UNIT 1 PRINCIPLES OF HOUSING

Structure

1.0 OBJECTIVES

After studying this unit, you will be able to:

- determine when to start a poultry farm;
- assess the pre-requisites for starting a poultry farm;
- estimate the dimensions of broiler and layer houses;
- explain the construction of a poultry house; and
- identify ways and means to reduce cost of construction.

1.1 INTRODUCTION

You must be aware that now-a-days, chicken of two different kinds are available in the market; one that is mainly meant for meat purpose; we call them "Broilers" and the other which produce many eggs; we call them "Layers". Do you know that broilers can attain a body weight of 2 kg by 40 to 42 days of age and layers produce 300 to 320 eggs a year?

Surprising; isn't it so? You might have heard of chickens reared at the backyard producing about 50 to 60 eggs in a year and weighing hardly 1 kg after completion of lay (52 weeks). All these are due to tremendous progress made by the Scientists in developing birds of high productivity. Our country produces approximately 160 crore kg (1.6 million tonnes) broilers. Considering that India has 100 crore (1000 million) population, each person is getting about 1600 grams (1.60 kg) of broiler meat *per annum*. This is generally referred to as "*per capita* consumption" of broiler meat. Similarly, we produce about 4200 crore eggs and hence, *per capita* consumption of eggs is 42.

Note: 1 crore = 100 lakhs or 10 millions; 1 tonne = 10 quintals or 1000 kg; 1 quintal=100kg.

1.2 STARTING A POULTRY FARM

When you want to start any business, you will definitely consider pros and cons (favourable and unfavourable aspects) of the enterprise. Similarly, for starting a poultry farm, you should consider several aspects. Answering the following questions will facilitate in decision making:

- Is there demand for poultry products in your locality?
- Which of the poultry products (egg or meat) has better demand?
- Is there any competition by other producers?
- Approximately, how much is the demand? How many eggs per day and how many kg poultry meat per week or per day is required?
- Do you have the necessary know how of the production essentials?
- Do you have capital or you need assistance from Bank or other financing institutions?
- Do you have Veterinary help nearby?
- Do you get all inputs (chicks, feed, medicines, vaccines etc.) easily and regularly?
- Do you have water and power supply at the farm premises?
- Has the water tested for suitability for drinking purposes?
- Are there any problems in marketing?
- Do you have sufficient land for the purpose?

When you can get answers in support of poultry farming, you can venture into the business.

Activity 1

Visit a nearby market and gather information regarding the demand and supply of poultry and its products. Give your opinion about starting a poultry farm in your locality based on the gathered information.

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1.3 PRE-REQUISITES OF A POULTRY HOUSE

You know that broilers attain 2 kg body weight by 40 days of age; that means, they grow at about 50 g per day (2000 g ÷ 40) or about 2 g per hour. Similarly, a layer produces 300 to 320 eggs per annum; considering each egg weighing 57 g, a layer also produces 46.8 g per day or about 2 g per hour.

Therefore, these high producing birds can't be reared at the backyard. They require a proper house, proper feeding and management; otherwise, they fail to produce as expected.

In this unit, you will be learning about the housing of broilers and layers. It is a general practice to rear broilers on floor with paddy husk or other suitable material being spread on the floor; this is referred to as "Deep-litter system". Hence, all description below refers to deep-litter system. On the same lines, layer chicks are reared up to 18 weeks on deep-litter and later in cages;

Any poultry house has some basic requirements. They are as follows:

1.3.1 Location

Poultry sheds are preferred to be located upwind (meaning that wind, on most occasions, blow from poultry shed to other buildings) to minimize spread of infection from other buildings into the poultry unit and on an elevated area to facilitate ventilation by wind. It must be remembered that ***wind cannot be created***. This is particularly true for broiler sheds and sheds meant for chicks in case of layers.

1.3.2 Orientation

It is advisable to construct poultry sheds in such a way that its length faces East-West direction. The length of the building should be parallel to the shadow of a pole vertically erected during afternoon of peak summer. You will be naturally getting a doubt; why not in other directions? The reasons for East-West orientation are as follows:

- South-West and North-East are the main monsoons in our country. Hence, most of the times, wind blows between South-West to North and North-East to South. Therefore, to prevent direct wind blowing into the building, orientation should be East-West; a slight angle of about 6° can be provided to further limit the direct wind flow;
- East-West orientation also minimizes direct sunlight entering into the shed; and
- Minimizes chances of rainwater entering into the building.

1.3.3 Width

The width of a broiler shed can't exceed 9 m (30 feet), excluding thickness of side walls.

You will definitely ask, why such a restriction on width?

Ammonia (NH_3), a gas produced by the action of bacteria in the faecal matter accumulates inside the building affecting human beings and performance of birds. Orientation of the building described above actually results in reduced wind flow. Hence, to minimize accumulation of ammonia, width should not exceed 9 m.

1.3.4 Length

Length of the building depends on number of birds to be housed, their age and the requirements of floor space by the birds. If building is very long, there may be some problems in water flow in water lines. Hence, length generally does not exceed 4 to 6 times the width.

1.3.5 Height

Full walls can be constructed unless doors are located on either side of the long axis (i.e. East and West sides), usually made of brick-work, 25 cm thick, in Portland Cement, lime and sand. Internal finishing of the walls by cement plastering (12 mm thick) must be smooth, unbroken and white-washed.

