions

1. A litter racker is used for
  - (a) Spreading of litter
  - (b) Racking of litter
  - (c) Collection of litter
  - (d) None of the above
2. Downtime required for \_\_\_\_\_
  - (a) Cleaning
  - (b) Washing
  - (c) Disinfection
  - (d) All of these
3. Bedding material used for the rearing of birds on the floor is known as
  - (a) Titer
  - (b) Fitter
  - (c) Litter
  - (d) None of these
4. The process of flushing and cleaning of waterlines has to be done during
  - (a) Night hours
  - (b) Absence of light
  - (c) When the sheds are empty
  - (d) All of these
5. Which one of the following problems are faced by farmers due to rodents
  - (a) Wastage of feed
  - (b) Eating and damaging of eggs
  - (c) Transmission of poultry diseases
  - (d) All of these

### B. Fill in the Blanks

1. Minimum down time required to break the disease cycle \_\_\_\_\_
2. \_\_\_\_\_ and \_\_\_\_\_ are necessary for effective control of diseases at a poultry farm.
3. A weekly treatment of water lines with 1-2 % of baking soda (sodium bicarbonate) reduces \_\_\_\_\_ formation on drinkers, valves and pipes.
4. \_\_\_\_\_ cause significant losses to the poultry farmers

5. Commercial preparations of \_\_\_\_\_ are available in the form of powder, gas or liquid which are mostly effective in the initial control of rodent population

**C. Mark True or False**

1. It is essential to follow an effective disease control program to optimize egg and meat production.
2. The use of pressure pumps in cleaning activities cannot improve the sanitation.
3. Rodents can transmit poultry diseases like E. coli and Salmonella.
4. The wastewater generated from the cleaning operations of poultry farm is used for the green belt without treatment.
5. Always provide clean potable water to bird.

## **SESSION 2: THE PROCESS OF DISINFECTION OF POULTRY SHEDS AND BIO-SECURITY MEASURES TO MINIMIZE RISK OF PESTS AND DISEASE**

Disinfection means destruction of microorganisms. A substance that kills disease-causing organisms is known as a disinfectant. Disinfectants are used after cleaning of sheds and equipment and are more effective at a warmer temperature. Disinfectants are applied in the form of aerosols, sprays or fumigants.

### **2.2.1 Equipment and materials used for disinfection**

The equipment and materials used for disinfection include a sprayer, gumboots, buckets, earthen pots, face masks, fog stars, disinfectants etc. Some of the equipment used for disinfection is depicted in Table 2.2.

**Table 2.2: Equipment and materials used for disinfection**

Fog stars	
Gumboots	
Earthen Pot	

There are various types of commercial preparations of disinfectants available as presented in Table 2.3

**Table 2.3: Commonly used disinfectants in poultry farms**

Disinfectant	Use	Limitations
Cresols and Cresylic Acid	<ul style="list-style-type: none"> <li>Effective against both gram-positive and gram-negative bacteria, some viruses and fungi.</li> <li>Effective against insects, insect eggs and worms.</li> <li>They quickly penetrate organic matter and maintain their effectiveness.</li> </ul>	<ul style="list-style-type: none"> <li>They have a strong odour.</li> <li>It is expensive and irritates the skin.</li> <li>Combustible when mixed with oil.</li> </ul>



Phenols	<ul style="list-style-type: none"> <li>• Effective against fungi, gram-positive and gram-negative bacteria and some viruses.</li> </ul>	<ul style="list-style-type: none"> <li>• They are expensive</li> <li>• Effective against worm eggs at higher concentration only.</li> </ul>
Iodine-iodophors (Used as disinfectant 50-75 ppm and as water sanitizer 25 ppm)	<ul style="list-style-type: none"> <li>• Effective against gram-positive and gram-negative bacteria, fungi and some viruses.</li> <li>• They are not affected by hard water or other chemicals like detergent and acids.</li> <li>• It is good for foot baths and works well in combinations.</li> </ul>	<ul style="list-style-type: none"> <li>• Easily and quickly binds with organic material thus loses its efficacy.</li> <li>• Acts as a good disinfectant in an acidic pH, but activity gets lowered in alkaline pH.</li> </ul>
Chlorine - Sodium or Calcium hypochlorite (Used as disinfectant at 200 ppm and as a water sanitizer at 50 ppm).	<ul style="list-style-type: none"> <li>• Effective against bacteria, fungi and viruses.</li> <li>• Activity does not get affected by the hard water and detergents.</li> <li>• % Sodium hypochlorite minimizes the risk of bird flu.</li> </ul>	<ul style="list-style-type: none"> <li>• Thorough cleaning is needed before using this disinfectant as they combine with organic matter and lose their disinfecting power.</li> <li>• Higher concentrations produce odor.</li> </ul>
Quaternary Ammonium Compounds (QAC) -Alkyl dimethyl benzyl ammonium chloride (Used as disinfectant at 400-800 ppm and as a water sanitizer at 200 ppm)	<ul style="list-style-type: none"> <li>• Effective against gram-positive bacteria, moderate effective against gram-negative bacteria</li> <li>• Useful against some fungi and some viruses</li> <li>• Efficacy is enhanced by addition of sodium carbonate</li> <li>• Used for egg washing and dipping, disinfecting hatcheries, poultry sheds, and equipment</li> <li>• As a sanitizer for drinking water</li> </ul>	<ul style="list-style-type: none"> <li>• Not useful in soapy solutions</li> <li>• Adversely affected by organic matter</li> <li>• Not very potent against viruses</li> <li>• Not useful against TB organisms</li> </ul>

Formaldehyde (HCHO) may be used as gas or liquid.	<ul style="list-style-type: none"><li>• Effective against bacteria, viruses and fungi</li><li>• In liquid form used as 1- 2% solution</li><li>• As a gaseous disinfectant (fumigant) 40% solution of formaldehyde in water is known as formalin</li><li>• Useful for fumigation</li><li>• Useful during disease outbreak to disinfect sheds, equipment, vehicles etc.</li></ul>	<ul style="list-style-type: none"><li>• It is corrosive, has a disagreeable odour, and extremely poisonous</li><li>• Disinfection is not effective if the temperature is &lt; 75°F and relative humidity is &lt;75%</li></ul>
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Other disinfectants *viz.* lime and lye (sodium hydroxide, caustic soda) are useful at a poultry farm. Lye is a 2% or 5% solution on concrete floors and is most effective when used as a hot solution.

### **Process of disinfection**

After thorough cleaning and washing suitable disinfectant *viz.* 2% sodium hydroxide, 5% formalin, 2% black phenyl, 100-200 ppm chlorine solution, 500 ppm quaternary ammonium compounds, 100 ppm of iodophor is sprayed on the house ceiling, sidewalls, floors, roof, curtains, mesh etc. If there is a disease outbreak in the previous batch, fumigation or cleaning with 2% of caustic soda is useful.

Cleaning and disinfection of equipment is done by spraying or dipping in disinfectant after initially washing with water. This is followed by sun drying and storing in a clean place until further use.

### **Use of flame gun**

In case of high morbidity and mortality in the previous batch of birds, flame gun is used for disinfecting the shed.

### **Precaution**

The flame gun is never used for thatched houses.

### **Fumigation**

It is a preferred and effective method of disinfection in case of a disease outbreak. Fumigation is performed using 40 % formaldehyde (formalin) along with

potassium permanganate ( $\text{KMnO}_4$ ). Formaldehyde gas is released when formalin is poured on  $\text{KMnO}_4$  placed in an earthen pot in 2:1 ratio.

### ***Process of fumigation***

Different concentrations of formaldehyde gas are used for fumigation under different conditions.

- To prepare a single-strength (1X) concentration, mix 20 grams of potassium permanganate with 40 ml of formalin for every 100 ft<sup>3</sup> (2.83 m<sup>3</sup>) area.
- Heat and moisture enhance the efficacy of formaldehyde gas production. The fumigation process is most effective at 75°F temperature and 75% relative humidity.
- Close the doors and side curtains to retain the formaldehyde gas for a longer time.

### ***Precautions***

- The earthen pot of large capacity is beneficial for the complete expulsion of gas and to avoid the boiling, foaming or splattering action.
- Always add potassium permanganate first and then pour formalin to avoid explosion.
- The fumigation of the brooder house is carried out at least 12 hours before the arrival of chicks.
- This method is not advisable and safe if the other batches are present in the adjacent sheds.

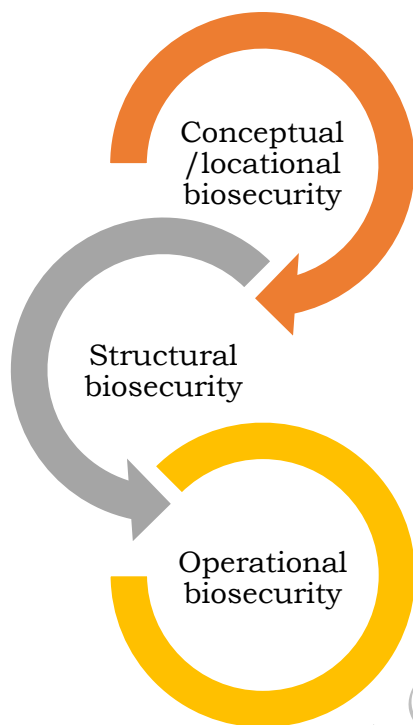
### **Minimization of risk of diseases through bio-security measures**

There is a direct relationship between management practices and outbreak of diseases. Good management practices eliminate disease occurrence in a flock.

### **Bio-security**

Bio-security is an important practice or a programme to provide safety, security and health cover to the birds and for limiting the spread of pathogens.

Bio-security is classified into three sub-types/steps as shown in the Fig. 2.4. Biosecurity measures cannot be implemented effectively if any one of these steps is not followed.



*Fig. 2.4: Different types of bio-security*

### **1. Conceptual /locational biosecurity**

This refers to the location of a poultry farm. Following points are taken into consideration pertaining to the locational biosecurity:

- Adequate distance is kept between different poultry sheds and other facilities like feed mills, hatcheries and processing plants.
- A minimum distance of 3 km is kept between the breeder farm and commercial farm.
- The farm should be located away from roads and highways.

### **2. Structural bio-security**

This type of biosecurity refers to the structural parts like complete fencing of the farm, disposal area for dead birds (Fig. 2.5), water supply, different structures on the farm premises like office, storage room and change room, construction of sheds, drainage facility, vehicle dip (Fig. 2.6) and foot bath (Fig. 2.7) at the entrance of farm, etc.



Fig. 2.5: Area for disposal of dead birds



Fig. 2.6: Vehicle dip at entrance of farm



Fig. 2.7: Foot bath at entrance of farm

### 3. Operational biosecurity

This type of bio-security is effective when equipment is ideal i.e. of proper size and sufficient in number. It mainly includes the practices which are performed routinely during farm operations. It includes periodic serum antibody assay, monitoring of integrated pest management programmes, farm activities like vaccination, beak trimming, deworming, monitoring diseases by post-mortem examination, decontamination and disinfection of equipment and farm structures etc.

#### Checklist for implementing an effective poultry biosecurity plan

1. Fix “restricted” signage board (Fig.2.8) at the entrance of the farm
2. Limit the visitors and maintain a logbook

3. Avoid vegetation around the poultry sheds
4. Provide lock and key facility for every shed
5. Provide the facility of boots and coveralls for farm workers and visitors
6. Farm workers must change boots and coveralls upon entering the shed
7. During visits, the resident flock manager must wear appropriate clothing
8. After visiting a poultry farm, change clothes, wash hands and arms before leaving premises
9. The flock manager and workers should not visit other poultry farms
10. Remove dead birds immediately and dispose them
11. Confirm that staff and visitors are aware of the dangers of raising or visiting other avian species and their contact with your flock
12. The regular visitors such as farm owners, service personnel, fuel or feed delivery drivers, meter readers and poultry catchers must wear protective outer clothing, boots and headgear before being allowed near the flocks
13. Before entering the farm premises, vehicles entering for poultry pick up or delivery, feed delivery, fuel delivery, etc. are disinfected
14. Clean and disinfect all coops, crates and other poultry containers or equipment before and after use
15. Keep a strong vector control program for insect, mammalian and avian vectors
16. Safeguard feed, water and litter material by ensuring that they are free from infectious agents
17. Evaluate your biosecurity plan and flock health programme, including vaccination protocols with a veterinarian regularly
18. In case of heavy mortality, morbid or dead birds are referred to a state or a well-established poultry diagnostic laboratory/centre



Fig. 2.8: Restricted sign post at entrance

### Use of Personal Protective Equipment (PPE)

It includes masks, gloves, apron/gown, head gear, gumboots, goggles etc. for carrying out an effective bio-security programme. Sequence for wearing and removing of personal protective equipment (PPE) is shown in Fig.2.9.



