UNIT 3 MANAGEMENT OF LAYING TYPE BIRDS

Structure

3.0 OBJECTIVES

After studying this unit, you will be able to:

- summarize management of chicks, growers and layers;
- recognize importance of feed restriction during growing period;
- demonstrate beak-trimming;

- differentiate good, poor and non-layers ;
- determine lighting schedule for layers;
- explain egg collection, handling and storage; and
- evaluate performance of chicks and layers.

3.1 INTRODUCTION

Title of the Unit itself is a bit unusual; instead of "Management of layers", it is "Management of laying-type birds". It is absolutely intended. The term "Layers" refers to the birds which have already started laying eggs. But, "Laying-type birds" includes chicks (up to 8 weeks of age), growers (9 to 18 or 20 weeks of age) and layers (after 18 or 20 weeks of age).

It is not common that one purchases birds which are ready for lay (called "Ready-to-lay pullets") and start a layer farm. This is primarily because of non-availability of ready-to-lay pullets and also because they are sold for profits by the seller. It is equally difficult to determine the exact age of the birds purchased and the care taken during rearing of those birds definitely influences their egg production also. Therefore, it is not advisable to purchase ready-to-lay pullets.

Therefore, management of laying-type birds has three components namely, chicks (0 to 8 weeks of age), growers (9 to 18 or 20 weeks of age) and layers (above 18 or 20 weeks of age). However, you have already learnt in Units 1 and 3 of Block 1 that it is very common to have brood-grow houses (BGH) where the chicks are grown up to 18 or 20 weeks of age and then shifted to cage layer house (CLH) during lay.

3.2 MANAGEMENT OF CHICKS

Management of laying-type chicks is exactly the same as management of broilers, which has been discussed in previous unit. It consists of:

- Preparation for arrival of chicks.
- Brooding requirements.
- Care after arrival of chicks which includes feeding, watering, lighting, litter management, etc.
- Vaccination of birds. Schedule differs from that of broilers because these birds have to be reared till they are 18 months of age, whereas, broilers are sold by 6 weeks of age.
- Since birds are not sold by the end of this period, chick performance standards are also different from that of broilers.

3.2.1 Space Requirement

Laying-type chicks require 700 cm^2 of floor space, 5 cm feeder space and 1.5 cm drinker space by the time they are 8 weeks of age. That means, these allowances are gradually increased as the birds grow. You should always remember that these requirements are at 21.1ºC. If temperature increases, all space requirements have to be increased. Comfort of the birds as indicated by livability is the criteria for deciding how much to increase.

3.2.2 Feed Requirement

Weekly feed requirement and body weight of laying-type chicks are tabulated below (Table 3.1). You can notice that they are substantially less than those of broilers. During brooding period, each bird consumes about 1.5 kg of chick starter, whereas, each broiler consumes about 4 kg feed by 6 weeks itself.

Table 3.1: Feed Consumption and Body Weight of Layer Chicks at 21.1ºC

Age (Weeks)	Body Weight (g)	Feed Consumption		
		g/bird/day	g/ bird /week	Cumulative (g)
1	65	10	70	70
2	115	15	105	175
3	180	20	140	215
4	250	25	175	490
5	320	30	210	700
6	400	35	245	945
7	475	40	280	1225
8	560	45	315	1540

Chick starter ration which is available in the mash form is offered during brooding period. You can consult the local feed dealers or Animal Husbandry Department to obtain the best feed source. Many standard feed manufacturers can supply feed at the farm gate. Sometimes, even the hatchery which supplies chicks also provides or recommends a feed source. You can make your own decision.

3.2.3 Water Requirement

Water must be available always and *ad libitum*. The following table (Table 3.2) is only a guide, but in practice, bell drinkers ensure continuous supply of water. It can be seen that during brooding period, each bird at 21.1ºC requires about 9 litres of drinking water.

Table 3.2: Water Intake by Layer Chicks at 21.1°C

Age (weeks)	Water Intake (ml)		
	Per bird/day	Per bird/week	Cumulative per bird
1	30	210	-
2	61	427	637
3	95	665	1302
4	133	931	2233
5	174	1218	3451
6	216	1512	4963
7	254	1778	6741
8	288	2016	8757
Adapted from : North and Bell, 1990			

3.2.4 Vaccination

All of you know that all vaccines cannot be and should not be given at the same time. The vaccines are given against diseases in such an order or schedule that the birds will be protected by the time the disease is likely to occur in the flock. This is commonly referred to as Vaccination schedule. The following table (Table 3.3) gives the recommended vaccination schedule during brooding period:

Table 3.3: Vaccination Schedule During Brooding Period

Age (days)	Disease	Route
5th	RD + IB	Ocular or nasal
5th to 7th	RD (Killed)*	Sub-cutaneous (neck)
14th	IBD	Ocular or nasal
24th	IBD	Ocular or nasal or water
28th to 30th	RD + IB	Ocular or nasal or water
5th to 6th week	Coryza*	Sub-cutaneous (neck)
7th week	Fowl pox	Sub-cutaneous (wing stab)
* Not compulsory		

RD- Raniket Disease; IB- Infectious Bronchitis; IBD-Infectious Bursal Disease (For details of diseases refer Unit 5 of this block)

3.2.5 Lighting

Same as for broilers discussed in previous unit.