Height of the side wall (Referred to as "Stud") of a poultry house should be such that the farm personnel can easily move in and out of the building. Generally, side-wall will be 2.1 to 2.4 m (7 to 8 ft) high to provide slope in the roof on either sides. The side-wall is strengthened by pillars every 3 m (10 ft) to help hold the roof structures. Pillars can be constructed of brick-work in Cement Concrete or, wherever available, stone pillars.

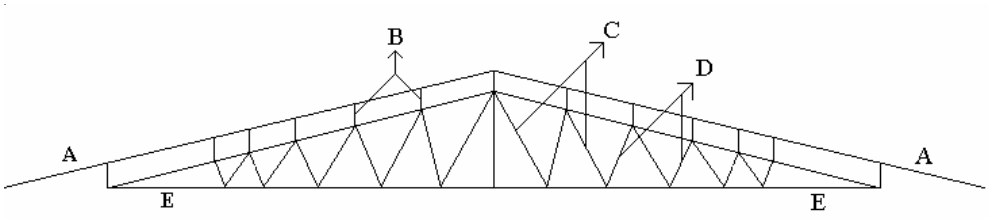
1.3.6 Roof

Poultry houses will have a roof sloping on either side. The roof itself projects out by 0.9 to 1.2 m (3 to 4 ft) out of the side walls.

Why such slope is required?

Slope helps move rainwater away from the poultry house. The slope can be as low as 5º and as high as 45º (in case of thatched roof).

Roof of poultry houses is generally made of corrugated Asbestos Cement Concrete (ACC) sheets. They are fixed over trusses which are triangular metal frames made of wood or steel to fix the roofing material (Fig. 1.1). Roofing material is fixed on horizontal strips called "Purlins"



A. Roofing material B. Purlins C. Struts D. Ties E. Main rafters

Fig. 1.1: Roof truss

If you observe the cross-section of the house carefully, you can notice that a gap of 10 to 15 cm (4 to 6 inches) is left between the roofing materials on either side of the centre of the building (called "Ridge"). This gap is covered (to prevent seepage of rainwater) by semicircular PVC pipes of 15 to 20 cm (6 to 8 inches) in diameter.

Can you imagine why such a gap is provided?

The answer is simple. Like human beings, the birds also respire (breath) and produce heat. Hence, the air inside the building becomes hot. You are aware from your Science lessons that hot air is lighter (less density) than normal air. Therefore, it rises up inside the building. To help escape of hot air, a gap is provided at the ridge of the roof.

1.3.7 Flooring, Side Walk and Steps

Floor of a poultry house must be clean (hygienic), non-porous, easily cleanable, durable, quick-drying, non-slippery, non-absorbent of moisture and least expensive. Before construction of the floor, the hollow space (trench) formed by the construction of the plinth wall is suitably filled. Usually, earth removed for foundation is used for this purpose. Concrete flooring is the best because it is durable, hygienic and most impervious, prevents rats making a way through the floor and cheap. However, cement-mortar flooring can also be employed to reduce cost of construction. Wherever available, stone slabs can be used for flooring. A slope of 1 cm for every 40-60 cm of the solid floor towards the side wall of the house with 5 cm (2 inches) pipes every 3 m (10 ft) will help in cleaning when the birds are removed.

What is the need of side walk all round the house?

Side walk is a projection of the floor all round the building (Fig 1.2). Its all surfaces are made smooth. The main advantages of the side walk are:

- Easy observation of the birds without even entering the house; especially during night.
- It greatly reduces rats and snakes entering into the building particularly when all the surfaces are smooth. Hence, it is also referred to as "Rat-proofing" structure.

Fig. 1.2: Side walk

Steps may be constructed to reach the doors (Fig. 1.3). Top of the steps should be parallel to the side walk with a gap of 0.6 to 0.9 m (2 to 3 ft). Obviously, you will be curious to know why such a gap is needed. The reason is, rats and snakes cannot jump over the gap to land on side walk and gain entry into the poultry house. However, there is no hard and fast rule that steps must be constructed.

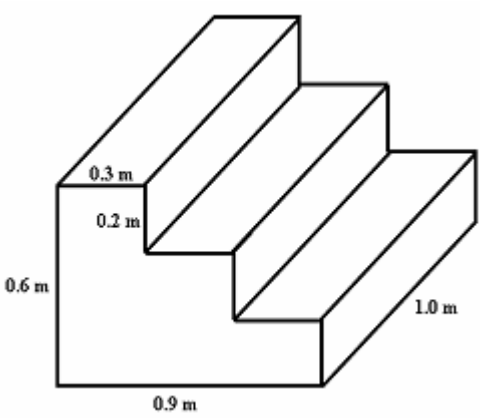


Fig. 1.3: Steps

1.3.8 Other Requirements

- All walls should be white-washed and in areas where hot weather conditions are prevalent, roof can be painted white.
- In front of every door, a foot-bath 60 cm × 45 cm (2 feet × 1½ ft), 5 cm deep (2 inches) should be provided (as a pit on the side walk) to facilitate sanitation (Fig. 1.4).

Fig. 1.4: Foot-bath

- An overhead tank, at least at the level of ridge of the roof i.e. 3.6 to 4.2 m (12 to 15 ft) of a minimum capacity of 500 litre has to be provided. An output pipe from the overhead tank should supply all the pipelines provided for the house to connect automatic waterers. Suitable valves for both input and output of water are compulsory. It is always recommended to have an additional output with valve to facilitate arrangement of sprinkling of water, especially under summer conditions.
- Incandescent bulbs with a square reflector (Fig.1.5) of size 30 cm (1 ft) fixed stiff at a height of 1.8 m in two rows (Fig. 1.7) will ensure optimum distribution of light. If possible, timer device can be provided to put off the light automatically during the day. Each bulb should have a separate switch.