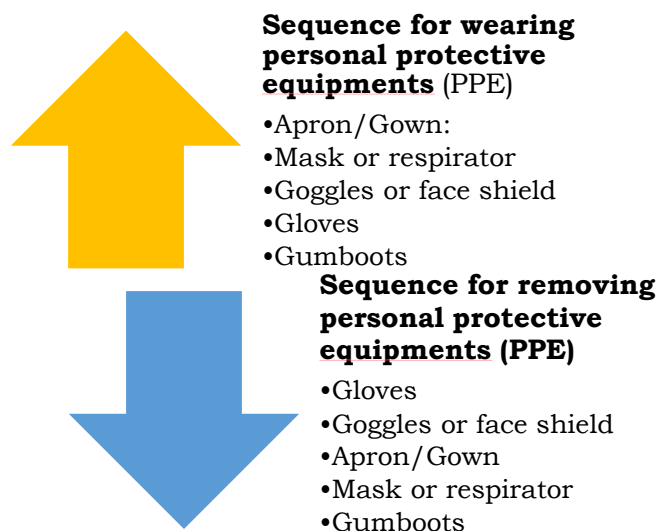


Fig. 2.9: Sequence for wearing and removing of personal protective equipment (PPE)

### Sanitizing waterers to prevent contamination

- The process includes regular cleaning of drinkers, scrubbing, application of hot water and sanitization
- The drinkers having close contact with litter material, poultry carcass, rodents, egg trays, etc. is cleaned, washed and sanitized before use
- Newly purchased drinkers are thoroughly washed with soapy water or sanitized
- Bleaching powder, iodophor compounds, quaternary ammonium compounds, hydrogen peroxide, glacial acetic acid etc. are used for sanitization

### Pest and rodent control programmes

- There are various pests in a poultry farm like flies, mosquitoes, lice, ticks and mites etc. However, domestic fly is the most common pest that spreads poultry diseases. An effective fly control program is adopted to minimize disease occurrence
- The poultry manure and exposed wet feed provide a suitable environment for breeding of house-fly. Therefore, manure management is of prime importance for house-fly reduction
- Fly problem is more common in cage layers compared to deep litter reared birds

### Tips to control domestic fly

1. Inspect the water lines regularly.
2. Identify the fly breeding areas and take the necessary measures to eradicate them immediately
3. Cracked eggs, dead birds and spilled feed are removed regularly and disposed of properly
4. Cooler days and months are suitable for manure removal as flies are less active
5. Provide proper ventilation and adopt good sanitation practices
6. Remove the vegetation around poultry sheds
7. Spray an insect growth regulator like pyriproxyfen on manure as it helps to prevent the development of fly larvae into adult flies
8. Add cryomyzine in feed at the dose rate of 50 gram per quintal of feed to kill the fly larvae in the poultry dropping
9. Use fogging repellents like cypermethrin or dichloroovas to control fly breeding around the shed
10. Keep sugar and insecticide mixed bait coated on gunny bags in different areas of the shed to control fly population

### Different methods to control rodents at poultry farms

One should not neglect the rodent problem and take the following control measures as presented in Fig. 2.10 and Fig. 2.11 respectively during the downtime and immediately after the sale of birds.

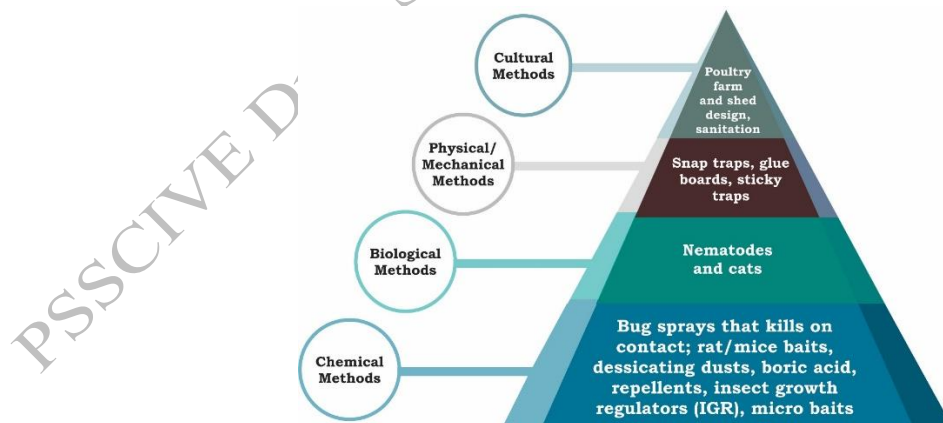


Fig. 2.10: Methods of rodent control

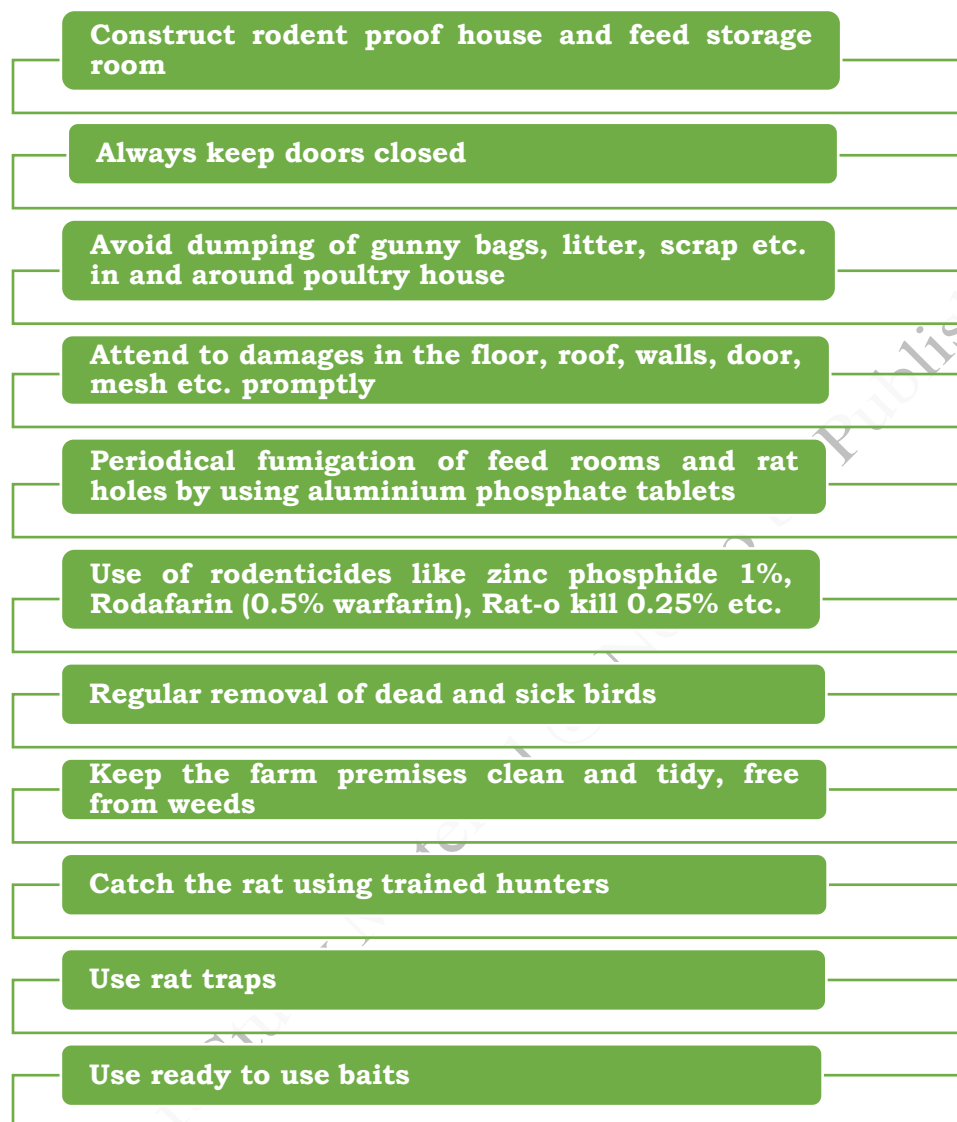


Fig. 2.11: Tips for rodent control

### Activities

**Activity 1:** Visit a poultry farm to study the procedure of disinfection of poultry sheds and biosecurity measures used there.

**Material required**

Pen, notebook and camera

**Procedure**

1. Visit a nearby poultry farm with your teacher.
2. Write the methods followed for disinfection and take photographs of the disinfectants being used there.

3. Write the different biosecurity measures adopted on a visited poultry farm.
4. Discuss it in your class.

## Check Your Progress

### A. Multiple Choice Questions

1. Conceptual biosecurity is also known as \_\_\_\_\_.  
(a) Structural biosecurity (b) Operational biosecurity  
(c) Locational biosecurity (d) All of the above
2. 1X concentration of formaldehyde gas can be useful for every \_\_\_\_\_ area.  
(a) 100 ft<sup>3</sup> (b) 500 ft<sup>3</sup>  
(c) 1000 ft<sup>3</sup> (d) None of these
3. Which one of the following is an example of water sanitizer  
(a) Bleaching powder (b) Iodophor compounds  
(c) Hydrogen peroxide (d) All of these
4. To adopt proper biosecurity measures minimum distance between breeder farm and commercial farm should be  
(a) 1 km (b) 2 km  
(c) 3 km (d) 4 km
5. Which method is used for the control of rodents  
(a) Biological (b) Physical  
(c) Chemical (d) All of these

### B. Fill in the Blanks

1. PPE stands for \_\_\_\_\_
2. The process of fumigation is performed using \_\_\_\_\_ gas.
3. Remove \_\_\_\_\_ birds immediately and dispose them properly.
4. \_\_\_\_\_ is the most common pest that spreads poultry diseases.
5. The fumigation of brooder house is carried out at least \_\_\_\_\_ hours before the arrival of chicks.

### C. Mark True or False

1. Fly problem is more common in cage layers compared to deep litter reared birds.
2. Cooler days and months are suitable for manure removal as flies are more active.
3. Fix the “restricted” signage board at the entrance of the poultry farm
4. The flame gun is always used for thatched houses.

5. During fumigation, add potassium permanganate first and then pour formalin to avoid explosion.

PSSCIVE Draft Study Material @ Not to be Published

## Module 3

# Documentation and Record Keeping

### Module Overview

Record keeping is an important aspect of poultry farms operations. Record keeping means systematic arrangement of documents. Records should be simple and easy to maintain and are useful for profitable poultry farming. Records give an indication of health, production performance as well as profit and loss statement which helps in taking decisions in a poultry farm. Thus, the importance of different types of records is described below.

### Learning Outcomes

After completing this module, you will be able to:

- Identify various types of documents and records required in poultry farming.
- Describe the importance of maintaining accurate and up-to-date records in poultry farming.
- Demonstrate the process of maintaining production records for broiler and layer farms.
- Explain the importance of financial records in poultry farming.

### Module Structure

Session 1: Various types of Documents and Records to be Maintained in Poultry Farming

Session 2: Various Aspects of Maintaining Records

Session 3: Production Records of Broiler and Layer Farm

Session 4: Financial Records



## SESSION 1: VARIOUS TYPES OF DOCUMENTS AND RECORDS TO BE MAINTAINED IN POULTRY FARMING

Records are maintained in a poultry farm for different purpose as shown in Fig.3.1.