3.2.6 Evaluation of Performance of Chicks

The following are some of the practical indicators of the performance of chicks farm which can be calculated only when accurate records are maintained:

(i) Average weight (kg)

This is simplest criterion. You can assess periodically (say weekly) body weight of about 5% of the birds, chosen at random, in each batch. Average weight can be easily calculated and can be compared with the values given in Table 3.1.

(ii) Feed conversion ratio (FCR)

As the name suggests, it is the quantity of feed required for one kg weight gain. Day-old layer chicks weigh only between 35 to 40 g. Hence, weight gain and average weight at a specified age are considered the same.

(iii) Livability %

This is 100 times the ratio of number of birds shifted to grower house to the number of birds started. This is the reverse of mortality; hence, higher the better. Generally, $\leq 98\%$ livability (or $\geq 2\%$ mortality) is expected. Hatchery supplies 5% of extra chicks free of cost. Under good management, farmer must have at least 500 layer chicks for transfer to CLH out of 500 (+ 25 extra) chicks purchased.

$$\text{Livability \% of a layer chick} = \frac{\text{Number of birds shifted to grower house}}{\text{Number of birds started}} \times 100$$

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) Give the space requirement of layer chicks

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2) Give the water requirement of layer chicks during brooding from 0 to 8 weeks of age.

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3) Define livability percentage.

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Activity 1

Visit a nearby layer house. Collect information on the management of laying type chicks. The information pertaining to floor, feeder and drinker space provided to chicks, vaccination schedule should also be collected.

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3.3 MANAGEMENT OF GROWERS

Now, you have 8 weeks old birds in the Brood-Grow House. Consider that these birds are destined to be layers by another 16 to 18 weeks of age. Therefore, it is very important that certain management steps are undertaken to improve their performance, which in turn increases your profit.

3.3.1 Space Requirement

Laying-type chicken during growing stage require 900 cm² of floor space, 6.5 cm of feeder space and 2.5 cm of drinker space. These requirements are gradually increased from brooding period. You should always bear in mind that these requirements are at 21.1ºC. If temperature increases, all space requirements have to be increased; comfort of the birds as indicated by livability is the criteria for deciding how much to increase.

3.3.2 Feed Restriction

During growing period, birds are feed restricted. You will immediately ask the reasons for not offering *ad libitum* feed. The reasons are as follows:

- A considerable saving on feed cost is possible because, only 90 to 92% of the calculated feed requirement will be offered.
- They are likely to consume less feed per dozen eggs even when they are offered *ad libitum* feed during laying period.
- The pullets (females before beginning to lay eggs) accumulate less fat and therefore produce more eggs.
- It is easier to identify weaker birds at an early age during feed restriction. Removing (Culling) of such birds helps not only saves feed cost, but also improves layer house livability because, healthier birds will be moving to the layer house.

- Layers which are feed restricted during growing period have been found to produce heavier eggs in longer sequences (number of eggs laid without a gap; also called "Clutch") than those fed *ad libitum*.

Obviously, you will definitely expect some bad effects also. They are as follows:

- Feed restricted birds mature late; but this is more than compensated by sustained production of heavier eggs.
- There will be reduction in grower house livability because, weaker birds will be culled. But, this is compensated in the form of higher layer house livability. In fact, it is possible to save feed which would have been offered to weaker birds had they entered layer house.
- Feed-restriction requires technical supervision.

You may get a different idea at this stage; why restrict feed? Just restrict feeder space. Restricting feeder space only postpones feed consumption marginally. Birds soon learn to eat rapidly and all would feed *ad libitum*. Next possibility you can think of is to carry on feed restriction and feeder space restriction. This is dangerous. Restricting feeder space adds further competition for the available feed and can result in fighting, injury and mortality. Therefore, feeder space and drinker space can be increased but never decreased.

(i) Method of feed restriction

Feed restriction can be done by several ways. But, under commercial conditions, quantitative feed restriction is commonly practiced on Leghorn-type laying pullets mainly, because it is easier to perform and the chick-supplier will be providing a readymade chart of the quantity of feed to be offered during the growing period. Otherwise, 90 to 92% of the expected feed consumption is offered so as to attain the expected body weights (Table 3.4). About 5.25 kg of feed is offered per growing bird between 9 and 20 weeks of age.

Table 3.4: Feed Intakes During Growing Period at 21.1°C

Age (weeks)	Av. Weight (g)	Feed intake g/bird		
		Daily	Weekly	Cumulative
9	650	45	315	315
10	725	50	350	665
11	825	53	371	1036
12	900	55	385	1421
13	975	58	406	1827
14	1050	60	420	2247
15	1100	64	448	2695
16	1175	65	455	3150
17	1225	68	476	3626
18	1275	70	490	4116
19	1325	78	546	4662
20	1400	85	595	5257

Grower ration which is available in the mash form is offered for growing birds till first egg is produced. You can consult the local feed dealers or Animal Husbandry Department to obtain the best feed source. Many standard feed manufacturers can supply feed at the farm gate. Sometimes, even the hatchery which supplies chicks also provides or recommends a feed source. You can make your own decision.