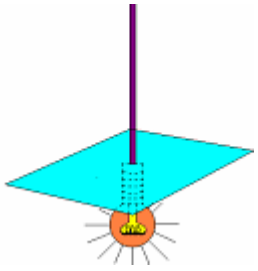


Fig. 1.5: Incandescent bulb with reflector

- You may ask why reflector is square in shape and not conical and why the bulbs are fixed stiff?
  - Only square reflector can illuminate all areas of the house which is also square or rectangular in shape. If the bulbs are swinging due to wind, the shadows also move and the birds get frightened. Therefore, they are fixed stiff.
- Store area can be separated by a chicken-mesh partition or by a wall itself to a height of 1.8 m (6 ft).
- At least 5 numbers of 15-cum-5 Amp power points have to be provided on the side wall inside the shed for arranging of brooders and also in the store room.
- A wash place (1 m × 1 m; 3.3 ft × 3.3 ft) with a tap is required at a convenient distance from the shed with proper drainage of wash water.
- In regions where severe summer conditions are expected, a network of pipeline with sprinklers can be fixed on the roof to facilitate evaporative cooling, whenever needed.
- An underground pit measuring 2 m × 2 m × 2 m (about 6 ft × 6 ft × 6 ft) with open floor, brick walls with lid made of concrete slab is necessary for carcass disposal. It should have an opening of 30 cm × 30 cm (1 ft × 1 ft) and a vent tube 15 cm (½ ft) diameter with a chimney of at least 3 m (10 ft) and a cowl at its tip as far away as possible [at least 15 m (50 ft)] from the broiler shed.
- The presence of trees and other farm buildings can greatly affect air flow around a livestock shelter. But, under hot-humid conditions as expected in coastal areas, trees are the best choice to reduce heat stress. Maintaining a minimum separation distance will take care of other buildings adjacent to the poultry house.

Check Your Progress 1

Note: a) Use the space given below for your answers.

b) Check your answers with those given at the end of the unit.

1) Why poultry houses are preferably built upwind?

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2) Why poultry houses are oriented East-West?

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3) Why width of Poultry shed should not exceed 9 m (30 ft)?

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Activity 2

Visit a nearby poultry farm and gather information pertaining to the location of the farm, orientation of the buildings, Width, length, height, roof, flooring, side walk, steps and other basic requirements of the poultry shed. Give your opinion about the poultry farm based on the standards and gathered information.

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1.4 BROILER HOUSE

You have already learnt that there are two types of chicken- broilers and layers. Broilers are reared for 5 to 6 weeks and sold for meat. Layers are reared for 6 months before they start lay (referred to as "Replacement stock") and will be retained for another 12 months, when they will be producing eggs. For the sake of convenience, assume broiler house for 1000 broilers every 7 weeks and houses for 500 replacement stock and 1000 layers.

Note: After sale of broilers by 6 weeks of age, one week's time is needed to clean and disinfect the house. Therefore, it is assumed to obtain broiler chicks once every 7 weeks.

In this section, you will know about broiler house. For construction of poultry sheds, you should have a clear picture as to what are the structures you will have when the house is cut across (North-South). We call this "Cross-section". You should also have a picture of structures in the house when seen from top without the roof. This is referred to as "Floor diagram". You may get a doubt, how do these two diagrams help construction?

The answer is simple; these two diagrams give a clear idea as to the dimensions of the building and also location of equipment, doors, lights etc.

1.4.1 Calculation of Total Area and Dimensions of the Building

When a building has to be constructed, you would like to know how to go about knowing the length and width. For this purpose, several factors have to be considered like: type and number of birds as well as up to what age they will be reared in that particular house. In the present example, we are considering broilers, 1000 numbers and reared up to 6 weeks of age. With this information, total area and dimensions of the building are calculated as follows:

(i) Total area

Total area of the building to be constructed depends on the floor space required; each broiler requires 900 cm² (1 sq ft). You have studied in your mathematics that area of a rectangle is measured as product of length and width. Therefore, 900 cm² (1 sq ft) means 30 cm (1 ft) length × 30 cm (1 ft) width. Hence, for 1000 broilers, a building with internal area of 900 cm² × 1000 = 90 m² or 1000 sq ft is required.

Note: 1 m is 100 cm; therefore, 1 m² is 100 cm × 100 cm = 10000 cm²

(ii) Dimension of the building

Keeping restriction on width of the building at ≤ 9 m (≤ 30 ft), the length is calculated so as to obtain a total area of 90 m² (1000 sq ft). Assuming that width of 5 m (16.5 sq ft) is the minimum to accommodate other equipments; the following combinations of length and width are possible:

Table 1.1: Dimensions of a Broiler Shed with a Total Area of 90 m² (1000 sq ft)

Length*, m	18.0	15.0	12.9	12.0	11.25	10.0
ft	60.0	50.0	42.9	39.6	37.5	33.3
Width, m	5.0	6.0	7.0	7.5	8.0	9.0
ft	16.7	20.0	23.3	24.8	26.7	30.0

*Additional 3 m (10 ft) in length is provided for storage of feed and equipment (1 m = 3.33 ft)

Any of the length-width combinations can be employed depending on the land available. For convenience, we will assume 15 m length × 6 m width building from now onwards. Length of the building will be 1½ to 6 times its width.