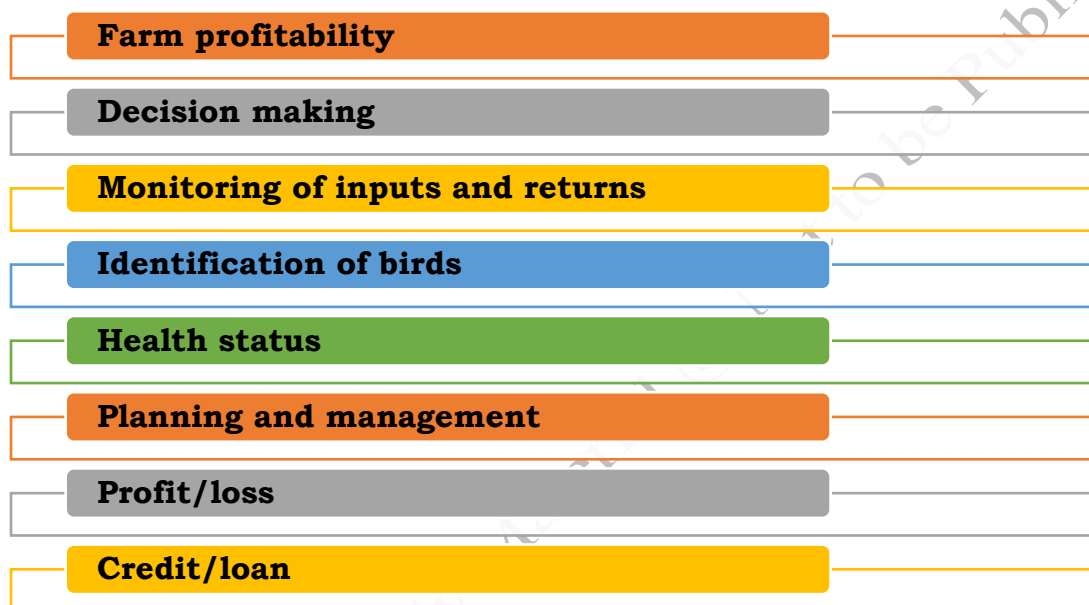


Fig. 3.1: Purposes of record keeping

### Types of Records

The poultry farmer has to maintain different records for production, diseases and feeding etc. for maintaining precise information about various activities for the smooth running of the farm. It also helps to reduce any doubts and errors. The following table 3.1 shows various types of records and entries to be recorded.

Types of records	Type of entries to be recorded
Identification records	Identification mark (Temporary/permanent)
Breeding records	Fertility, Parents and offspring record

Production records	Egg production, Body weight and FCR
Feeding records	Feed intake
Diseases, Vaccination and Medication records	Morbidity, mortality, vaccination, de-worming and treatment
Financial records	Profit loss, credit loan, receipts, insurance and bank interest

**Table 3.1: Types of records**
**Purpose of various types of records**

Records are primarily maintained for permanent memory of any event occurred in the farm. It includes all types of records related to flock size, production and health status of the birds etc. These records help to analyze current status of the farm and future strategy for further improvement to achieve short term and long term goals. Different records serve different purposes and as shown in Table 3.2.

**Table 3.2: Purpose of records**

S. No.	Type of registers and records	Purpose
1.	Attendance Register	For Labour Salary and job distribution
2.	Equipment Register	For distribution of equipment as per need in various houses
3.	Feed ingredient, feed additives and feed supplement Register	To keep the record of feed ingredients
4.	Feed Register	To keep the record of compounded feed
5.	Medicine Register	For recording of routine medication, vaccination and de-worming of birds
6.	Petty items and miscellaneous purchase Register	For entry of other consumable items
7.	Layer farm Register	For recording of egg production, feed consumption, mortality etc.
8.	Broiler farm Register	For recording of body weight, feed consumption, mortality etc.
9.	Health and medical Records	For recording of unproductive and diseased birds
10.	financial Records	For recording credit/loan, receipt, insurance and expenditure
11.	Production Record	For recording daily egg production, broiler production per batch
12.	Sales Record	For keeping records of egg sale, birds sale, manure sale, gunny bag sale etc.

13.

Dead Stock Register

For recording of dead stock items

## Activities

**Activity 1:** Visit a poultry farm to study different types of poultry records.

### Material required

Notebook and Pen

### Procedure

1. Visit a nearby poultry farm with your teacher.
2. Note down the names of various poultry records and registers.

## Check Your Progress

### A. Multiple Choice Questions

1. Records give an indication of following parameters in a poultry farm.
 

(a) Health	(b) Production
(c) Profit and loss statement	(d) All of the above
2. Records are maintained in a poultry farm assessing.....
 

(a) Farm profitability	(b) Decision making
(c) Planning and management	(d) All of these
3. Fertility, Parents and offspring record are known as
 

(a) Financial records	(b) Breeding records
(c) Production Record	(d) None of these
4. For egg laying birds.....register is used for recording egg production.
 

(a) Broiler farm Register	(b) Layer farm Register
(c) Feed Register	(d) All of these
5. For labour salary and job distribution.....register is used.
 

(a) Health and medical Register	(b) Sales register
(c) Attendance Register	(d) All of these

### B. Fill in the Blanks

1. Record keeping means .....arrangement of documents.
2. For recording credit, loan, receipt, insurance and expenditure .....records are required.
3. .... register record recognition of individual birds.
4. For entry of other consumable items.....register is used.

5. To keep the record of compounded feed.....register is used.

### **C. Mark True or False**

1. Record keeping is not an important aspect of poultry farms operations.
2. Records should be simple and easy to maintain.
3. Medication records also depicts with vaccination.
4. Broiler farm register are used for recording of egg production.
5. Health and medical records are used for recording of unproductive and diseased birds.

## **SESSION 2: VARIOUS ASPECTS OF MAINTAINING RECORDs**

Health and medical records are maintained to know the well being of the flock. These records are essential for disease prevention and control.

### **Flock health record**

It includes details of vaccination, medication (medicines used in routine farm practices for prevention of diseases) and treatment of birds performed routinely in the farm. A model format for flock health record is presented here under in Table 3.3.

**Table 3.3: A model format for flock health record**

Name/Address of Farm _____		No. of chicks _____			
Source of stock _____		Date of hatch _____			
Vaccination Record: _____					
Name of vaccine		Date of vaccination			
Medication Record:					
Name of medicine		Date of administration			
Treatment Record:					
Date of symptoms first noticed	Signs and symptom noticed	No. of birds affected	Medicine used	Mode of Administration	Duration

### Daily Mortality Record

It is maintained to get an idea of the number of birds that die daily in the farm. The format for daily mortality record is presented below in Table 3.4.

**Table 3.4: Daily mortality record of birds**

Daily Mortality Record						
						Date: _____/_____/20____
S. No.	House no.	Sex	Breed	Wing band/ Leg band no.	Cage no.	Remarks if any

The dead birds are needed to be sent for post mortem examination by experts to know the cause of the death. The format for requisition is presented below.

Date:     /   /20\_\_

**The In charge,  
Department of Veterinary Pathology/Laboratory,**

Date of hatch	:
Identification no. if any	:
Date of death	:
Age	:
Sex	:
Breed	:
Strain/variety	:
Symptoms observed if any	:
Treatment given	:

It is maintained to get an idea about the details of the persons visiting the farm. The format for visitors log book is presented below in Table 3.5.

**Table 3.5: Visitors Log book**

Visitors Log book					
S. No.	Date	Time	Name of visitor	Purpose	Signature

**Note:** Visitors entry must be restricted at poultry farm premises.

### Activities

**Activity 1:** Prepare the format for requisition of post mortem examination.

**Material required**

Pen and Notebook

**Procedure**

1. Visit a nearby poultry farm with your teacher.
2. Note down the format for requisition of post mortem examination.

### Check Your Progress

**A. Mark True or False**

1. Health and medical records are maintained to know the well being of the flock.
2. Vaccination records are essential for disease prevention and control.
3. Medication record gives information about de-worming also.
4. Visitors must be encouraged in entering poultry farm premises.
5. Daily mortality record indicates live number of birds.

## SESSION 3: PRODUCTION RECORDS OF BROILER AND LAYER FARM

Production records of broiler and layer farms are maintained to get an idea about the inputs and outputs in the farm and plan accordingly. Production records help to ensure profitability of the farm.



**Broiler farm record**

This is maintained to keep the record of all the routine operations in the broiler farm. Broiler farm records are conveniently maintained in the following format.

**Format of Broiler Farm Record****Name and address of the farm:**

1. Batch No.
2. Date of arrival of the chicks:
3. Name and address of the hatchery:
4. Brand (commercial) name of the chicks:
5. Number of chicks received:
  - (a) Healthy chicks:
  - (b) Weak chicks if any:
  - (c) Dead chicks if any:
6. Number of chick housed:
7. No. of birds sold and their age:
8. Total weight and average weight/bird:
9. Rate/kg and total receipts by sale of birds:
10. Other receipts by sale of gunny bags, manure etc.:
11. Total receipt generated:
12. Expenses:
  - (a) Chicks (no. and cost):
  - (b) Feed (kg and cost):
  - (c) Medicines and vaccines cost:
  - (d) Labour charges:
  - (e) Electricity, water, transport, taxes etc.:
  - (f) Bank interest and insurance premium:
  - (g) Other miscellaneous expenses:
  - (h) Total expenses (a to g):
13. Total net income generated:
14. Net income/bird:
15. Net income/kg weight sold:
16. General remarks, if any

**Broiler flock strength register**

It is maintained to know the flock size in the broiler farm at a specified time. The format for broiler flock strength is presented below in Table 3.6.

**Table 3.6: Broiler flock strength register**

<b>Broiler flock strength register</b>							
<b>Date</b>	<b>Age in days</b>	<b>Opening balance</b>	<b>Deaths and culls</b>	<b>Sales</b>	<b>Feed issued (kg)</b>	<b>Medicines &amp; vaccines given with dose &amp; cost</b>	<b>Remarks (other details)</b>
	1						
	-						
	-						
	42						

### **Layer farm records**

This is maintained to keep the record of all the routine operations in the layer farm. Layer farm records are conveniently maintained in the following formats according to the different periods of rearing.

- Brooding period (0 to 8 weeks)
- Growing period (9 to 20 weeks )
- Laying period (21 week onwards)

### **Brooder flock records**

These records are maintained to get information about daily farm operations of a brooder house. The format for brooder flock records is presented below in Table 3.7.

**Table 3.7: Brooder flock record**

<b>Brooder flock record</b>			
Name and address of the Hatchery	Date of Hatch	No. of birds	Strain

<b>General information of brooder house</b>	
No. of chicks at start	
Feed consumed/chick	
Total feed consumed	
Mortality/culling till 8 wk	
% Mortality	
Vaccination and medication	
Beak-trimming/debeaking	
Remarks if any	

<b>Daily record of brooder house</b>		
Days	Feed intake (kg)	Mortality (No.)
Monday		
Tuesday		
Wednesday		
Thursday		
Friday		
Saturday		
Sunday		
Total		

### **Grower flock records**

These records are maintained to get information about daily farm operations of a grower house. The format for grower flock records is presented below in Table 3.8.

**Table 3.8: Grower flock record**

General information of grower house	
No. of birds shifted from brooder to grower house	
Feed consumed/grower birds	
Total feed consumed	
Mortality/culling till 20 wk	
% Mortality	
Vaccination and medication	
Beak-trimming/debeaking	
Remarks if any	

Daily record of grower house		
Days	Feed intake (kg)	Mortality (No.)
Monday		
Tuesday		
Wednesday		
Thursday		
Friday		
Saturday		
Sunday		
Total		

**Layer flock records**

These records are maintained to get information about daily farm operations of a layer house. The format for layer flock records are presented below in Table 3.9.

**Table 3.9: Layer flock record**
**Daily Egg production Record**

House No. \_\_\_\_\_

Breed/Strain \_\_\_\_\_

Month \_\_\_\_\_

Year \_\_\_\_\_

Date	Opening balance of eggs	Egg Production	Cracked Eggs	Egg Sold	Closing balance of eggs	Remarks if any
01/.../20....						
02/.../20....						
Total						

**Layer Performance Record**

House No. \_\_\_\_\_

Breed/Strain \_\_\_\_\_

Month \_\_\_\_\_

Year \_\_\_\_\_

Date	Opening balance of birds	Age of birds in weeks	Total daily egg production	Mortality	Culling	Daily feed given	Closing balance of birds
01/.../20...							
02/.../20...							
03/.../20...							
04/.../20...							
05/.../20...							
06/.../20...							
07/.../20...							
08/.../20...							
09/.../20...							
Total							

### Activities

**Activity 1:** Visit a poultry farm to study of broiler and layer performance record

**Material required**

Pen and Notebook

**Procedure**

1. Visit a nearby poultry farm with your teacher
2. Note down the broiler and layer performance record of the farm.

### Check Your Progress

#### A. Multiple Choice Questions

1. Age of brooder flock ranges ..... weeks in a poultry farm.  
(a) 0 to 8 weeks (b) 9 to 20 weeks  
(c) 21 weeks onwards (d) None of these
2. Age of grower flock ranges ..... weeks in a poultry farm.  
(a) 0 to 8 weeks (b) 9 to 20 weeks  
(c) 21 weeks onwards (d) None of these
3. Age of layer flock ranges ..... weeks in a poultry farm.  
(a) 0 to 8 weeks (b) 9 to 20 weeks  
(c) 21 weeks onwards (d) None of these

#### B. Mark True or False

1. Production records help to ensure profitability of the farm.
2. Broiler farm records are maintained for egg purpose birds.
3. Layer farm records are maintained for meat purpose birds.