3.3.3 Water Requirement

Water must be available always and *ad libitum*. Table 3.5 is only a guide, but in practice, bell drinkers ensure continuous supply of water. You can note that each bird at 21.1ºC drinks about 12 litres of water during growing period (9 to 20 weeks of age)

Table 3.5: Water Intake During Growing Period at 21.1ºC

Age (weeks)	Water Intake (ml/bird)		
	Per day	Per week	Cumulative
9	124	868	-
10	129	903	1771
11	131	917	2688
12	134	938	3626
13	136	952	4578
14	138	966	5544
15	141	987	6531
16	143	1001	7532
17	145	1015	8547
18	147	1029	9576
19	149	1043	10619
20	150	1050	11665
Adapted from : North and Bell, 1990			

3.3.4 Beak-trimming (Debeaking)

This is popularly known as debeaking. It is undertaken usually after 6 weeks of age and most often in the grower house. It can be done in the brooder house also. For the majority of birds, it involves the partial removal of the upper and lower beak using an electrically heated blade.

You are now very much interested to know why and how to carry-out beak-trimming and what are the advantages of such a procedure. They are described below:

(i) Why beak-trimming?

- Beak trimming is performed early in the life of commercial hens to decrease injuries caused by the behavioural bad habits (vices) like pecking and eating one's own species (cannibalism), bossing over others (bullying) as well as feather and vent pecking.
- To avoid feed wastage:

  a) Quantitative: Birds have a natural tendency to scratch the feed and search for grains especially when feed is in the mash form. In this process, there will be spillage of feed out of the feeders.

  b) Qualitative: You are aware that grower ration comes as mash (powder form). Birds do establish a peck order within the pen. The stronger birds eat feed first and preferentially pick and eat the grains (also a natural instinct) if beaks are not trimmed. It is well known that the grains are energy-rich and poor in all other nutrients. Hence, the stronger birds become weaker. When the weaker birds reach the feeders after the stronger ones have left, they will be left with only powdery feed which they cannot eat because of sharp beaks. Therefore, they also suffer nutrient deficiency and become weaker. Consequently, the entire flock shows a

poor feed conversion ratio and you will be at loss. If the beaks are trimmed, the birds cannot search for grains. Instead, they have to scoop the feed and eat thereby making available all components of the feed to all the birds ensuring uniform growth, production and reproduction.

- To avoid egg-eating vice.

(ii) How much trimming?

For birds 10 to 12 weeks of age, beaks should be trimmed 6 to 7 mm beyond the nostril with 2 seconds of cauterization (Fig. 3.1).

(iii) Precautions before beak-trimming

- You will naturally expect bleeding when beak is cut. Therefore, administering Vitamin K through drinking water 2 to 3 days before trimming can reduce bleeding.
- Birds should not be subjected to stress from housing, vaccination or deworming during the week before or after trimming.
- Sick birds should not be beak-trimmed.

(iv) Precautions during beak-trimming

- You should hold the bird in such a way that it neither shakes it head nor suffocates.
- The beaks are opened with the help of index finger and the tongue is held back.
- The upper beak is cut first to the recommended level. The beak is held against the blade and circular motion is given for at least 2 seconds while holding to effect proper cauterization (blocking of cut blood vessels by heat).
- Lower beak is then cut as per the recommendation.
- Proper cauterization is once again ensured before the bird is left into the pen.

Note: If toe nails have grown in excess, they can also be trimmed.

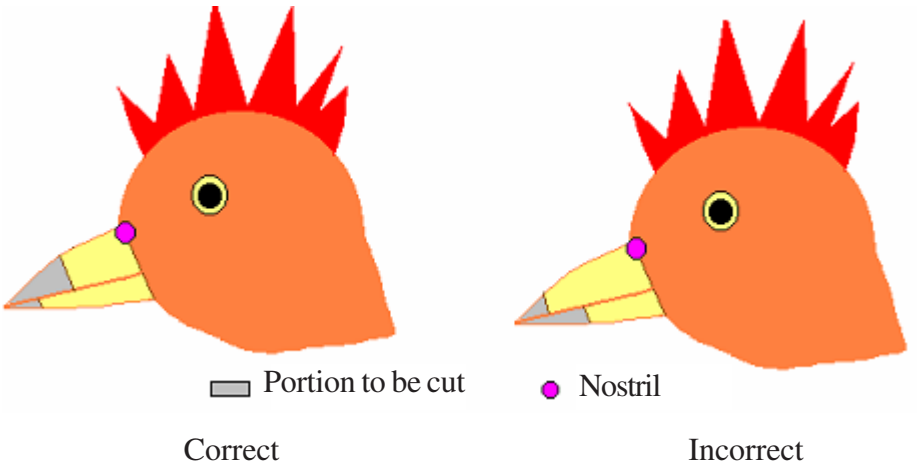

Fig. 3.1: Beak trimming – procedure

(L L L rule: Leave Lower beak Longer)

Fig 3.2: Normal beak

Fig 3.3: Trimmed beak

(v) Precautions after beak-trimming

- Feeders must be kept full with feed to help birds eat easily. Probably, this is the only occasion when feeders are full with feed.
- Vitamins B-complex, C and K can be given through water to help reduce stress.
- All the birds must be observed carefully for any bleeding, especially in the upper beak. If any bird shows bleeding, it must be separated at once, suitably treated. Otherwise, there is a likelihood of cannibalism.

3.3.5 Deworming

Internal parasites (worms) is one of the problems under deep-litter system because, the birds have an access to their own faeces. However, in cage system, worms are not expected due to obvious reason that faeces falls away from the birds. Hence, generally, during growing period, birds are dewormed few days before shifting them to CLH. If the layers are reared on deep-litter, they have to be de-wormed once every 3 months.