1.4.2 Cross-section

Cross-section is a picture you would obtain when a building is cut by an imaginary line across the length. Cross-section of the broiler house under our consideration is given below (Fig. 1.6):

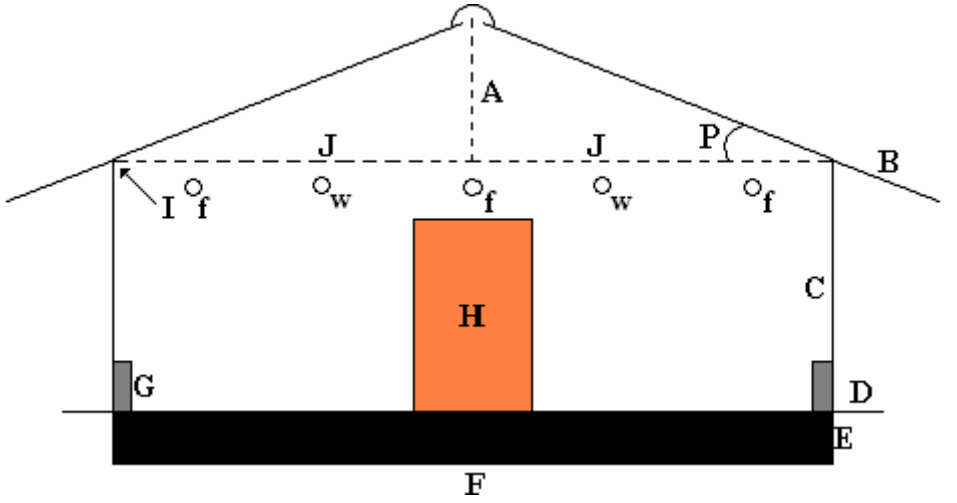

Fig. 1.6: Cross-section of a broiler house

Where,

A Rise (0.60 to 1.20 m)

B Overhang

C Stud height (2.10 to 2.40 m)

D Side walk (0.45 to 0.60 m)

E Plinth (Minimum 0.30 m)

F Width (Maximum 9 m)

G Side wall (0.30 to 1.20 m depending on climate)

H Door (1.80 × 1.20 m)

I Eaves

J Run (Maximum 4.5 m)

P Pitch (angle depending on A and J or F)

f GI pipes to fix hanging feeders

w Water line to automatic waterers

Note:

1. Pitch normally does not exceed 30°.
2. Doors can be provided on the sides also.
3. No central passage is required.
4. In the present example, F = 6 m (20 ft) and J = 3 m (10 ft).

Look at the cross-section given above. You can see that all the dimensions excepting length of the house is given.

1.4.3 Floor Diagram

Floor diagram is a picture you would get when roof is removed and you are viewing the building from the top. Floor diagram of the broiler house for the above example is given below (Fig. 1.7):

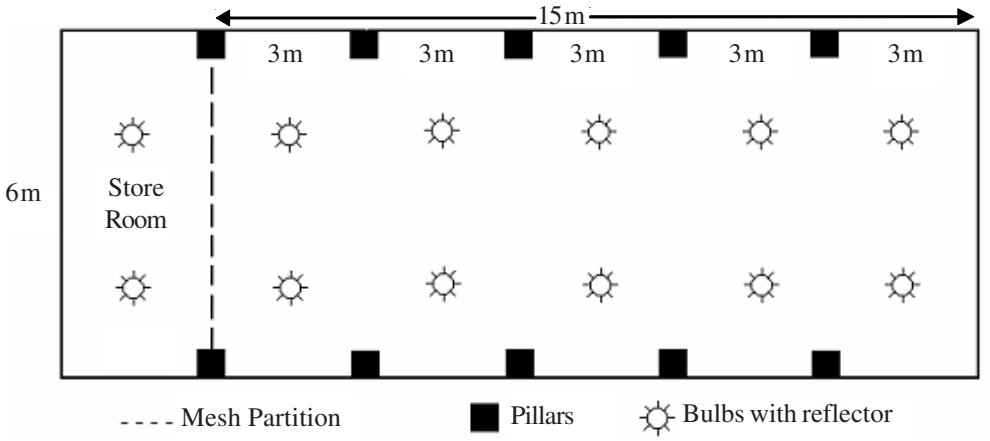

Fig. 1.7: Floor diagram of a broiler house

You can clearly notice that the floor diagram gives the length of the building as well as the location of lights and pillars.

1.4.4 Construction

With the cross-section and floor diagram available, construction of any building involves the following steps:

- Laying foundation,
- Construction of plinth, front walls and side walls,
- Fixing of doors and roof, and
- Construction of flooring, side walk, steps, overhead tank and carcass disposal facility.

Hence, broiler shed construction is discussed in the same order:

(i) Foundation

Width of the foundation will be more than that of the wall. A concrete foundation is preferred since it will be strong and water-resistant. Brick-work foundation with stepped increase in thickness of wall (greatest at the base; projection called as footings) can be provided (Fig. 1.8).

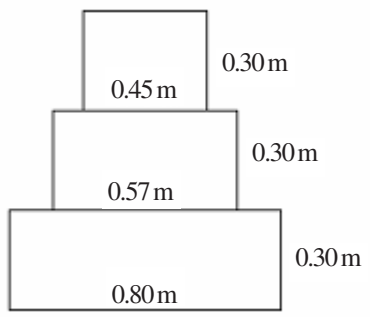

Fig. 1.8: Brick-work foundation (Stepped)

(ii) Plinth, front and side walls

Plinth refers to the height to which the floor of the house is raised above the ground. You may want to know why plinth is essential in the first place? The reason is given below:

- Plinth prevents seepage of water from the ground into the litter spread on the flooring. If litter becomes wet, chances of litter-borne diseases, especially coccidiosis increases.
- It also minimizes entry of rainwater, rats, snakes and other creatures into the building. Hence, a plinth of minimum 30 cm (1 ft) is provided for poultry houses.

