POULTRY FARMING (653)

NSQF LEVEL 4

(Job Role: Small Poultry Farmer)

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To meet the growing requirement of the skilled manpower in the poultry sector NIOS has developed a National Occupational Standards based course "Poultry Farming", based on job role "Small Poultry Farmer" prepared by Agriculture Sector Skill Council. This course is designated for the youths of rural and semi urban areas that are willing to make their carrier in the poultry sector. After completing this course you will acquire all the competencies that a skilled worker should have for joining a hatchery or a broiler farm. Also you will be competent well for entrepreneurship. The course "Poultry Farming" comprises of theory and practical components and are intended to provide basic knowledge and technical skills in the areas of Poultry Feeding, Housing, Management, Health Care and Marketing.

During the course of your study, NIOS will treat you as the manager of your learning. This is why your course material has been developed keeping in mind the fact that there is no teacher to teach you. You are your own teacher. Of course, if you have a problem, we have provided you a teacher at your Accredited Vocational Institution (AVI) study centre. I would advise you that you should always be in touch with your AVI for practical, examination schedules etc. You should also always attend the Personal Contact Programmes and Practical/Training sessions held at your study centre. These will give you the necessary hands on training that is very essential to master this vocational course.

We look forward to any comments and suggestions from you for further improvement.

We wish you all the best in your future career.

Course Team

National Institute of Open Schooling (NIOS)

How to use the Study Material

Congratulation! You have accepted the challenge to be a self-learner. NIOS is with you at every step and has developed the material in *Poultry Farming* with the help of a team of experts, keeping you in mind. A format supporting independent learning has been followed. If you follow the instructions given, then you will be able to get the best out of this material. The relevant icons used in the material will guide you. These icons have been explained below for your convenience.

Title: will give a clear indication of the contents within. Do read it.

Introduction: This will introduce you to the lesson linking it to the previous one.

Objectives: These are statements that explain what you are expected to learn from the lesson. The objectives will also help you to check what you have learnt after you have gone through the lesson. Do read them.

Notes: Each page carries empty space in the side margins, for you to write important points or make notes.

Intext Questions: Very short answer self check questions are asked after every section, the answers to which are given at the end of the lesson. These will help you to check your progress. Do solve them. Successful completion will allow you to decide whether to proceed further or go back and learn again.

What You Have Learnt: This is the summary of the main points of the lesson. It will help in recapitulation and revision. You are welcome to add your own points to it also.

Terminal Exercise: These are long and short questions that provide an opportunity to practice for a clear understanding of the whole topic.

Answers: These will help you to know how correctly you have answered the questions.

www **Web site:** These websites provide extended learning. Necessary information has been included in the content and you may refer to these for more information.

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1

INTRODUCTION TO POULTRY FARMING

Poultry farming and development are not a matter of only plans, targets, budgets, technology, material aid, experts and organizations to govern them. Rather, it is an effective use of all these mechanisms as education and entrepreneurial means for poultry farmers in such ways that they help themselves to attain economic and social improvement through poultry farming. By following exactly this principle, India within five decades has emerged as a global key player in poultry farming. All over the India, poultry meat and eggs are preferred over other animal products for a variety of reasons. The objective of this lesson is to make you understand the importance and transformation of Indian poultry farming from a backyard venture five decades ago to the most vibrant and fast growing sub-sector of agriculture. You will also come to know about different academic research and training institutions involved in development of poultry sector.

OBJECTIVES

After reading this lesson, you will be able to:

- explain the transformation of poultry from backyard to an established industry;
- discuss the importance of poultry sector in National economy with respect to employment generation;
- analyse the trends in egg production in India;
- discuss poultry meat production in India;
- identify the academic and training organisations working for the poultry sector.

1.1 TRANSFORMATION OF POULTRY SECTOR

Before understanding transformation of poultry sector, let us know the meaning of "Poultry" first as we will be using this term frequently. The term poultry includes a number of avian species such as chickens, ducks, turkey, quail, geese and guinea fowl

Notes

domesticated for economic purposes. These adapt well under a wide range of agro climatic conditions and can successfully be raised if proper management and nutritional requirements are provided. Chicken, ducks and quails are kept for production of both eggs and meat while turkey, guinea –fowl and geese are reared essentially for meat. The most common and widely used poultry birds in the world are chicken which may be called broiler chicken raised for meat production or egg type chicken called layer meant for egg production.

India being in the tropical region of the world, the climatic conditions in most of the states are congenial to poultry production. The demand for poultry products and the scope for poultry farming, both for broiler and layer, is in the increasing trend due to growing needs of the ever increasing population in India. Indian poultry industry has emerged as one of the fastest growing segments of the agriculture sector today in India. As the production of agriculture crops is rising at a rate of 2.5% per annum, the production of eggs has been rising @ 5.5% and broilers @11.44% per annum. Today, India is the World's third largest egg producer and the fourth largest producer of broilers.

Let us understand how the poultry farming / farms have transformed over the years through the following picture:

First poultry farm in Namakkal area of Tamil Nadu

Initial tile roofed deep litter system house

The early cage layers house

Elevated cage layer house

Environment cotrolled automated poultry house

Fig. 1.1: Transformation of poultry farming

1.2 IMPORTANCE OF POULTRY SECTOR WITH RESPECT TO NATIONAL ECONOMY AND EMPLOYMENT

Chicken is the most widely accepted meat in India. Many Indian families, especially the educated people in urban areas, have begun to accept eggs as a regular supplemental part of their vegetarian diet. The forecast surveys indicate that as the present younger generation goes to the adulthood, the acceptability and demand for eggs and chicken meat in next 2-3 decades is likely to increase many-folds very rapidly.