Several deworming preparations are available in the market. Selection of medicine and its dosage can be made preferably in consultation with a Veterinarian or a Poultry Specialist.

Most of the times, deworming medicine is given through water. You may ask why not in feed? All birds compulsorily drink water and not necessarily same quantity of feed. Further, mixing small quantity of drug in feed will not be uniform. Hence, deworming drug is given through water.

You know that these medicines will not have good taste. Therefore, birds hesitate to drink water. Hence, what can be done? Do not provide water for 3 to 6 hours depending on temperature (shorter if hot and *vice versa*). Then, introduce more number of smaller drinkers with medicated water. All birds will drink.

After administering the medicine, it is advisable to observe litter carefully to identify presence of any worms. If worms are detected, it means that the birds had worms which were sticking to the intestines. Therefore, when the worms are removed, there will be small wounds in the intestines. To help birds recover from this, Vitamin A and B-complex vitamins are given through water. If worms are not noticed, there is no need of wasting money on vitamins. However, it is again a general practice to give vitamins following deworming.

3.3.6 Vaccination

For details of vaccine handling and administration as well as medication, you can refer Unit 5 Block 2. The following vaccines (Table 3.6) are administered during the growing period:

Table 3.6: Vaccination Schedule During Growing Period

Age (weeks)	Disease	Route
9^{th} to 10^{th}	RD (R_2B)	Sub-cutaneous (wing web)
12^{th}	IB	Ocular or nasal or water
13^{th} to 14^{th}	Coryza*	Sub-cutaneous (neck)
17^{th}	RD (R_2B)	Sub-cutaneous (neck)
* Not compulsory		

3.3.7 Lighting

Although, specific lighting programs are recommended for different locations, they are, by far, not practicable in open-sided poultry houses. It is sufficient if no artificial light is given during the growing period.

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) Give the space, feed and water requirements during growing period.

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2) What are the advantages of feed restriction?

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3) Why beaks are trimmed during growing period?

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Activity 2

Visit a nearby layer house. Collect information on the management of growers. The information pertaining to floor, feeder and drinker space provided, de-worming and vaccination schedule, lighting and beak-trimming should also be collected.

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3.4 MANAGEMENT OF LAYERS

Now, birds ready-to-lay are shifted from BGH to CLH. Again, the routine works of feeding, watering, vaccination and medication are to be undertaken. In addition, you have to know about lighting, identifying good layers, and evaluation of performance. These are dealt in this Section. Layers are generally kept up to 72 weeks of age (1 year of production). However, some which are identified as poor layers or becoming weak for any reason or at the end of lay are sold.

3.4.1 Space Requirement

During laying period, hens require 1400 cm² of floor space, 8.75 cm of feeder space and 2.5 cm of drinker space. These requirements are gradually increased from growing period. You should always bear in mind that these requirements are at 21.1°C. If temperature increases, all space requirements have to be increased; comfort and egg production are the criteria for deciding how much to increase.

3.4.2 Feeding

You have already studied about 3-bird laying cage (Fig. 3.4) in Unit 1 of previous block. You can easily recognize that laying cages have a feeding channel running in front all along the width of the cage at about 8 to 10 cm above the cage floor to facilitate feed consumption. Each cage has also a separate nipple drinker. Therefore, there is no need to bother about feeder and drinker space in a CLH.

Fig 3.4: Detailed view of a 3-bird laying cage

Layer ration which is usually in mash form is offered for layers. You can consult the local feed dealers or Animal Husbandry Department to obtain the best layer feed

source. Many standard feed manufacturers can supply feed at the farm gate. Farmer can have his own decision.

Layers are never feed-restricted; they are given feed *ad libitum* meaning as much as they want. At an ideal temperature of 21.1ºC, White Leghorns (most of the commercial layers in market are strains of this breed) consume 100 g feed and 200 ml water per day. However, for every 1ºC rise in temperature above 21.1ºC, feed intake reduces at a rate of 3.0 %, whereas, for every 1ºC reduction in temperature from 21.1ºC, feed intake increases by 1.5 %. Hanging feeders are usually re-filled as and when the feed level reduces so that hens will have feed *ad libitum*. Under farmer's conditions, feed wastage is expectable to some extent and hence, feed consumption could be marginally higher than the expected 100 g/bird/day. Let us consider at 21.1ºC, feed and water consumption is 110 g/bird/day and 220 ml/bird/day, respectively water. Therefore, in 1 year (365 days), each layer consumes 40.15 kg (say 40 kg) feed and drinks 80.30 litres (say 80 litres) of water.

3.4.3 Watering

Laying cages have nipple drinkers (see Unit 3 Block 1). They must be regularly inspected both to ensure that they are in proper working condition and also to replace those which are leaky. Water must be available always and *ad libitum*. Water consumption is influenced by temperature; higher the temperature, higher will be the water consumption.

3.4.4 Judging Layers

It is understandable that there could be some birds which may not produce eggs as good as others. These have to be identified as early as possible to save feed cost and space occupied by them. This process of identifying good layers from others is called "Judging of layers" and it is generally performed at the age of 26 to 28 weeks.

You may raise a question, why not when they are transferred from BGH itself? It is not possible at the time of housing into the CLH, because, all the birds should have an opportunity to produce at least one egg to know whether it is going to be a good layer or not. Not all birds can be expected to start laying on the same day. Therefore, it is reasonable to assume that by 26 to 28 weeks of age, all the birds should have produced at least one egg.