Full walls can be constructed unless doors are located on either side of the long axis (i.e. East and West sides), usually made of brick-work, 25 cm thick, in Portland Cement, lime and sand. Internal finishing of the walls by cement plastering (12 mm thick) must be smooth, unbroken and white-washed. Side wall, also made of brick-work, will be 0.3 to 1.20 m (3 to 4 ft) in height depending on outside temperature.

(iii) Doors

Doors can be fixed on either side of the long axis (East and West sides) or on the side wall.

Check Your Progress 2

Note: a) Use the space given below for your answers.

b) Check your answers with those given at the end of the unit.

1) What do you understand by "Cross-section" and "Floor diagram"?

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2) Calculate dimensions of a shed for 2500 broilers.

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3) Why poultry houses have plinth?

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Activity 3

Visit a nearby broiler house. Measure the basic dimensions of the house. Draw a cross-section and floor diagram of the broiler house you visited. Give your opinion about the broiler house based on the standards and gathered information.

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1.5 HOUSES FOR LAYERS

In the previous section, you have learnt about the broiler house. Similarly, the layer house has certain standard area and dimensions for different types of houses which are discussed below:

1.5.1 Buildings Required

As discussed earlier, layers are reared for 18 months. They are usually grown till start of lay in "Brood-grow house" (BGH) and later on shifted to "Cage layer house" (CLH). It is also a general practice to rear birds on litter (similar to broilers) till start of lay and shift to cages during egg production. For the sake of convenience, assume layer house for 500 replacement stock in BGH and 1000 layers in CLH for further discussions.

You will be questioning now that how many buildings for replacement stock and how many for layers are required? The following table (Table 1.2) gives the method for utilizing all buildings properly:

Table 1.2: Flock Schedule

Year	Months	BGH	CLH–1	CLH–2	For sales
I	1 to 6	Batch 1	-	-	-
	7 to 12	Batch 2	Batch 1	-	-
II	1 to 6	Batch 3	Batch 1	Batch 2	-
	7 to 12	Batch 4	Batch 3	Batch 2	Batch 1
III	1 to 6	Batch 5	Batch 3	Batch 4	Batch 2
	7 to 12	Batch 6	Batch 5	Batch 4	Batch 3
The process goes on; after 18 months of start of the farm, there will be one batch of replacement stock, two batches of layers and one batch for sales after completion of lay.					

You can clearly notice that:

- One BGH and two CLHs are required and
- By obtaining a batch of layer chicks every 6 months, all the buildings will be engaged properly.

The above table is popularly referred to as "Flock schedule" because it gives the exact details of birds (flock) in the farm. Flock schedule depends on the number of batches of layer chicks you will be procuring every year. Depending on the flock schedule, the buildings have to be constructed.

For convenience, consider a layer house for 500 layer chicks every 6 months. Obviously, we need a BGH for 500 chicks and two CLHs each to house 500 layers.

Note: Similar flock schedule is necessary if broiler chicks are obtained once every week, fortnight, month etc. In such cases, number of buildings also changes.

1.5.2 Calculation of Total Area and Dimensions of the Building

As described for broilers in the previous Section, dimensions of layer house also depend on type, number and age up to which the birds are reared in the house. Dimensions of BGH and CLH for the example under consideration are calculated below:

(i) Brood-Grow House

Birds before lay require 900 cm² (1 sq ft) of area and hence, total area required is 500 × 900 = 45 m² (500 sq ft). The building dimension can be 9 m in length and 5 m in width. Calculations are already described in Section 1.4.1.

(ii) Cage Layer House

Layers in cages require about 900 cm² (1 sq ft). For 500 layers, 500 × 900 = 45 m² (500 sq ft) area is required. Therefore, two buildings each of 45 m² (500 sq ft) area are required.

The most important factors to be considered are:

1) Cage dimensions, and
2) Cage arrangement

You might have visited layer farms and noticed that 3-bird laying cages which measure 45 cm (18 inches), 38 cm (15 inches) and 40 cm (16 inches) in width, depth and height, respectively are fixed in CLHs (see Fig. 1.9). The floor of the cage projects by 15 cm (6 inches) to facilitate rolling out of eggs. Width is parallel to the length and depth to the width of the building.