## SESSION 4: FINANCIAL RECORDS

Financial records are needed to assess the profitability of the farm and to know the economic viability of different farm operation. These records are needed for routine audit of the farm.

### Financial record of broiler farm

Feed accounts for nearly 70% of the total production cost in broiler farming. Remaining 30% of the cost is required for purchase of chicks, medicines, vaccines, litter material, labour charges, electricity etc. It includes expenditure record, income record and profit/loss statement.

## Expenditure record

This record is maintained to keep the details about purchasing of different input items like chick, feed, medicine, vaccines etc. for successful farming. The format for expenditure record is presented below in Table 3.10.

**Table 3.10: Expenditure record of broiler farm**

Expenditure record of broiler farm							
No. of chicks purchased..... Date of purchase.....							
Expenditure in the year..... from Poultry Unit (in Rs.)							
S. No.	Batch	Chick cost	Feed cost	Medicine & Vaccine cost	Labour cost	Miscellaneous cost	Total Expenditure
1.	I Batch						
2.	II Batch						
3.	III Batch						
4.	IV Batch						
5.	V Batch						
6.	VI Batch						
<b>Total</b>							

**Note:** Miscellaneous cost includes cost of bedding material, electricity, repairing etc.

## Income/Receipt record

This record is maintained to keep the details about selling of different output items like birds, manure, gunny bags etc. for successful farming. The format for income/receipt record is presented below in Table 3.11.



**Table 3.11: Income/Receipt record of broiler farm**

<b>Income/Receipt record of broiler farm</b>							
<b>S. No.</b>	<b>Batch</b>	<b>No. of birds sold</b>	<b>Selling rate/kg live weight</b>	<b>Total Receipt generated from birds sale</b>	<b>Receipt generated from selling of Gunny bags</b>	<b>Receipt generated from selling of Manure</b>	<b>Total Receipt</b>
1.	I Batch						
2.	II Batch						
3.	III Batch						
4.	IV Batch						
5.	V Batch						
6.	VI Batch						
<b>Total</b>							

### **Profit/loss statement**

This record is maintained to keep the track of profit/loss incurred due to rearing of different batches of the broilers for successful farming. The format for profit/loss record is presented below in Table 3.12.

**Table 3.12: Profit/loss statement of a broiler farm**

<b>Profit/loss statement of a broiler farm</b>				
<b>S. No.</b>	<b>Batch</b>	<b>Total Expenditure</b>	<b>Total Income/Receipt</b>	<b>Profit/loss</b>
1.	I Batch			
2.	II Batch			
3.	III Batch			
4.	IV Batch			
5.	V Batch			
6.	VI Batch			
<b>Total</b>				

### **Financial record of Layer farm**

In a layer farm, feed accounts nearly 70-75% of total production cost. Remaining 25-30% of the cost is required for purchase of chicks, medicines,

vaccines, labour charges, electricity etc. It includes expenditure record, income record and profit/loss statement.

### **Expenditure record**

This record is maintained to keep the details about purchasing of different input items like chick, feed, medicine, vaccines, egg trays etc. for successful layer farming. The format for expenditure record is presented below in Table 3.13.

**Table 3.13: Expenditure record of layer farm**

<b>Expenditure record of layer farm</b>							
No. of chicks purchased..... Date of purchase.....							
Expenditure in the year..... from Poultry Unit (in Rs.)							
<b>S. No.</b>	<b>Month</b>	<b>Chick cost</b>	<b>Feed cost</b>	<b>Medicine &amp; Vaccine cost</b>	<b>Labour charges</b>	<b>Miscellaneous</b>	<b>Total</b>
1.	January						
2.	February						
3.	March						
4.	April						
5.	May						
6.	June						
7.	July						
8.	August						
9.	September						
10.	October						
11.	November						
12.	December						
<b>Total</b>							

### **Income/Receipt record**

This record is maintained to keep the details about selling of different output items like eggs, culled birds, spent hens, manure, gunny bags etc. for successful layer farming. The format for income/receipt record is presented below in Table 3.14.

**Table 3.14: Income/Receipt record of layer farm**

<b>Income/Receipt record of layer farm</b>									
Income generated in the year ..... from Poultry Unit (in Rs.)									
S. No.	Month	Egg sold	Selling price of egg	Total income generated from selling of eggs	Income generated from selling of culled birds	Income generated from selling of spent hen	Income generated from selling of manure	Income generated from selling of gunny bags	Total income generated
1.	January								
2.	February								
3.	March								
4.	April								
5.	May								
6.	June								
7.	July								
8.	August								
9.	September								
10.	October								
11.	November								
12.	December								
<b>Total</b>									

**Profit/loss statement**

This record is maintained to keep the track of profit/loss incurred due to rearing of layer birds. The format for profit/loss record is presented below in Table 3.15.

**Table 3.15: Profit/loss statement of a Layer farm**

Profit/loss statement of a Layer farm				
S. No.	Batch	Total Expenditure	Total Income/Receipt	Profit/loss
1.	January			
2.	February			
3.	March			
4.	April			
5.	May			
6.	June			
7.	July			
8.	August			
9.	September			
10.	October			
11.	November			
12.	December			
<b>Total</b>				

## Activities

and layer farms

### **Material required**

Pen, Calculator and Notebook

### **Procedure**

1. Visit a nearby poultry farm with your teacher.
2. Note down the income and expenditure record of broiler and layer farms.

## Check Your Progress

### **A. Mark True or False**

1. Financial records are also needed for routine audit of the farm.
2. In broilers, feed accounts nearly 50% of total production cost.
3. About 30% of the cost is required for purchase of chicks, medicines, vaccines, litter material, labour charges, electricity etc in layer farm.

## **Module 4**

### **Setting up a Small Poultry Farm**

#### **Module Overview**

'Poultry' includes all the domestic species of birds (chicken, duck, quail, turkey, guinea fowl, geese, emu, etc.) which are reared for economic purpose. Thus, when we speak of poultry farm, it may include a farm housing any of the species. However, in our country, chicken is the predominant domesticated species. Thus, in this unit we will study the types, benefits, design and layout of a small-scale broiler and layer farm. A small-scale poultry farm may comprise of 3000 broilers and 5000 layers.

#### **Learning Outcomes**

After completing this module, you will be able to:

- Identify the various types of poultry species.
- Explain the criteria for selecting poultry birds for meat and egg production.
- Identify the components of a poultry house.
- Discuss strategies for resource generation and management in poultry farming
- Describe relevant acts, regulations, and organizations governing the poultry industry,

#### **Module Structure**

Session 1: Types and Benefits of Poultry

Session 2: Choosing Birds for Meat Production and Egg Production

Session 3: Construction of Poultry House, Equipment and Materials

Session 4: Resource Generation and Management of Poultry for Profit

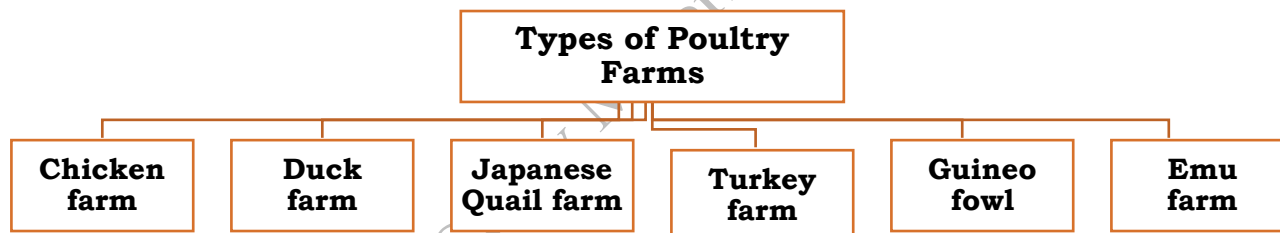
Session 5: Acts, Regulation and Organizations related to Poultry

## **SESSION 1: TYPES AND BENEFITS OF POULTRY FARMS**

In this session, we shall discuss about the different types and benefits of poultry farms. The different types of poultry farms vary region wise and the socio-economic status of the entrepreneurs.






### **Types of poultry farms**

There are different types of poultry farms in India. The predominant types of poultry farm in our country have been elucidated in Fig. 4.1 and the purpose has been depicted in Table 4.1.



*Fig. 4.1: Types of poultry farm*

**Table 4.1: Purpose of different poultry farms**

1.	<b>Broiler Farm:</b> Chicken reared for meat purpose		
2.	<b>Layer Farm:</b> Chicken reared for eggs		
3.	<b>Duck Farm:</b> Ducks reared for egg and meat, popular in coastal states.		



4.	<p><b>Quail Farm:</b> Japanese quail reared for egg and meat. The meat of quail is popular for its delicacy.</p> <div data-bbox="388 371 773 753" data-label="Image"> </div> <div data-bbox="938 363 1323 747" data-label="Image"> </div>
5.	<p><b>Turkey Farm:</b> Turkey is reared for meat especially in winters and also termed as the “thanks giving bird”.</p> <div data-bbox="375 911 760 1295" data-label="Image"> </div> <div data-bbox="938 911 1323 1295" data-label="Image"> </div>
6.	<p><b>Guinea Fowl:</b> Mainly reared for meat and has high disease resistance.</p> <div data-bbox="357 1390 777 1774" data-label="Image"> </div> <div data-bbox="927 1390 1338 1774" data-label="Image"> </div>

### Site selection before setting up a broiler/layer farm

The points which need to be considered before selecting a site for setting up a commercial broiler farm are given in Fig 4.2.

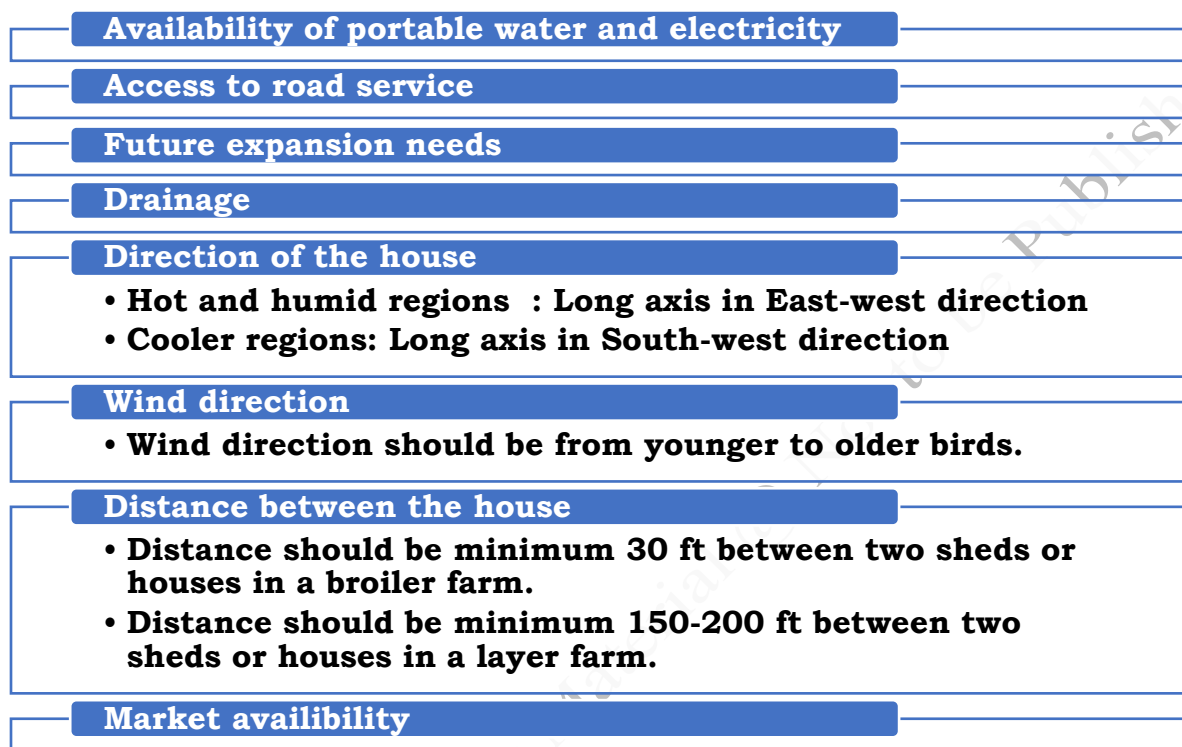


Fig 4.2: Points considered before setting up a broiler farm

### Small scale Broiler Farm

Broilers are unsexed chicken reared till 6 weeks of age for meat production. Before starting a small-scale broiler farm, we need to systematically plan the site for setting up the farm, design and layout, economic feasibility for construction of the poultry farm, equipment required in the poultry farm and the availability of the market for selling the broilers. You have already studied the different types of housing and rearing systems of poultry birds in class XI. Commercial broilers are basically reared in deep litter system and 1.2 sq. ft floor space per broiler is provided for broilers till 6 weeks of age.