After sufficient experience, you will be able to detect such poor performing birds by just observation itself. Feed restriction during growing period does help identification of such birds during early age. However, some may even escape identification during growing period and reach the layer house. Further, in CLH, only 3 layers are housed in each cage. If you are careful in observing while egg collection, you should be able to identify a poor or a non-layer easily and sell away such birds. The criteria involved to judge laying capacity is tabulated below:

Table 3.7: Judging Present Production

Parameters	Good layer	Poor layer	Non-layer
Comb	Large, red, warm	Small, less warm, shrunken	Underdeveloped
Eyes	Big, bright and active	Comparatively looks smaller and less active	Appears dull and inactive

Vent	Oblong, moist and pink	Less oblong, maybe moist and pink	Round, dry and has a yellow rim
Distance between two pubic bones	At least three fingers	Less than three fingers	Maximum one finger
Distance between tip of the breastbone and pubic bones	At least four fingers, the region being soft and pliable	Less than four fingers, not very soft	Hardly two fingers, very hard and rubbery

Fig 3.5: Comb–Good layer

Fig 3.6 Comb–Poor layer

Fig 3.7 Vent–Good layer

Fig 3.8 Vent–Poor layer

Fig 3.9 Good layer

Fig 3.10 Poor layer

(Distance between pubic or hip bones)

Fig 3.11 Good layer

Fig 3.12 Poor layer

(Abdominal capacity)

3.4.5 Vaccination

For details of vaccine handling and administration as well as medication, you can refer Unit 5 Block 2. The following vaccines are administered during the laying period:

Table 3.8: Vaccination schedule for Layers (Pullets)

Age	Disease	Route
Above 18 to 20 weeks	RD	Spray or drinking water (Every 3 months)

3.4.6 Lighting

You will probably be surprised to know that light is very important for egg production. Light rays stimulate (through eyes) egg formation. Therefore, light is a very important factor to be discussed for layers.

(i) Type of bulbs and reflectors

Incandescent bulbs with flat reflectors are preferred for poultry houses (Fig. 3.13). The reason is fluorescent bulbs (tube lights) can stimulate egg production only when the outside temperature is around 21.1°C. Further, incandescent bulbs have more of red light which is a better stimulant to egg production than blue light in fluorescent bulbs.

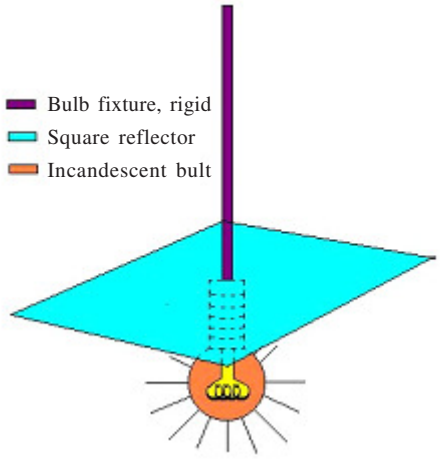

Fig. 3.13: Bulb-reflector assembly

Incandescent bulbs must have flat reflectors of size 30 cm × 30 cm with reflecting surface facing the bulb. You will be interested to know why reflectors are needed and why flat in shape?

First of all, if there is no reflector, light will illuminate even ceiling and walls which will be a waste. Hence, to direct the light toward the layers, reflectors are needed. Further, light illuminating the walls and roof doesn't stimulate layers. Hence reflectors are needed.

Secondly, cone reflectors do not illuminate the entire area because they form circular areas. Hence, flat reflectors are preferred.

Bulb and reflector assembly must be regularly cleaned; at least once a fortnight. Otherwise, amount of light actually falling on the birds may reduce to even 50% of the total expected.

(ii) Location in a CLH

You know now that light has to stimulate egg production; and only eyes can perceive light. Therefore, bulbs have to be located above the passage so that when birds drink and eat, light stimulates simultaneously. Fig. 3.14 and 3.15 below shows the arrangement in conventional cage system; the same is applicable for high rise house as well.

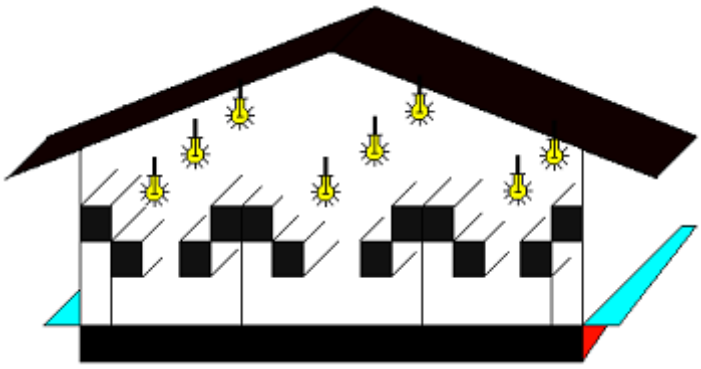

Fig. 3.14: Arrangement of bulbs in Conventional cage system

Fig 3.15: Interior view of a CLH

(iii) Fixing bulbs

The bulbs are fixed in such a way that the distance between two bulbs is 1½ times the height at which it is suspended. Further, it is fixed in such a way that it will not swing due to wind etc. Your obvious doubt is what happens if the bulbs swing? If the bulbs move, they cast moving shadows, especially in cage system, which frighten the birds and may lead to reduced egg production. A 40 or 60 Watts bulb with reflector is generally optimum for CLHs.