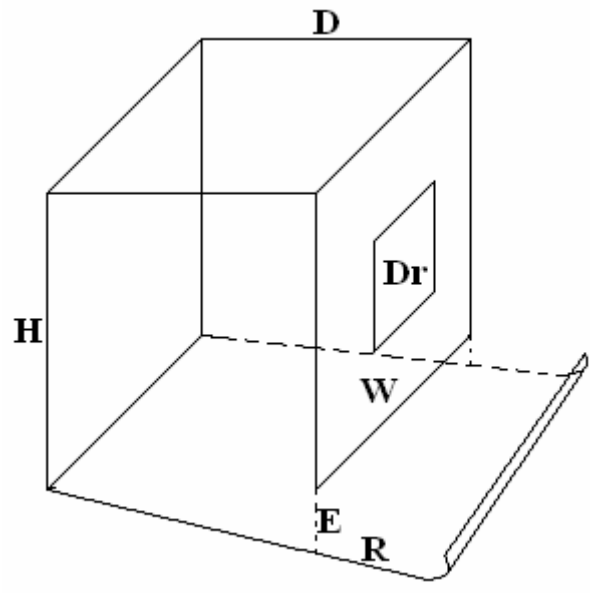


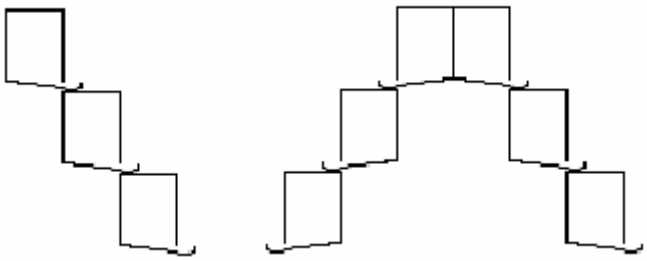
Fig. 1.9: Three- bird laying cage

Where,

W Width (45 cm)
D Depth (37.50 cm)
H Height (40 cm)
E Egg space (7.5 cm)
R Rolling space (15 cm)
Dr Door (20 cm × 20 cm)

Note: Feeding channel runs along the width of the cage in front and 15 cm (6 inches) above the egg space. Nipple drinkers will be fixed at the top edge in front (width) of the cage.

The maximum number of tiers of cages generally adopted is 3. Accordingly, 3- tier cage arrangement with 2 L and 1 M will be appropriate for the present case (see the illustration below for meaning of L and M).



L – Type M – Type

Fig. 1.10: Cage arrangements

Note: It can be seen from the Fig 1.10 that projections for egg rolling need provision in width only for the lower-most tier.

It is easy to visualize that every 45 cm (18 inches) length can house 12 cages each of which can house 3 layers; that means 36 layers require 45 cm in length of the building. Therefore, (500 ÷ 36) = 13.88 or 14 cages are needed in each row. Hence, length of each row of cages is (14 × 45) = 630 cm or 6.30 m. On either side of the length, 50 cm space is required for walking. Therefore, total length of the building will be 7.30 m.

Of 12 cages forming the width of the building, 4 will have the egg-rolling projection toward the passage. Hence, total width required for cages alone will be (52.5 × 4) + (37.50 × 8) = 516 cm or 5.16 m. There are two passages, each of which should be at least 50 cm. Therefore, total width of the building should be 6.16 m (or say 6.20 m)

Note: It can be seen that the total floor space required for 500 layers in a CLH is (7.30 × 6.20) = 45.88 m^2.

If two CLHs are constructed along the length (composite CLH), the total length will be (7.30 × 2) = 14.60 m and giving allowance for 40 cm partition wall, it will be 15 m. Additional 2.50 m are required for feed storage. Hence, the total length of the CLH will be 17.50 m.

1.5.3 Cross-section

Cage layer house is different from other animal and poultry houses because you will not be walking on the ground in such houses! Instead, you will have to climb about 2 m (6.7 ft) and then walk on passages raised to that level.

(i) Brood-Grow House

Cross-section and floor diagram of BGH is same as that for broilers with only changes in dimensions. You have already studied broiler house in section 1.4.2 and 1.4.3.

(ii) Cage Layer House

The required two CLHs can be constructed separate or joined at one end to save cost of one wall. You have already calculated the dimensions of composite CLH required as 17.50 m × 6.20 m (58.3 ft × 20.7 ft).

The cross-section below (Fig.1.11) makes you understand this aspect:

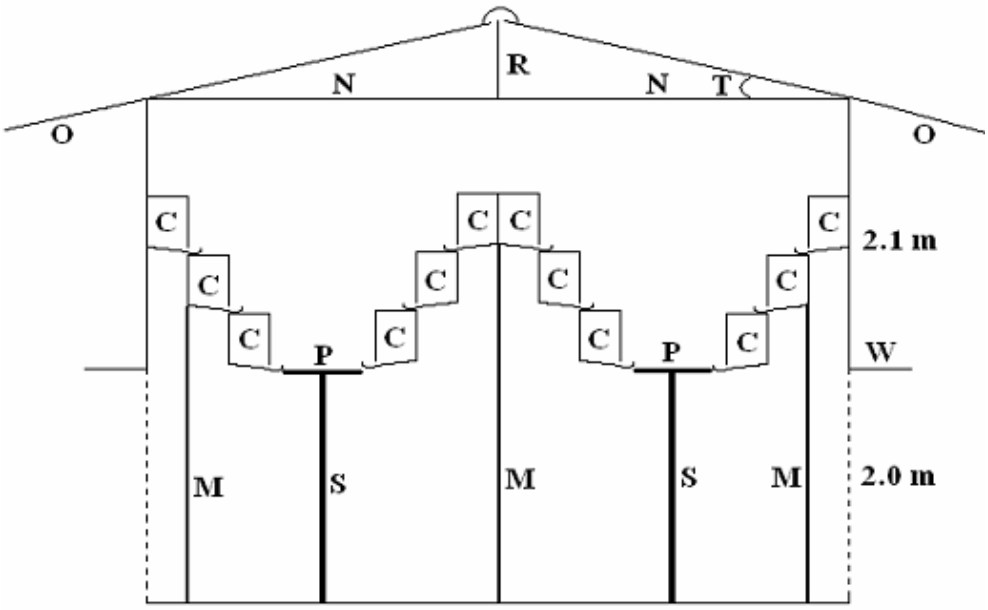


Fig. 1.11: Cross-section of CLH

Where,

P Concrete passage (0.5 m)

O Overhang (0.90 to 1.20 m)

S Support for cages

R Rise (0.60 to 0.90 m)

M Metal supports to fix cages

C Cage

N Run (3.09 m)

T Pitch (11 to 16º)

W Side walk

Note:

- Steps have to be constructed for persons to carry birds, feed, eggs etc. from and to the CLH (see Fig 1.12).
- Door will be provided to the store-room directly on the side-wall, but at the level of passages. From the store room, entry is provided into the CLH; door is also provided in the partition wall between CLHs (see Fig 1.12).
- Wall is constructed only from the level of passages and upwards (Fig. 1.13); below the level of passage, it is left completely open.
- Side-walls above the level of passage can also be completely open; but to prevent predators and theft, they may be covered by expanded metal.
- Pitch normally does not exceed 30°.