The broilers may be reared in All-in all out system and Multiple batch system i.e. rearing birds of same age at a time and in multiple batches. The desirable conditions for optimum production in broilers is 22-30°C

environmental temperature, relative humidity is 30-60%, ammonia less than 25 ppm and litter moisture 15-25%.

### Small Scale Layer Farm for Egg Production

Layers are female chicken reared till 72 weeks of age for egg production. Young chicks are reared till 8 weeks of age in a brooder house and the growers (9-18 weeks) are reared in grower house followed by layers (19-72 weeks) housed in layer cages. Most aspects for establishing a layer farm are similar to a broiler farm. Commercial layers are basically reared in cage system. The number of buildings in a layer farm depends on the length of intervals between introductions of different batch of chicks. Thus, a layer farm can be of :

- **1+1+1 pattern:** one brooder house + one grower house + one layer house
- **1+1 pattern:** one brooder cum grower house + one layer house

### 1.5 Benefits of poultry farms

A poultry farm includes one or many houses. Housing of poultry for meat or egg production is necessary because of the following benefits as shown in Fig. 4.3.

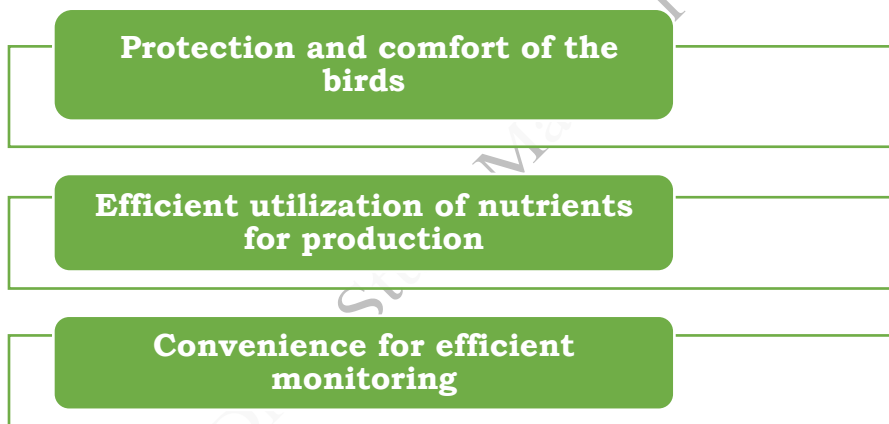


Fig. 4.3: Benefits of poultry farming

## Activities

**Activity 1:** Comparison of scale of production and size of different poultry farms

### Material required

Writing material

### Procedure

1. Visit different poultry farms in locality with your teacher.

2. Note down the equipment used in the different house, house design, routine activities of the farm
3. Identify the difference in the scale of production and size of different farms
4. Present it before the class.

## Check Your Progress

### A. Multiple Choice Questions

1. Poultry includes \_\_\_\_\_  
(a) Chicken (b) Turkey  
(c) Both chicken and turkey (d) None
2. Turkeys are reared for  
(a) Eggs (b) Meat  
(c) Both eggs and meat (d) None
3. Distance should be minimum \_\_\_\_\_ ft between two sheds in a broiler farm  
(a) 30 (b) 60  
(c) 90 (d) 120
4. Broilers are reared in  
(a) All in all out system  
(b) Multiple batch system  
(c) Both all in all out and multiple batch  
(d) None
5. Commercial broilers are basically reared in  
(a) Deep Litter System  
(b) Cage system  
(c) Both deep litter and cage system  
(d) None

### B. Fill in the Blanks

1. The longitudinal axis of the house in hot and humid climate is in \_\_\_\_\_ direction.
2. \_\_\_\_\_ floor space per broiler is provided for broilers till 6 weeks of age
3. The desirable temperature for optimum production of broiler is \_\_\_\_\_.
4. Young chicks are reared till \_\_\_\_\_ weeks of age in brooder house.
5. Commercial layers are basically reared in \_\_\_\_\_ system.

### C. Mark True or False

1. A small scale layer farm comprises of 5000 layers.
2. Japanese quails are reared for only egg production.

3. Wind direction should be from old to young birds.
4. Ammonia level in the broiler house should be less than 25 ppm.
5. Layers are female chicken reared till 72 weeks of age.

### SESSION 2: CHOOSING BIRDS FOR MEAT PRODUCTION AND EGG PRODUCTION

It is quite important to set one's priorities before starting a poultry farm. This depends on the market prospects, socio economic status and experience of the person. Accordingly, one can opt for a broiler farm or layer farm. In some instances, there may be a high demand of fancy birds like Silke, Kashmir Faverolla, Bantam, game birds like Aseel and native birds like Kadaknath due to the black colour meat speciality. Some of the popular indigenous breeds and improved varieties are shown in Table 4.2.

A new entrant in a poultry business can start with rearing broilers in small continuous batches of 500-1000 birds (weekly/fortnightly/monthly). As returns in a broiler farm are quicker, they can be reared in small batches with a minimum infrastructure as compared to layers. However, one should also keep in mind that there are more fluctuations in broiler prices compared to egg prices.

#### Choosing the type of bird

Both for broilers and layers, various improved broiler and layer strains are available. Various factors which determine the choice of a broiler strain are availability of the strain in the nearby commercial hatchery, chick weight and previous performance records of the strain. A few popular commercial broiler strains are Cobb-400, Cobb-430 y, Ross, Hubbard, Hybro, Starbro etc.

White Leghorn layer variety is used globally for production of improved strains. Some of the examples of popular commercial layer strains are BV 300, Hyline, Lohmann, Hisex, Bovans etc.

**Table 4.2: Types of indigenous (desi) birds**

Desi breeds and improved variety of chicken	
<p><b>Kadaknath:</b> It is also known as “Kalamasi” famous for black meat.</p>	
<p><b>Aseel birds:</b> Also known as “game bird” and used for entertainment.</p>	
<p><b>Narmada Nidhi:</b> Colour bird used for meat and egg production</p>	



## Activities

**Activity 1:** Study poultry breeds and market demand

### Material required

Writing material

### Procedure

1. Discuss the selection of the poultry sector
2. Note down the different poultry breeds
3. Discuss the market demand
4. Present it before the class

## Check Your Progress

### A. Multiple Choice Questions

1. Aseel is a \_\_\_\_\_  
 (a) Fancy bird (b) Egg type  
 (c) Game (d) None
2. BV 300 is a commercial  
 (a) Broiler (b) Layer  
 (c) Both broiler and layer (d) None
3. Cobb 400 is a commercial  
 (a) Broiler (b) Layer  
 (c) Both broiler and layer (d) None
4. Returns in a broiler farm are  
 (a) Quick (b) Slow  
 (c) Difficult to calculate (d) None
5. Setting up of the type of poultry farm depends upon  
 (a) Market prospects (b) Socio economic status  
 (c) Both (d) None

### B. Fill in the Blanks

1. \_\_\_\_\_ layer variety is used globally for production of improved strains.
2. Kadaknath is also known as \_\_\_\_\_.
3. \_\_\_\_\_ bird is used entertainment.
4. Bantam is a \_\_\_\_\_ bird.
5. The colour of the meat of Kadaknath is \_\_\_\_\_.

### C. Mark True or False

1. One can start with rearing broilers in small continuous batches.
2. There are more fluctuations in egg prices compared to broiler prices.



3. The choice of a broiler strain depends upon the previous performance record of the strain.
4. Ross is a commercial layer strain,
5. Lohmann is a commercial broiler strain

### SESSION 3: CONSTRUCTION OF POULTRY HOUSE, EQUIPMENT AND MATERIALS

#### INTRODUCTION

There are various aspects taken into consideration while constructing a poultry house. Depending upon the type of poultry farm i.e. broiler or layer farm, a proper layout of the farm should be designed.

#### Layout of a small poultry farm

A poultry farm comprises of one or more houses such as broiler house and layer house as given in Session-1. There are different types of houses based on system of rearing, type of roof etc. as shown in Fig. 4.4.

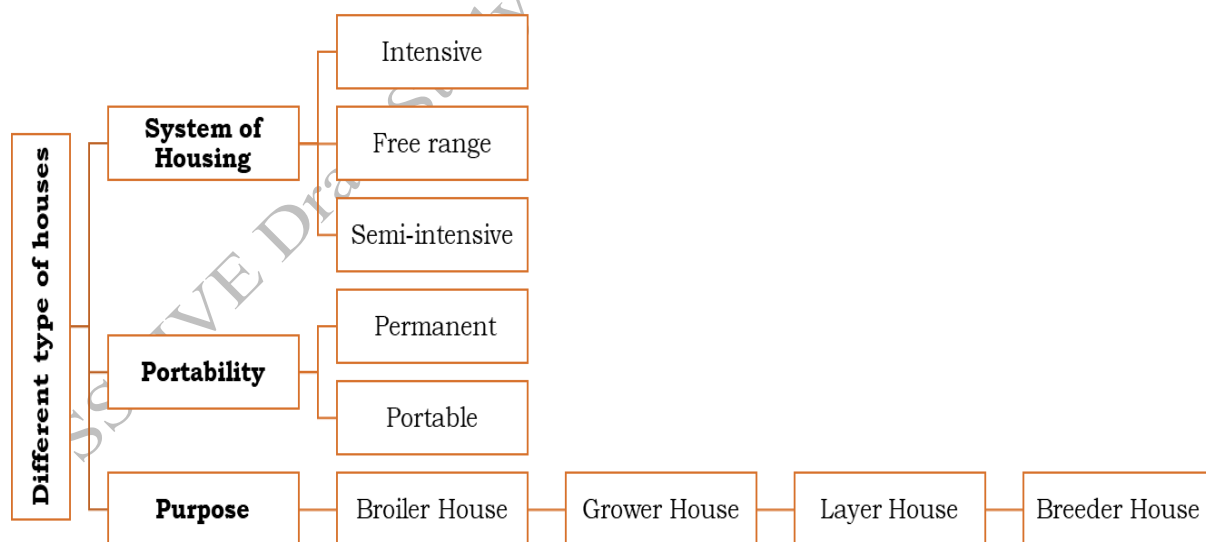


Fig 4.4: Classification of different types of poultry houses

The required necessities for a poultry house are the following as shown in Fig. 4.5:

Width	<ul style="list-style-type: none"> <li>• Broiler house : maximum 30 feet</li> <li>• Layer house: maximum 45 feet</li> </ul>
Length	<ul style="list-style-type: none"> <li>• Depends on the number of birds to be housed</li> </ul>
Foundation	<ul style="list-style-type: none"> <li>• Concrete with 1 to 1 ½ feet above the ground level.</li> </ul>
Height	<ul style="list-style-type: none"> <li>• Broiler house : Eves height minimum 6-7 feet and gable height 10-12 feet</li> <li>• Layer house: Eves height minimum 15-18 feet and gable height 20-25 feet</li> </ul>
Floor type	<ul style="list-style-type: none"> <li>• Concrete floor</li> </ul>
Doors	<ul style="list-style-type: none"> <li>• Must open outside</li> </ul>
Sidewall or Parapet wall	<ul style="list-style-type: none"> <li>• Broiler house: 1 to 3 feet height sidewall depending upon the climatic condition of the region. The rest portion covered with wire mesh (1" 16 gauge ) upto eves.</li> <li>• Layer House: Sidewall is made up of wire mesh (1.5 " 16 gauge)</li> </ul>
Overhang	<ul style="list-style-type: none"> <li>• Minimum of 3 feet</li> </ul>

Fig 4.5: Dimensions of a poultry house

### Materials required for construction of poultry sheds for small scale poultry production

- Different materials are required for construction of roof, floor, walls and doors of poultry house.