Note:

- In general, required intensity of light can be achieved by supplying 4 bulb-Watt for each m² of floor space i.e. One 40 Watts bulb will be sufficient for 10 m^2 floor area.
- The bulbs are fixed at a height of 2.1 to 2.4 m above the floor and 3.15 to 3.6 m apart.
- It is preferable to use many smaller bulbs than fewer larger bulbs to effect proper distribution of light.

Example

In the present example, to rear 500 layers, a CLH measuring (7.40 m × 6.18 m) = 45.732 m² is required; Therefore, 45.732 × 4 = 182.938 bulb-Watts are required. Hence, 4 bulbs, each of 45 Watts (or say 40 Watt because 45 Watt bulbs are not available in the market) have to be fixed.

(iv) Duration of light (Photoperiod)

The total duration of light, including sunlight is referred to as "Photoperiod". A photoperiod of 15½ to 16 hours is recommended.

A sudden change in duration of light or feed should not be done and only a gradual change must be made in length of the light-day (photoperiod). When the first egg is laid (about 20 weeks of age), it is advisable to consider the change of lighting program. The additional light other than the natural day-light may be given either before the sunrise or after sunset or a combination of both.

Hence, under commercial conditions, duration of light is increased by ½ hour per week (from 20th week onwards till a maximum of 16-17 hours of light a day is attained and maintained at that point onwards.

Now, the next question is what happens if 24 hours of light is given. It causes more harm than good. It is like, vitamins are good for us; if we take too much of them every day, we will land up in health problems. Similarly, layers must never be given continuous (24 hours) light. Excess light results in excess feed consumption, fat accumulation, hyper-excitability, cannibalism, prolapse (see Unit 5 Block 2), reduced egg production and many other diseases.

3.4.7 Egg Collection and Storage

You have learnt about the care of hatching eggs in Unit 1 Block 2. The same care is essential for these table eggs also. They have to be collected at least once an hour between 10 am and 3 pm. The collected eggs kept in filler flats (Fig. 3.16) have to be fumigated (see Unit 5 Block 2) and stored in cold storage till they are marketed. Cold storage temperature can be lower than that of fertile eggs (say 8 to 10ºC) because there will be no embryo inside these eggs. However, cold storage facility is expensive and many small and medium farmers store eggs in store rooms and sell them within 3 to 4 days without cold storage.

Fig. 3.16: Eggs in filler flats

3.4.8 Summer Management

Layers in a CLH are particularly susceptible to heat stress more than those on deep litter because of restricted movement and more number of birds per unit floor space (high density). Reducing number of birds per cage may have to be resorted to if hot weather is too extreme and persistent. Layers also produce thin-shelled and shell-less eggs (Fig. 3.17) depending on the severity of heat stress; they may even reduce or stop egg production. Otherwise, management during extremes of weather is same as outlined in Unit 4 Block 2 of this course.

Fig. 3.17: Thin and shell-less eggs

It is rather very difficult to overcome reduction in shell thickness during severe summer. You can feed additional shell-grit or limestone by sprinkling them on the feed. Regular management steps to alleviate heat stress must be taken up immediately. It may even be necessary to use foggers to spray cold water on to the face of layers. Ice cold water may be sent through water lines. Vitamin C and other B-complex vitamins can be added in water. Sprinklers have to be arranged to the roof especially if the location of the farm is not humid. Thatches can be laid on the existing roof. Gunny-sack curtains made continuously wet to the side-walls is also an option when humidity is not a problem.

Under hot-humid conditions, the only option will be to plant shade-giving trees all round the shed. This will reduce wind flow which is unavoidable.

3.4.9 Evaluation of Performance of Layers

The following are some of the practical indicators of the performance of layer farm which can be calculated only when accurate records are maintained (See Unit 4 Block 2):

Note: Of all the indices, hen-housed egg production (HHEP), hen-day egg production (HDEP), feed per dozen eggs and livability are by far the most important under commercial conditions.

(i) Per cent production

a) HDEP

$$\text{For one day} = \frac{\text{Number of eggs produced}}{\text{Number of live hens}} \times 100$$

For a longer period =

$$\frac{\text{Average number of eggs produced over a period}}{\text{Average number of live hens}} \times 100$$

b) HHEP

For one day =

$$\frac{\text{Number of eggs produced}}{\text{Number of hens housed at the beginning of the laying period}} \times 100$$

For a longer period =

$$\frac{\text{Average Number of eggs produced over a period}}{\text{Number of hens housed at the beginning of the laying period}} \times 100$$

For a given flock, HDEP and HHEP will be same only when all birds housed survive throughout the period. Whenever there is mortality, the HDEP will be greater than the HDEP due to reduction in the magnitude of the denominator.

Note: HHEP = (HDEP × Livability) ÷ 100; HDEP = (HHEP × 100) ÷ Livability

(ii) Livability

Same as in case of broilers; it is 100 times the ratio of number of hens alive to number of hens transferred from BGH.

(iii) Egg mass

Calculated as a product of egg number and egg weight. This is normally calculated on each layer. However, average egg production of the flock and its average egg weight also can be used.

(iv) Feed consumed per dozen eggs or 100 eggs

As the name indicates, it is 12 or 100 times (as the case may be) the ratio of feed consumed in kg to the total number of eggs produced.