1.5.4 Floor Diagram

Floor diagram of the CLH is different from that of a broiler house because of passages and cages being alternatively located inside the house. Look at the figure below (Fig. 1.12) for the details:

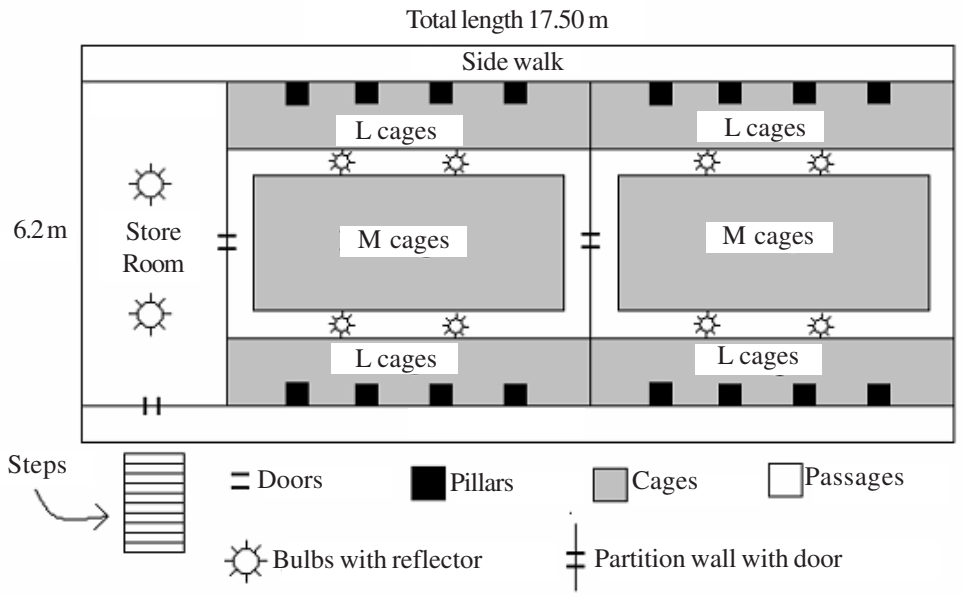


Fig. 1.12: Floor diagram of CLH

Note:

- All pillars and bulbs are equally spaced; pillars are 1.48 m apart and bulbs in the cage-layer area are 2.46 m apart. Bulbs are fixed at a height of 1.8 m over the passages.
- Side walk is at the level of passages (2.0 m above the ground level).
- Steps should be parallel to the side walk (Fig. 1.13) with a gap of 0.6 to 0.9 m (2 to 3 ft).

Fig. 1.13: Cage Layer House

Activity 4

Visit a nearby layer house. Measure the basic dimensions of the house. Draw a cross-section and floor diagram of the layer house you visited. Give your opinion about the layer house based on the standards and gathered information.

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1.6 LOW-COST HOUSING

Low-cost housing means constructing poultry house using the locally available and less expensive materials, thereby minimizing the initial cost.

1.6.1 Items to be Considered

In a poultry house, the following items can be made less expensive by using locally available cheaper materials:

(i) Floor

Instead of cement concrete, floor can be made of:

- Cement mortar: This is quite common in villages and reduces cost of flooring considerably.
- Stone slabs, wherever available at low cost.
- Clay flooring.
- Wooden materials.

(ii) Side wall and foundation

- Instead of brick wall, stone slabs or asbestos sheet can be used.
- Instead of welded mesh fixed on brick wall, complete area can be covered with chicken mesh.
- Instead of concrete pillars with foundation, Wooden poles (Casuarina/Bamboo/ wood), Stone pillars, hollow galvanized iron or steel pipes or Cement pillars can be used.

(iii) Roof and truss

Instead of ACC sheet roofing on steel truss, the following alternatives can be considered:

- Tiled roofing on wood or bamboo framework.
- Thatched roofing on bamboo framework.

Note: In both tiled and thatched roofs, roof should have more slope and the pitch of the roof should be at least 30º and 45º, respectively.

You may ask why slope should be more? The answer is to prevent rainwater entering into the thatched house by its weight or through the spaces between the tiles.

1.6.2 Advantages and Disadvantages

Obviously, changes given above for different parts of the building are primarily to reduce cost of the building. Another advantage is that the material suggested have to be available locally and therefore, reduces cost of handling and transportation.

However, the disadvantages include:

- They are not very long lasting. Flooring may have to be replaced once in two years. Roofing, in case of thatches, once every year.
- They are not easy to clean and disinfect.
- The material may not be available when needed.
- Thatches and tiles are prone to pests like rats, snakes etc. and parasites like ticks.
- Tiles may break and thatches can catch fire.
- Heavy wind can blow-off thatches.
- Bamboo or wood structures can be damaged by termites.
- Side walk cannot be provided.
- Require labour more often.