- Roof is generally thatched, tiled, covered with asbestos or iron sheets, asphalt or bitumen depending upon the financial condition, climate and availability of materials in the region. Generally for small scale poultry farming, tiled roofs are preferable.
- In hot and humid parts of the country, foggers and sprinklers are used to keep the house cool.

**Table 4.3: Equipment and tools required for setting up of a small scale poultry farm**

S. No.	Equipment	Usage
1.	Feeders	For providing feed to poultry birds
2.	Waterers	For providing water to poultry birds
3.	Nests	For laying birds to lay eggs maintained under deep litter system
4.	Perches (Roosts):	Used for desi birds as a resting place in deep litter system
5.	Brooders	For providing warmth to the young chicks
6.	Weighing balance	For periodic weighing of birds and feed
7.	Vaccinator	For vaccination of poultry birds
8.	Debeaker/ beak trimmer	For trimming of beak
9.	Catching devices	It includes catching hooks and crates for catching and holding birds
10.	Candler	For candling of eggs
11.	Egg filler flats	For collection of eggs
12.	Incinerator	For disposal of the dead birds
13.	Blow lamp/ flame gun	For disinfection of the farm

### Activities

**Activity 1:** Study a small poultry farm

**Material required**

Writing material

**Procedure**

1. Visit a nearby poultry farm with your teacher
2. Study the design and construction
3. Note down the different materials used

4. Present it before the class

### Check Your Progress

#### A. Multiple Choice Questions

- The maximum width of a broiler house can be \_\_\_\_\_ feet.  
(a) 10 (b) 20  
(c) 30 (d) 40
- The minimum overhang of the poultry house is \_\_\_\_\_ feet.  
(a) 1 (b) 2  
(c) 3 (d) 4
- In hot and humid regions, \_\_\_\_\_ are used to keep the house cool.  
(a) Fogger (b) Sprinkler  
(c) Both a and b (d) None
- \_\_\_\_\_ are used for laying birds to lay eggs.  
(a) Feeder (b) Drinker  
(c) Perches (d) Nests
- \_\_\_\_\_ is used for disposal of dead birds.  
(a) Dustbins (b) Drainage system  
(c) Incinerators (d) Open field

#### B. Fill in the blanks

- \_\_\_\_\_ is used for candling eggs.
- \_\_\_\_\_ is used for collection of eggs.
- Blow lamp is used for \_\_\_\_\_ of the farm.
- \_\_\_\_\_ is used for trimming of the beak.
- \_\_\_\_\_ devices include hooks and crates.

#### C. Mark 'True' or 'False'

- Roosts are used for resting places of birds in deep litter system.
- Foundation of the poultry farm building is made of mud.
- Asbestos roof is preferable for small scale poultry farming.
- Vaccinator is used for vaccination of the birds.
- The length of the poultry house depends on the number of birds to be housed.

## SESSION 4: MANAGEMENT OF POULTRY FOR PROFIT

For profit generation in a poultry farm, it is necessary to plan in advance the size of the flock depending upon the socio-economic feasibility and the market prospects of the poultry products nearby.

### Business plan

Small poultry farmer should clearly make a business plan pertaining to the intervals in which batches of broiler chicks will be procured in the farm. It may be weekly, fortnightly or monthly. Weekly batches of broiler chicks is always a good option for a small scale poultry farm as price fluctuations of broilers are quite common. As stated in session 2, one can start with broilers in small batches of 500-1000 chicks in a continuous cycle of multiple batches of broilers. Layers are reared with a minimum batch of 5000 birds to ensure good returns. Thereafter, detailed plan of the farm is planned in terms of equipment, housing, feed and all requirements including adequate bio-security measures.

## Financial and human resources and management

### Broiler economics on a fortnightly batch system with 1000 birds per batch

#### Assumptions:

1. Down time – 2 weeks;
2. Rearing period – 6 weeks.
3. Cost of poultry house construction – Rs. 200/sq.ft
4. Cost of other buildings construction – Rs.250sq.ft. and
5. Cost of equipment – Rs.10/bird
6. Cost of day-old broiler chicks – Rs. 35/chick.
7. Cost of medicine, vaccines, electricity, and litter – Rs. 6 / bird.
8. Extra chicks per batch provided – 2%
9. Mortality (other than extra chicks of 2%). – 3%
10. Average body weight at six weeks (market age) – 2.4 kg / bird
11. Average feed consumption up to market age – 4 kg / bird (FCR-1.67)
12. Manure production – 4 Kg / bird.
13. Cost of feed – Rs.30/bird
14. Selling price of live chicken – Rs.75 / kg
15. Selling price of manure – Rs. 700 / tonne
16. Bank interest – 8 % / annum
17. Depreciation Cost on Fixed Capital - 5%/year
18. Insurance of Birds -Rs 0.50/bird

I. Fixed Capital (Non-recurring expenditure):			
1)	Cost of construction of poultry house: @ Total floor space – 4000 sq. ft. (1.2 sq.ft./bird; 1000 birds / batch; 4 batches (3 houses with birds + 1 house empty) @Rs. 200 / sq.ft. (4800x 200)		960000
2)	Cost of construction of feed mill and store room @1,200 sq.ft. @Rs.250 / sq.ft. (1200x250)		300000
3)	Cost of bore well, water tank and related pipelines		70000

	4)	Cost of feed grinder (mini-type)	25000
	5)	Cost of equipment (feeder, waterers, platform weighing scale, brooders etc.) @ Rs.10 / bird for 3000 birds	30000
		<b>Total fixed capital</b>	<b>13,85,000</b>
<b>II.</b>	<b>Working Capital</b>		
	1)	Cost of chicks - 3 batches @ Rs.35 / chick	1,05,000
	2)	Cost of feed Feed consumption by 3 batches @ Rs. 30 / kg feed @ 3000 birds (12x3000x 30)	1,080,000
	3)	Cost of medicine, vaccine, electricity, litter etc. @ average cost for 3 batches- Rs.6 / bird @ 3000 birds (3000x6)	18,000
		<b>Total working capital</b>	<b>12,03,000</b>

**Total capital investment needed = Fixed capital + Working capital**  
**= Rs. 25, 88,000**

S. No.	Total Capital Investment	Margin Money/ Farmer's Share (15%)	Bank Loan
1.	Rs. 25,88,000	Rs. 3,88,200	Rs. 21,99,800

<b>III.</b>	<b>Annual Recurring Expenditure:</b>		
	1)	Cost of day-old chicks @ 26 batches @Rs.35 / chick	9,10,000
	2)	Cost of feed -26 batches @ Rs.30/ kg feed (4x1000x30x26)	31,20,000
	3)	Cost of medicine, vaccine, electricity, litter etc. - 26 batches @ Rs.6 / bird (26x1000x6)	1,56,000
		<b>Total annual recurring expenditure</b>	<b>41,86,000</b>
<b>IV.</b>	<b>Annual Returns:</b>		
	1)	By sale of live broilers @ 3% mortality (excluding free chicks of 2%) @1000 birds / batch @26 batches / year @ Rs.80 kg live weight @ average bird weight – 2.4 kg (1000x0.97x26x80x2.4)	48,42,240
	2)	By sale of manure @ 4 kg / bird @ Rs.700 / tonne @ 1000 birds / batch	72,800

	@ 26 batches / year (4x1000x26x0.7)	
	<b>Total annual returns</b> (annual total gross income)	<b>49,15,040</b>

Gross profit per annum = Annual total gross income – total annual expenditure  
 = 49,15,040-41,86,000  
 = 7,29,040

Bank interest over capital investment (8% p.a.)

= 0.08 x 21,99,800  
 = Rs. 1,75,984

**Net Profit Per Year = Gross profit - (Bank interest over capital investment + Depreciation cost + Insurance cost)**

= Rs. 7,29,040– (Rs. 1,75,984+ Rs.69,250 +13,000)  
 = Rs. 7,29,040 -2,58,234  
 = Rs. 4,70,806

<b>Net profit/year</b>	<b>Rs. 4,70,806</b>
<b>Net Profit/month</b>	Rs. 39,233.83
<b>Net profit/bird</b>	<b>Rs.18.11</b>

## Economics of layers under 1+1+1 housing system with 5000 birds

(1+1+1 Housing System is 1 Brooder House + 1 Grower House + 1 Layer House)

### Assumptions:

- 1) Cage system of rearing from 0-72 weeks of age (layers in elevated cages).
- 2) Poultry shed cost – Rs.400 / sq.ft.
- 3) Other buildings cost – Rs.450 / sq.ft.
- 4) Floor space of chick cage house – 0.33 / sq.ft.
- 5) Floor space of grower cage house – 0.42 / sq.ft.
- 6) Floor space of elevated cage layer house – 0.590 / sq.ft.
- 7) Floor space required for feed plant, feed store and egg room – 1500 sq. ft.
- 8) Cost of digging bore-well, pipelines and overhead tank etc. – Rs. 2,00,000
- 9) Cost of chick cages with nipple drinker – Rs.30 / bird



- 10) Cost of grower cages with nipple and feeding system – Rs.50 / bird
- 11) Cost of layer cages with nipple and feeding system – Rs.80 / bird
- 12) Cost of feed mill equipment – Rs. 2,00,000 (Pulveriser and horizontal type mixer)
- 13) Miscellaneous farm equipment – Rs.10 bird capacity
- 14) Cost of day-old chick – Rs.30 / chick
- 15) Feed cost – Rs. 25 / kg (average cost of chick, grower and layer feed)
- 16) Feed consumption up to 20 weeks of age – 9 kg
- 17) Feed consumption from 21 week to 72 weeks – 37 kg
- 18) Cost of medicine, vaccine, and electricity etc. – Rs.20 (5+15) / bird (0-72 weeks of age).
- 19) Average egg production – 85%
- 20) Selling price of egg – Rs. 4.0 / egg
- 21) Selling price of spent hens at 72 weeks of age – Rs. 100 / bird.
- 22) Selling price of manure – Rs.700 / tonne
- 23) Interest rate – 8% / annum
- 24) Labour requirement – One labour / 5000 birds
- 25) Wages for labour – Rs. 8000 / month
- 26) Mortality up to 20 weeks – 8%
- 27) Mortality from 21 weeks to 72 weeks – 10%
- 28) Insurance – Rs. 5/bird
- 29) Depreciation Cost on Fixed Capital- 5%/ year

<b>I. Fixed Capital (Non-recurring expenditure):</b>		
1)	Cost of construction of one chick cage house <u>Assumptions</u> <ul style="list-style-type: none"> <li>• 0.33 sq.ft. / chick</li> <li>• Rs.400 / sq.ft.</li> <li>• 5000 chicks</li> </ul>	6,60,000
2)	Cost of construction of one grower cage house <u>Assumptions</u> <ul style="list-style-type: none"> <li>• 0.42 sq.ft. / chick</li> <li>• Rs.400 / sq.ft.</li> <li>• 5000 chicks</li> </ul>	8,40,000
3)	Cost of construction of layer cage houses <u>Assumptions</u> <ul style="list-style-type: none"> <li>• 0.59 sq.ft. / layer</li> <li>• Rs.400 / sq.ft.</li> <li>• 5000 layers</li> </ul>	11,80,000

4)	Cost of construction of feed mill, feed store room and egg store room etc. <u>Assumptions</u> <ul style="list-style-type: none"> <li>1500 sq.ft.</li> <li>Rs.450 / sq.ft.</li> </ul>	6,75,000
5)	Cost of digging bore-well, laying pipelines and construction of overhead tank etc	2,00,000
6)	Cost of chick cages <u>Assumptions</u> <ul style="list-style-type: none"> <li>Rs.30/bird</li> <li>5000chicks</li> </ul>	1,50,000
7)	Cost of grower cages <u>Assumptions</u> <ul style="list-style-type: none"> <li>Rs.50/bird</li> <li>5000 chicks</li> </ul>	2,50,000
8)	Cost of layer cages <u>Assumptions</u> <ul style="list-style-type: none"> <li>Rs.80/bird</li> <li>5000 chicks</li> </ul>	4,00,000
9)	Cost of feed mill equipments	2,00,000
10)	Miscellaneous farm equipments <u>Assumptions</u> <ul style="list-style-type: none"> <li>Rs.10 bird capacity</li> <li>5000 birds</li> </ul>	50,000
	<b>Total fixed capital</b>	<b>46,05,000</b>