(v) FCR (Egg mass)

As the name suggests, it is the ratio of kg feed consumed per kg egg produced; similar to FCR in broilers.

(vi) Egg to feed price ratio

This ratio is similar to FCR (Egg mass); instead of weights, values (in Rupees) are taken; i.e. ratio of value of egg produced to that of feed consumed.

(vii) Cracked eggs %

This is 100 times the ratio of total number of cracked eggs (especially in CLHs due to rolling of eggs on the cage floor) to total number of eggs produced.

(viii) Stage break even point (BEP)

This is 1.175 times the ratio of income from eggs to expenditure on feed. Total income from eggs is the product of eggs produced and price of eggs. Similarly, expenditure on feed is the product of feed consumed during laying period and feed price.

Note:

- The factor 1.175 is based on the fact that layers would have consumed 7 kg feed before start of lay (during brooding and growing periods) and they consume about 40 kg during the laying year. Hence, feed cost is increased by (7 ÷ 40) = 0.175 to get the actual BEP. However, it is assumed that prices of chick starter, grower and layer rations are same.
- Obviously, the farmer can retain the birds as long as BEP is > 1 provided there is no problem of housing.
- Generally, other expenditure on medicines, vaccines, mortality and administration are also involved in production cost. Therefore, it is generally agreed that BEP should be 1.30 and in an ideal farm BEP > 1.40.
- There is no point in retaining the flock when BEP < 1.

(ix) Weekly egg production and livability standards

Standard HDEP values are available at different ages starting from 21st week till 80th week of age (Table 3.9). These are very useful in calculating number of eggs produced on hen-housed basis.

Table 3.9: Weekly HDEP Standards (Age in weeks, HDEP in %)

Age	HDEP	Age	HDEP	Age	HDEP	Age	HDEP	Age	HDEP
21	25	33	94	45	91	57	87	69	82
22	57	34	94	46	91	58	87	70	82
23	80	35	94	47	90	59	87	71	81
24	90	36	94	48	90	60	86	72	81
25	94	37	93	49	90	61	86	73	78
26	95	38	93	50	90	62	86	74	77
27	95	39	93	51	89	63	86	75	76
28	95	40	93	52	89	64	85	76	75
29	95	41	92	53	89	65	85	77	75
30	95	42	92	54	89	66	84	78	75
31	95	43	92	55	88	67	84	79	74
32	94	44	91	56	88	68	83	80	74

Note:

1. Number of birds at the completion of 20 weeks is taken as 100%
2. From 21st week of age onwards, a mortality of 0.1% per week is allowed. That means, by 30th, 40th, 50th, 60th, 70th and 80th week, number of layers surviving (livability) will be 99, 98, 97, 96, 95 and 94%, respectively.
3. In simple terms, livability % = 100 – 0.01 × (Age in weeks – 20)
4. HHEP = (HDEP × Livability) ÷ 100
5. Weekly egg production per hen = (%HHEP × 7) ÷ 100
6. Generally, birds are kept till 72 weeks of age

Example

Let us calculate number of eggs produced by 500 hens housed during 40th week of age:

HDEP from (chart above) = 93%; livability = 100 – 0.01 × (40 – 20) = 98%. Therefore, HHEP = (93 × 98) ÷ 100 = 91.14%. Consequently, each bird would have produced (91.14 × 7) ÷ 100 = 6.38 eggs in 40th week and 500 hens would have produced (500 × 6.38) = 3,190 eggs.

Likewise, weekly egg production and cumulative egg production for the given age can be calculated.

Check Your Progress 3

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

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

1) Explain judging of layers.

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2) Why incandescent bulbs are preferred to fluorescent bulbs?

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3) Why bulbs are fixed stiff and they have reflectors?

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4) Name any thee indices for evaluating the performance of layers.

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Activity 3

Visit a nearby layer house. Collect information on the management of layers. The information pertaining to floor, feeder and drinker space provided, de-worming and vaccination schedule, duration of lighting, egg collection and storage should be collected.

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3.5 LET US SUM UP

Laying-type chicken are reared in BGH till 18 or 20 weeks of age. They are transferred to CLH during lay. Care of chicks during brooding period (up to 8 weeks of age) is essentially same as that of broilers except that, being smaller in size, their requirements of space, feed and water are comparatively less than those of broilers. During growing period (9 to 18 or 20 weeks), the birds are feed restricted to avoid excess accumulation of fat and to save feed cost. It also helps identify weak birds and transfer only healthy birds to CLH so that their performance as layers will

be optimum. It is also a common practice to trim the beaks during the growing period by an electrical beak-trimmer. If toe nails are grown excessively, they can also be trimmed. Birds in CLH birds are subjected to 15½ to 16 hours of photoperiod. Bulbs are fixed over the passages so that it stimulates egg production during feeding and drinking. Layers are judged for egg production capacity by 26 to 28 weeks of age; all poor and non-layers are removed and sold. Eggs are collected once every hour and fumigated and stored; if feasible in cold storage; otherwise, they have to be sold as quickly as possible. During summer, especially with high humidity, special care is required to maintain egg shell quality. Various criteria for evaluation of layer performance are available. But, hen-housed egg production (HHEP), hen-day egg production (HDEP), feed per dozen eggs and livability are by far the most important under commercial conditions.