Check Your Progress 3

Note: a) Use the space given below for your answers.

b) Check your answer with those given at the end of the unit.

1) What do you understand by "Flock schedule"?

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2) How do cage layer houses differ from other animal houses?

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3) Draw L and M type of cage arrangement.

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Activity 5

Visit a low-cost poultry house in your locality. Gather information regarding the type of floor, wall, roof etc. Note down the locally available materials used for construction of poultry sheds. Give your opinion on the low-cost housing.

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1.7 LET US SUM UP

The chickens are available in two forms: one for meat called broilers and the other for eggs called layers. They will be gaining weight at about 2 grams every hour and hence require good house, feed and management. Dimensions of a poultry house depend on type of housing and number of birds reared. Broilers are reared on litter for 6 weeks and they require 900 cm² (1 sq ft) of area per bird. Layers, on the other hand, are reared on litter in a brood-grow house till start of lay and later on grown in laying cages in a cage layer house. In both the houses, layers also require 900 cm² (1 sq ft) of area per bird. Generally, poultry houses are constructed on brick foundation with brick-work side-wall, concrete flooring and asbestos cement concrete sheet roofing mounted on steel trusses. Plinth, side walk and overhang are provided to the houses. Cage layer house is uniquely different from other animal houses in its passages being raised 2 m above the ground level. Cost of the house construction can greatly be reduced by using cheaper material locally available. However, low-cost houses do have certain disadvantages.

1.8 GLOSSARY

Broiler : Bird meant for meat purpose usually reared only for 5 to 6 weeks.

Brood-grow House : is a house in which the chicks are reared till they start laying eggs.

Cross-section : A diagram showing details of a house when it is cut across (North-South in case of poultry houses) is called cross-section.

Flock Schedule : Detailed plan of arrival of different batches of chicks into a poultry farm is called flock schedule.

Floor Diagram : A diagram indicating view from top of a poultry house when its roof is removed.

Layer : Bird meant for egg production.

Overhang : A projection of the roof beyond the side wall.

Per capita : Amount per person per year.

Plinth : Plinth is the height to which the building is raised above the ground level.

Replacement Stock : Birds grown to replace the layers sold.

Ridge : Gap given in the roof to help escape of hot air.

Side Walk : Projection of the floor all round the building.

1.9 SUGGESTED FURTHER READING

Ensminger, M.B. 1993. *Poultry Science,* 3rd Edition, International Book Distributing Company, Lucknow, India.

North, M.O. and Bell, D.D. 1990. *Commercial Chicken Production Manual*. AVI Publication, Van Nostrand Reinhold, New York, USA.

Sreenivasaiah, P.V. 2006. *Scientific Poultry Production*, 3rd Edition, International Book Distribution Company, Lucknow, India.

1.10 REFERENCES

Sreenivasaiah, P.V. and Venugopal, S. 2008. *Small-Scale Broiler Production*. International Book Distributing Company, Lucknow, India.

Sreenivasaiah, P.V. and Venugopal, S. 2008. *Small-Scale Layer Production*. International Book Distributing Company, Lucknow, India.

1.11 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

1) Poultry houses are built upwind so that wind from other buildings, especially from those housing older birds, does not enter. This is to minimize spread of infection.

2) Poultry houses are oriented East-West to:

   a) reduce direct sunshine;

   b) minimize heavy wind; and

   c) prevent rainwater entry into the building.

3) Bacteria in the faecal matter of birds produce ammonia which is a poisonous gas. With the wind being reduced by East-West orientation of the building, ammonia accumulates. Therefore, to control ammonia concentration within tolerable limits, width of the building should always be less than 9 m (30 ft).

Check Your Progress 2

1) A diagram showing details of a house when it is cut across (North-South in case of poultry houses) by an imaginary line is called cross-section. A diagram indicating view from top of a poultry house when its roof is removed is the floor diagram.

2) Each broiler requires 900 cm^2 (1 sq ft). Hence, for 2500 broilers a building with internal area 900 $cm^2 \times 2500 = 225\ m^2$ or 2500 sq ft is required. Since width of the building at ≤ 9 m (≤ 30 ft), the length is calculated (225 ÷ 9) = 25.00 m. That means 25.00 m (84 ft) long and 9 m (30 ft) wide. However, to

avoid fractions, the building can be of 25 m (82.5 ft) in length and 7 m (23 ft) in width.

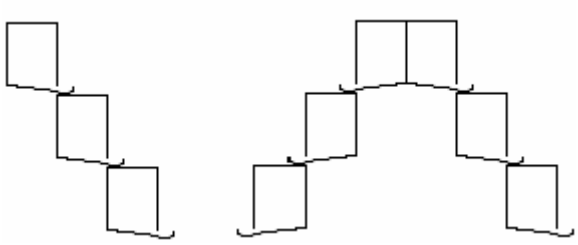
3) Plinth prevents entry of water from the ground and surroundings. If litter becomes wet, the litter material becomes wet and birds are likely to get infections. It also minimizes entry of rainwater, rats, snakes and other creatures into the building. Hence, a plinth of minimum 30 cm (1 ft) is provided for poultry houses.

Check Your Progress 3

1) Flock schedule gives the exact details of birds (flock) in the farm. Flock schedule depends on the number of batches of layer chicks you will be procuring every year. When broiler chicks are brought to the farm more frequently than once every 6 weeks, flock schedule has to be developed.

2) Cage layer house is different from other animal and poultry houses because the passages are raised 2 m (6.7 ft) above the ground level.

3) L and M type of cage arrangement:



L – Type M – Type