S. No.	Total Capital Investment	Margin Money/ Farmer's Share (15%)	Bank Loan
I.	Rs. 46,05,000	Rs. 6,90,750	Rs. 39,14,250

II.	<b>Working Capital</b>	
1)	Cost of chicks <u>Assumptions</u> <ul style="list-style-type: none"> <li>5000 birds / batch</li> <li>Rs.30 / chick</li> </ul>	1,50,000
2)	Cost of feed <u>Assumptions</u> <ul style="list-style-type: none"> <li>Average feed consumption of 9.0 kg / bird up to 20 weeks</li> <li>Rs.25 / kg feed</li> </ul>	11,25,000

		<ul style="list-style-type: none"> <li>5000 birds</li> </ul>	
	3)	Cost of medicine, vaccine, electricity, etc. <u>Assumptions</u> <ul style="list-style-type: none"> <li>Average cost of medicines Rs. 05 / bird up to 20 weeks</li> <li>5000 birds</li> </ul>	25,000
	4)	Labour charges <u>Assumptions</u> <ul style="list-style-type: none"> <li>One labourer up to 5 months for 5000 birds</li> <li>Rs. 8000 / month</li> </ul>	40,000
		<b>Total working capital</b>	<b>13,40,000</b>

**Total capital investment needed** = Fixed capital + working capital  
 = Rs. 46, 05,000 + Rs. 13, 40,000  
 = Rs. 59,45000

<b>III.</b>	<b>Recurring Expenditure (for one batch):</b>		
	1)	Cost of feed <u>Assumptions</u> <ul style="list-style-type: none"> <li>Average feed consumption (20-72 weeks) 40 kg</li> <li>Rs.25 / kg feed</li> <li>4600 birds (including 8% mortality up to 20 weeks)</li> </ul>	46,00,000
	2)	Cost of medicine, vaccine, electricity etc. <u>Assumptions</u> <ul style="list-style-type: none"> <li>10000 birds / batch</li> <li>Rs.15 / bird for 4600 hens</li> </ul>	69,000
	3)	Labour charges <u>Assumption</u> <ul style="list-style-type: none"> <li>Rs. 8000/month labour charges for 12 months</li> </ul>	96,000
		<b>Total annual recurring expenditure</b>	<b>47,65,000</b>

<b>IV.</b>	<b>Returns (from one batch):</b>		
	1)	By sale of 1423240 eggs <u>Assumptions</u> <ul style="list-style-type: none"> <li>4600 laying hens</li> <li>85% average egg production i.e. 3910 eggs/day</li> <li>8% mortality (up to 20 weeks)</li> <li>52 weeks egg production</li> <li>Rs.4.0 / egg</li> </ul>	56,92,960
	2)	By sale of manure - 46 kg / bird <u>Assumption</u> <ul style="list-style-type: none"> <li>Rs.700 / tonne for 85% birds i.e. 4600 hens= 230 tonnes</li> </ul>	1,61,000

3)	By sale of spent hens (sold after 72 weeks) <u>Assumptions</u> <ul style="list-style-type: none"> <li>Rs.100 / bird</li> <li>18% total mortality up to 72 weeks of age for 4100 birds</li> </ul>	4,10,000
	<b>Total annual returns</b> (Annual total gross income)	<b>62,63,960</b>

Gross profit / batch = Total gross income – Total expenditure  
 = Rs. 62,63,960 – Rs.47, 65,000  
 = Rs. 14,98,960

Bank interest over capital investment (8% p.a.) =  $0.08 \times 59,45,000$   
 = Rs. 4,75,600

**Net Profit / Batch = Gross profit– (Bank interest over capital investment+ Depreciation cost + Insurance cost)**

= Rs. 14, 98,960 – (Rs. 4,75,600+ 2,30,250+ Rs. 25,000)  
 = Rs 14,98,960 – Rs. 7,30,850  
 = Rs.7,68,110

**Net Profit / Egg = Rs. 0.54** (Based on total 14,23,240 eggs in one year)

**Marketing of poultry farm produce:**

Marketing means exchange of poultry products for an agreed sum of money. In case of broilers, marketing is done basically for live birds and in case of layers marketing is done for shelled eggs in our country.

Four Ps of marketing are as follows:



1. Product: Eggs, meat and processed poultry products
2. Price: Fluctuations based on region, season, outbreak of disease, festivals
3. Place: Organised and unorganised markets (Mandis), e- marketing
4. Promotion: Advertisement, live events, discounts, promotional schemes,

Both for eggs and poultry meat, there are different channels of marketing.

The different channels for marketing of eggs and broilers are depicted in Fig. 4.6:

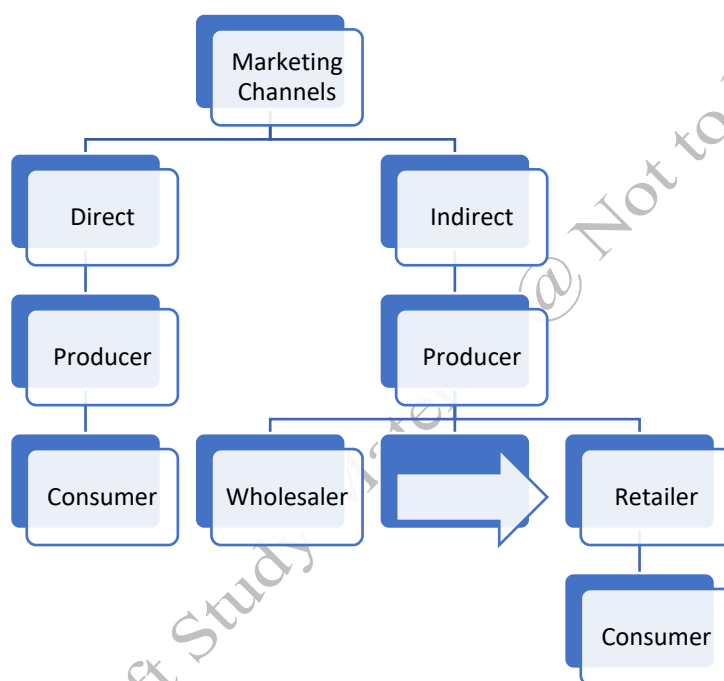


Fig 4.6: Different channels for marketing of broilers and eggs

### Activities

**Activity 1:** Preparation of a business plan

**Material required**

Writing material

**Procedure**

1. Discuss the determination of flock size
2. Study the various aspects a business plan
3. Prepare a business plan for setting up a small scale poultry farm

**Check Your Progress****B. Multiple Choice Questions**

1. Fixed capital is \_\_\_\_\_.  
(a) Working capital (b) Non recurring expenditure  
(c) Recurring expenditure (d) None
2. Marketing channel involving producer to consumer is \_\_\_\_\_.  
(a) Direct (b) Indirect  
(c) Both direct and indirect (d) None
3. The rearing period of broilers is till \_\_\_\_\_ weeks.  
(a) 6 (b) 8  
(c) 10 (d) 12
4. The rearing period of layers is till \_\_\_\_\_ weeks.  
(a) 8 (b) 20  
(c) 42 (d) 72
5. \_\_\_\_\_ are sold as spent hens after 72 weeks of age.  
(a) Broilers (b) Layers  
(c) Both broilers and layers (d) None

**C. Fill in the blanks**

1. Net profit is calculated by deducting bank interest, insurance and \_\_\_\_\_ cost from gross profit
2. Product, price, place and \_\_\_\_\_ are four Ps of marketing.
3. Cost of medicines is included in \_\_\_\_\_ expenditure.
4. In layer farming, birds of 10 weeks are reared in \_\_\_\_\_ cages.
5. Labour charges are included in \_\_\_\_\_ expenditure.

**D. Mark 'True' or 'False'**

1. Broilers consumer more feed than layers.
2. In layer farming, chicks consume more feed than layers.
3. In case of broilers, marketing is done basically for live birds in India.
4. In case of layers, marketing is done for shelled eggs in India.
5. Prices of poultry products fluctuate depending upon region.

**SESSION 5: ACTS, REGULATIONS AND ORGANIZATIONS RELATED TO POULTRY****The Prevention & Control of Infectious and Contagious Disease in Animals Act, 2009**

It is an act to provide for prevention, control and eradication of infectious and contagious diseases in animals. The act also provides for prevention of

outbreak of diseases from one state to another and to meet the international obligations of India for facilitating export and import of animals and animal products.

The animals covered under the act are cattle, buffalo, sheep, goat, yak, mithun, dog, cat, pig, horse, camel, ass, mule, poultry, bees and any other animal or bird as the Central Government may specify by notification.

- As of now total of 14 diseases are enlisted for poultry. Some of the widely occurring disease such as Ranikhet disease, Avian influenza (bird flu), Pullorum disease, Infectious bursal disease (Gumboro disease), Marek's disease are included in this list

### Food Safety & Standards Act, 2006

The act is a comprehensive legislation for the poultry sector as well and lays down standards and guidelines for consumer safety, health and regulation. It seeks to harmonize Indian standards with international standards like CODEX and facilitates international trade in food articles.

Food Safety and Standards Authority of India (FSSAI) has been created under the Act. FSSAI regulates the food sector by framing guidelines and standards to be followed by food businesses. It also specifies procedures for accreditation of laboratories and provides advice to central and state government in matters relating to food safety.

### Bureau of Indian Standards (BIS) & ISO 22000:2005

The Bureau of Indian standards (BIS) came into existence on 1 April 1987. The Bureau of Indian Standards has approved the Indian Standard, 2007 for poultry wherein nutrient requirements of poultry are specified. The B.I.S. specifications for broiler and layer feed are given below in Table 4.4.

**Table 4.4: B.I.S. specifications (2007) for broiler and layer feed**

Characteristics (Nutrients)	Broiler			Layer			
	Pre-starter	Starter	Finisher	Chick	Grower	Layer Phase I	Layer Phase II
Moisture	11	11	11	11	11	11	11
Crude protein % (Minimum)	23	22	20	20	16	18	16
Calcium % (Minimum)	1	1	1	1	1	3	3.5



Available phosphorus % (Minimum)	0.45	0.45	0.45	0.5	0.4	0.4	0.4
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**ISO 22000:2005**

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. The International Organization for Standardization (ISO) developed the Food Safety Management System Certification: ISO 22000.

ISO 22000 is a Food Safety Management System that can be applied to any organization in the food chain including poultry from farm to fork. ISO 22000 describes requirements for a food safety management system and sets out the requirements an organization must meet to control food safety hazards.

**The Prevention of Cruelty to Animals Act, 1960**

Cruelty to animals means willfully causing them unnecessary pain or suffering. The following are the major forms of cruelty to poultry:

1. Transporting poultry in a manner that causes them pain or suffering.
2. Keeping poultry in overcrowded conditions.
3. Starving or keeping the poultry thirsty.
4. Using poultry for public entertainment.

The Prevention of Cruelty to Animals Act was enacted in 1960 to prevent the imposition of unnecessary pain or suffering on animals and to amend the laws relating to the prevention of cruelty to animals. After the enactment of this Act, the Animal Welfare Board of India was formed and is headquartered in Chennai. The 1960 Act is comprehensive.

**Organisations involved in poultry development*****Poultry Federation of India***

Poultry Federation of India (PFI) is the foremost national level Organization established in the year 1988 and happens to be the voice of the Indian Poultry Industry. PFI works for the protection, welfare and the overall growth and

development of the poultry sector and raises the concerns with central government, state government(s) and other authorities. The mission of PFI is to promote, preserve and encourage the activities of all stakeholders related to the poultry either directly or indirectly. PFI also works on eradication of protein malnutrition in India and also creates awareness among people about the consumption of egg and meat.

### ***National Egg Coordination Committee (NECC)***

The NECC is an association of Indian poultry farmers with a membership of more than 25,000 farmers. NECC plays a significant role for the betterment of egg industry through its various programmes like market intervention, price support operations, egg promotion campaigns, consumer education, market research, rural market development and liaisons with the government on vital issues concerning the industry. Its main objective is it declares the prices of eggs on daily basis region wise to safeguard the interest of the consumers and poultry farmers.