3.6 GLOSSARY

Ad libitum	**:**	As desired or as required or without restriction.
Bullying	**:**	Bossing over others.
Cannibalism	**:**	Eating one's own species.
Cauterization	**:**	Blocking cut blood vessels by heat.
Clutch	**:**	Number of eggs produced without gap.
Culling	**:**	Removal of unproductive birds.
Oblong	**:**	Deviating from a square, circular or spherical form by being elongated in one direction.
Photoperiod	:	Total duration of light given every day.
Prolapse	**:**	Coming out of intestines and/or reproductive system through vent.
Pubic Bone	**:**	Hip bone.
Pullet	**:**	Female ready to lay eggs.
Scoop	**:**	To take up or gather something like feed.
Spent-hens	**:**	Layer completing their laying cycle.
Subcutaneous	**:**	Under the skin.
Vent	**:**	Anus in case of birds.
Vice	**:**	Bad habit.

3.7 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 Distributing Company, Lucknow, India.

3.8 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.

3.9 ANSWERS TO CHECK YOUR PROGRESS

Check Your Progress 1

1) Laying-type chicks require 700 cm² of floor space, 5 cm feeder space and 1.5 cm drinker space by the time they are 8 weeks of age. That means these allowances are gradually increased as the birds grow. You should always bear in mind that these requirements are at 21.1ºC; if temperature increases, all space requirements have to be increased; comfort of the birds as indicated by livability is the criteria for deciding how much to increase.

2) It can be seen that during brooding period from 0 to 8 weeks of age, each bird at 21.1ºC requires about 9 litres of drinking water.

3) This is 100 times the ratio of number of birds shifted to grower house to the number of birds started. This is converse of mortality; hence, higher the better. Generally, ≥ 98% livability (or ≤ 2% mortality) is expected. Hatchery supplies 5% of extra chicks free of cost. Under good management, farmer must have at least 500 layer chicks for transfer to CLH out of 500 (+ 25 extra) chicks purchased.

Check Your Progress 2

1) Floor, feeder and drinker space of laying-type birds at growing periods are listed below:

Per bird	9 to 20 weeks
Floor space, cm²	900
Feeder space, cm	6.50
Drinker space, cm	2.50

2) Growing birds are feed restricted because:

- A considerable saving on feed cost is possible because, only 90 to 92% of the calculated feed requirement will be offered.
- They are likely to consume less feed per dozen eggs even when they are offered *ad libitum* feed during laying period.
- The pullets (females before beginning to lay eggs) accumulate less fat and therefore produce more eggs.
- It is easier to identify weaker birds at an early age during feed restriction. Removing (Culling) of such birds helps not only saves feed cost but also improves layer house livability because, healthier birds will be moving to layer house.
- Layers which are feed restricted during growing period have been found to produce heavier eggs in longer sequences (number of eggs laid without a gap; also called "Clutch") than those fed *ad libitum*.

3) Beak-trimming is essential due to following reasons:

- Beak trimming is performed early in the life of commercial hens to decrease injuries caused by the behavioral bad habits (vices) like pecking and eating one's own species (cannibalism), bossing over others (bullying) as well as feather and vent pecking.

- To avoid feed wastage:
  a) Quantitative: Birds have a natural tendency to scratch the feed and search for grains especially when feed is in the mash form. In this process, there will be spillage of feed out of the feeders.
  b) Qualitative: Grower ration comes as mash (powder form). Birds do establish a peck order within the pen. The stronger birds eat feed first and preferentially pick and eat the grains (also a natural instinct) if beaks are not trimmed. It is well known that the grains are energy-rich and poor in all other nutrients. Hence, the stronger birds become weaker. When the weaker birds reach the feeders after the stronger ones have left, they will be left with only powdery feed which they cannot eat because of sharp beaks. Therefore, they also suffer nutrient deficiency and become weaker. Consequently, the entire flock shows a poor feed conversion ratio. If the beaks are trimmed, the birds cannot search for grains. Instead, they have to scoop the feed and eat thereby making available all components of the feed to all the birds ensuring uniform growth, production and reproduction.
- To avoid egg-eating vice

Check Your Progress 3

1) Layers are judged when they are 26 to 28 weeks of age so that by then all good layers should be in production. The criteria involved to judge laying capacity is as follows:

Para Meters	Good layer	Poor layer	Non-layer
Comb	Large, red, warm	Small, less warm, shrunken	Underdeveloped
Eyes	Big, bright and active	Comparatively looks smaller and less active	Appears dull and inactive
Vent	Oblong, moist and pink	Less oblong, maybe moist and pink	Round, dry and has a yellow rim
Distance between two pubic bones	At least three fingers	Less than three fingers	Maximum one finger
Distance between tip of the breastbone and pubic bones	At least four fingers, the region being soft and pliable	Less than four fingers, not very soft	Hardly two fingers, very hard and rubbery

2) Fluorescent bulbs can stimulate egg production when temperature is around 21.1ºC. Further, incandescent bulbs have more of red colour which is a better stimulant of egg production. Therefore, incandescent bulbs are preferred to fluorescent bulbs in layer houses.

3) If bulbs are not fixed stiff, they are likely to swing due to wind. Such swinging will make shadows to move and the birds get frightened. Bulbs without reflectors illuminate ceiling and walls which is a waste. Therefore, bulbs are fixed stiff and they have reflectors.

4) The three indices for evaluating the performance of the layers are per cent production (HDEP and HHEP), Livability % and egg mass.