### ***Central Poultry Development Organisation***

The Central Poultry Development Organisation was earlier known as Central Poultry Breeding Farm. There are four Central Poultry Development Organisation located at Chandigarh, Bhubaneswar, Bengaluru and Mumbai to supply day old chicks of different varieties of chicken to poultry farmers.

### ***National Smallholder Poultry Development Trust***

NSPDT (National Smallholder Poultry Development Trust) was set up by PRADAN (an NGO) to encourage the smallholder poultry farming in India. The main objectives of the Trust are:

- Promotion, protection and nurturing of smallholder poultry farmers
- Initiation and advocating policies to support smallholder poultry farmers
- Creation of an enabling environment for the growth and security of the small poultry farmers
- Representation of the interest and welfare of the small poultry farmers

### ***Agriculture Skill Council of India (ASCI)***

Agriculture Skill Council of India (ASCI) has been set up under Ministry of Skill Development & Entrepreneurship (MSDE). ASCI works towards capacity

building by bridging gaps and upgrading skills of farmers, wage workers, self-employed and extension workers engaged in organized/ unorganized segments of agriculture & allied sectors. ASCI is responsible for skill development in agriculture with the development of 182 Qualification Packs and covers various segments including poultry.

### Activities

**Activity 1:** Study of acts and regulations governing poultry production

**Material required**

Writing material

**Procedure**

1. Discuss the different acts and regulations governing poultry production and marketing of eggs and meat
2. Note them down and study
3. Present in the class
4. Prepare a business plan for setting up a small scale poultry farm

**Activity 2:** Visit to organisations dealing with poultry promotion

**Material required**

Writing material

**Procedure**

1. Visit different organisations dealing with poultry promotion and development
2. Discuss the objectives of these organisations
3. Note them down and study

### Check Your Progress

**A. Multiple Choice Questions**

1. \_\_\_\_\_ Act provides for prevention, control and eradication of infectious and contagious diseases in animals.  
(a) Prevention & Control of Infectious and Contagious Disease in Animals  
(b) Food Safety & Standards Act  
(c) Bureau of Indian Standards (BIS)  
(d) ISO 22000:2005
2. \_\_\_\_\_ is an act for the poultry sector and lays down standards and guidelines for consumer safety, health and regulation.  
(a) Food Safety & Standards Act  
(b) ISO 22000:2005

- (c) Bureau of Indian Standards (BIS)
- (d) Prevention & Control of Infectious and Contagious Disease in Animals
- 3. Nutrient requirements of poultry are specified in \_\_\_\_\_.
  - (a) Bureau of Indian Standards (BIS)
  - (b) ISO 22000:2005
  - (c) Food Safety & Standards Act
  - (d) Prevention & Control of Infectious and Contagious Disease in Animals
- 4. \_\_\_\_\_ is a Food Safety Management System that can be applied to any organization in the food chain including poultry from farm to fork.
  - (a) Bureau of Indian Standards (BIS)
  - (b) ISO 22000:2005
  - (c) Food Safety & Standards Act
  - (d) None
- 5. \_\_\_\_\_ Act prevents the imposition of unnecessary pain or suffering on animals.
  - (a) Prevention of Cruelty to Animals
  - (b) Food Safety & Standards Act
  - (c) Bureau of Indian Standards (BIS)
  - (d) Prevention & Control of Infectious and Contagious Disease in Animals

**B. Fill in the blanks**

- 1. \_\_\_\_\_ promotes, preserves and encourages the activities of all stakeholders related to the poultry either directly or indirectly.
- 2. \_\_\_\_\_ declares the prices of eggs.
- 3. Central Poultry Development Organisation was earlier known as \_\_\_\_\_.
- 4. \_\_\_\_\_ was set up to encourage the smallholder poultry farming in India.
- 5. \_\_\_\_\_ provides for skill development in poultry.

**C. Mark 'True' or 'False'**

- 1. Finisher feed is broiler feed
- 2. Layer feed is provided in two phases, Phase I and Phase II.
- 3. Overcrowding in a poultry house is cruelty to poultry.
- 4. BIS fixes prices of eggs in India.
- 5. Central Poultry Development Organization is located at New Delhi

## GLOSSARY

**Bait:** Food placed on a hook or trap entice rodents as prey.

**Beak trimming (Debeaking):** Removal of a part of beak and cauterizing by soldering strip. The instrument used for beak trimming is known as beak-trimmer.

**Clutch:** Eggs laid by a hen on consecutive days without a break.

**Cock (Rooster):** A mature male chicken (above one year of age) with coarse skin, toughened and darkened meat and hardened breast bone cartilage usually kept for breeding.

**Coveralls:** clothing that covers body of the human and is worn especially over other clothes.

**Commercial layer:** It is a hybrid egg type bird capable of producing about 320 eggs per year with a very good feed efficiency.

**Dessicating dust:** Silica gel and diatomaceous earth induce a state of dryness on the rodents

**De-worming:** Act of removing or killing intestinal worms or parasites through drug.

**Flame gun:** Instrument used for fumigation

**Filler flats:** A card board or plastic made tray used for collection, storage and transport of eggs. Thirty eggs can be kept in one filler flat.

**Fogger:** A cooling device installed inside the poultry house.

**Flock:** A group of birds.

**Glue borad:** Glue board also known as glue trap is a tray coated with an extremely sticky adhesive to trap rodents.

**Hen:** The female of all classes of poultry, except goose, whose age can vary considerably depending on the class of poultry. A chicken hen is of egg laying age, usually over 20 weeks old, and raised for egg production purposes.

**Insect growth regulators (IGR):** A substance that inhibits the growth of insects and thus control the pest population .

**Layer:** A mature female fowl which has been kept for egg-laying purpose (21-72 weeks of age) especially those are in current production (or) an adult commercial chicken of 21 – 72 weeks of age and produces most of the eggs for consumption.

**Litter:** Bedding material used to cover the floor in poultry houses to absorb moisture.

**Manure:** Poultry excreta.

**Morbidity:** Affected birds from a disease or medical condition

**Mortality:** Death of birds

**Nematodes:** Nematodes or round worms belong to the Phylum Nematoda inhabiting a wide range of environment.

**Non-recurring expenditure:** Expenditure that occurs once to set up a poultry farm.

**Pathogen:** Disease causing agent is called as pathogen

**Pest:** Examination of different body parts of poultry after mortality.

**Potable water:** Water safe for drinking purpose to birds

**Pullet:** A young domestic hen, usually one that is less than one year old. A female chicken that has not yet started to lay eggs.

**Recurring expenditure:** Expenditure that occurs periodically in a farm. Such expenditure can occur more than once in a year.

**Roche colour fan:** It is collection of different sheds of yellow to orange colour, used to measure the yolk quality

**Sprinkler:** A cooling device installed over the roof of a poultry house.

**Snap trap:** A trap that snaps shut when the bait or trigger is disturbed. This is used to trap a rodent unharmed in suitable container.

**Stick trap:** Sticky traps are glue board traps to catch rodents.

**Vector:** Organism which carries the pathogen.

**Vitelline membrane:** A thin membrane encircling the yolk in an egg.

**Foot Candle:** It is the unit to measure light intensity. One foot candle is the luminance of one lumen on a one-square foot surface with a uniform distribution.

**Further Reading**

1. Poultry Production - B. Panda and S.C. Mohapatra
2. Scientific Poultry Production - P.V. Sreenivasaian
3. Simply Poultry Science - R. Asha Rajni
4. Poultry Production in India - R.P. Sharma
5. Nutrition and Disease Management of Poultry - A.B. Mandal
6. Commercial Chicken Production - R. Prabakaran
7. Handbook of Applied Broiler Production - D. Narahari and R. Kumararaj
8. Hand Book of Poultry Production and Management - N.R. Jadhav and M.F. Siddiqui
9. Avian (Poultry) Production- Eds. D Sapkota, D. Narahari and J.D. Mahanta



**ANSWER KEY**

**UNIT 1: EGG COLLECTION, STORAGE, CLEANING, PACKAGING AND TRANSPORTATION**

**Session 1: Parameters for Judging the Quality of Eggs**

**A. Multiple choice**

1. a
2. a
3. c
4. d
5. b

**B. Fill in the blanks**

1. Ooporphyrin
2. Egg White
3. Roche colour fan
4. 58
5. 0.30

**C. Mark Ture of False**

1. True
2. False
3. False
4. True

**5. True**

**Session 2: Storage, Cleaning, Packaging and Transportation**

**A. Multiple choice**

- 1. c**
- 2. d**
- 3. c**
- 4. b**
- 5. a**

**B. Fill in the blanks**

- 1. 20**
- 2. 24-25 weeks**
- 3. 16 hours, 1 foot candle**
- 4. 3**
- 5. 65-70**

**C. Mark Ture of False**

- 1. True**
- 2. False**
- 3. True**
- 4. True**
- 5. False**

**UNIT 2: CLEANING AND DISINFECTING POULTRY FARM**

**Session 1: Maintain Cleanliness in Poultry Sheds**

**A. Multiple choice**

1. b
2. d
3. c
4. d
5. d

**B. Fill in the blanks**

1. 7 days/ 1 week
2. Cleaning, disinfection
3. Slime
4. Rodents
5. Fumigants

**C. Mark Ture of False**

1. True
2. False
3. True
4. False
5. True

**Session 2: The Process of Disinfection of Poultry Sheds and Bio-Security Measures to Minimize Risk of Pests and Disease**

**A. Multiple choice**

1. c
2. a
3. d

4. c

5. d

**B. Fill in the blanks**

1. Personal protective equipment

2. Formaldehyde

3. Dead

4. House fly

5. 12

**C. Mark Ture of False**

1. True

2. False

3. True

4. False

5. True

**UNIT 3: DOCUMENTATION AND RECORD KEEPING**

**Session 1: Various Types of Documents and Records to Be Maintained in Poultry Farming**

**A. Multiple choice**

1. d

2. d

3. b

4. b

5. c

**B. Fill in the blanks**

1. systematic
2. Financial
3. Identification
4. Miscellaneous purchase registers
5. feed

**C. Mark Ture of False**

1. False
2. True
3. True
4. False
5. True

**Session 2: Various Aspects of Maintaining Health and Medical Record**

**A. Mark Ture of False**

1. True
2. True
3. True
4. False
5. False

**Session 3: Production Records of Broiler and Layer Farm**

**A. Multiple choice**

1. a
2. b

3. c

**B. Mark Ture of False**

1. True
2. False
3. False

**Session 4: Financial Records**

**A. Mark Ture of False**

1. True
2. False
3. True

**UNIT 4: SETTING UP A SMALL POULTRY FARM**

**Session 1: Types and Benefits of Poultry Farms**

**A. Multiple choice**

1. c
2. a
3. a
4. c
5. c

**B. Fill in the blanks**

1. east west
2. 1.2 ft
3. 22-300C
4. 8
5. Cage

**C. Mark Ture of False**

1. True
2. False
3. False
4. True
5. True

**Session 2: Choosing Birds for Meat Production and Egg Production**

**A. Multiple choice**

1. c
2. b
3. a
4. a
5. c

**B. Fill in the blanks**

1. White Leghorn
2. Kalamasi



3. Aseel
4. Fancy
5. Black

**C. Mark Ture of False**

1. True
2. False
3. True
4. False
5. False

**Session 3: Construction of Poultry House, Equipment and Materials**

**A. Multiple choice**

1. c
2. c
3. c
4. d
5. c

**B. Fill in the blanks**

1. Candler
2. Egg filler flats
3. Disinfection
4. Debeaker
5. Catching devices

**C. Mark Ture of False**

1. True
2. False
3. False
4. True
5. True

#### **Session 4: Resource Generation and Management of Poultry for Profit**

##### **A. Multiple choice**

1. b
2. a
3. a
4. d
5. b

##### **B. Fill in the blanks**

1. Depreciation
2. Promotion
3. Recurring expenditure
4. Debeaker
5. Recurring expenditure

##### **C. Mark Ture of False**

1. False
2. False
3. True
4. True

5. True

**Session 5: Acts, Regulations and Organizations related to Poultry**

**A. Multiple choice**

1. a
2. a
3. a
4. b
5. a

**B. Fill in the blanks**

1. Poultry Federation of India
2. NECC
3. Central Poultry Breeding Farm
4. NSPDT
5. ASCI

**C. Mark Ture of False**

1. True
2. True
3. True
4. False