With the total poultry population of 729.2 million (2014-15), poultry sector is providing employment to more than 6 million people either directly (80%) involving 4.8 million people or indirectly (20%) involving 1.2 million people through several supporting activities viz. feed, pharmaceutical, equipment and other services required by poultry. The Indian poultry industry, which includes broilers and eggs, is worth Rs 48070 crores annually (http: www.poultryinida.co.in/why-poultry-india). This accounts for about 1% to India's GDP and 11.70% GDP from livestock sector. The organized poultry sector is contributing nearly 70% of the total output and the rest 30 % by the unorganized sector. Within poultry sector, 2/3 rd of the output (about 66.7%) is contributed by poultry meat sector and rest 1/3rd (about 33.3%) is from egg production. This indicates that broiler production has been more vibrant than layer production in terms of annual growth. However, it is estimated that an increase in per capita availability of one egg will generate 50,000 more jobs.

Notes

1.3 EGG PRODUCTION IN INDIA

India is the 3rd largest producer of eggs in the world in 2014-15 with production of 78.48 billion eggs. As per ICMR the recommended level of eggs consumption is 180 eggs / person / annum. However, the availability of eggs is 68 / person / annum only. 75 % of eggs produced are consumed by the 25 % of population living in urban and semi-urban areas. In the rural India, the per capita egg consumption is very low compared to urban and peri-urban areas.

Table 1.1: Egg production and per capita availability in India

Year	Egg (in million)	Human Population	Per Capita Availability (Numbers / Head / Annum)
1950-51	1832	359	5
1960-61	2881	434	7
1968-69	5300	518	10
1980-81	10060	679	15
1990-91	21101	839	25
2000-01	36632	1019	36
2010-11	63024	1186	53
2015-16	83640	1230	68

Table 1.2: Time line with major milestones of Indian egg production

Year	Milestones
1950-51	Backyard poultry with native breeds and low egg production by dual purpose birds
1955	Hybrid White Leg Horn (WLH) introduced
1965	Key Village Scheme (KVS)
1970	All India Coordinated Research Project (AICRP) on Egg
1975	Cage rearing of layers
1982	National Egg Coordination Committee (NECC), Support from banks, Establishment of feed and pharmaceutical industries
1995	High platform cages, Vertical integration, Corporate tendency
2000	Automation in feeding, egg collection, environmental controlled housing, exports, egg powder production plants
2010	High capacity farms with low margins

Notes

Reasons for Improved Egg Production and Productivity Differences

The increased productivity of commercial hybrid layers over the years are due to several reasons. Some of them are:

1. Strong private sector participation.
2. Investments by public & private sectors in poultry sector.
3. Improvements in genetic potential of poultry.
4. Advances in feeding technology like least cost formulation, pelleted feeding, feed additives, provision of fed by integrators, feed analytical laboratories for quality control etc.
5. Advances in healthcare like vaccines and medication.
6. Adoption of bio-security measures – water sanitation, restricted entry of personnel into farms, dead bird disposal etc.
7. Improved breeder management and chick quality.

The genetic potential of commercial layer chicks being supplied by public and private institutions is almost same. However, the productivity varies in different parts of the country due to:

1. Influence of climatic conditions and weather.
2. Availability of inputs and services.
3. Dissimilar entrepreneurial nurture of farmers.
4. Great variation in management practices.
5. Economy of scale in production.

Andhra Pradesh is leading state in egg production followed by Tamil Nadu, Maharashtra, West Bengal, Haryana and Punjab, which accounts for 80 % of eggs produced in India.

For table eggs, National Egg Coordination Committee (NECC) fixes and publishes daily prices for each of the major production and consumption centres.

INTEXT QUESTIONS 1.1

1. Fill in the blanks

   (a) The recommended level of eggs consumption should be ..... eggs / person / annum.

   (b) For table eggs, ... fixes and publishes daily prices.

   (c) Per-capita availability of eggs in India is ..... eggs / person / annum.

Notes

2. State True or False

(a) India is the 3rd largest producer of eggs in the world.

(b) In the rural India, the per capita egg consumption is high compared to urban and peri-urban areas**.**

(c) Backyard poultry products declined gradually mainly due to lack of economic viability and due to unavailability of manpower.

(d) Bihar is leading state in egg production.

1.4 POULTRY MEAT PRODUCTION IN INDIA

India is the 4h largest producer of poultry meat in the world. Poultry meat production has increased from 0.069 million tonnes in 1961 to 3.04 million tonnes in 2014-15. The per capita availability of poultry meat is 2.50 kg as against recommended level of 11 kg of meat per annum.

Table 1.3: Trends in poultry meat production in India ('000 tonnes)

Year	Poultry meat production (1000 tonnes)	Per capita availability of poultry meat (kg)
1980	179	0.266
1990	412	0.498
2000	980	0.820
2005	1900	1.300
2010	2337	2.150
2015	3040	2.50

Table 1.4: Time line with major milestones of Indian poultry meat production

Year	Milestones
1962	Meat type strains imported from Israel
1970	All India Coordinated Research Projects (AICRP)
1974	Import of Cobb strain
1980	Entry of private sector (Cobb + Venkateswara), Pureline broiler stock, Multiple batch farms, Market in urban areas
1995	Introduction of contract broiler farming, All -in – all -out batches, Rural based production and urban marketing, Improved bio-security
2000	Growth of contract broiler farming, Hatcheries, Feed mills, Feed additives
2010	High capacity farms with low margins, Entry of broiler breeding giants, Growth performance matching with world standards – 2.2 kg at 37 days with 1.6 Feed Conversion Ratio.

Reasons for Improved Poultry Meat Production

The reasons for improved poultry meat production are:

1. Private sector partnerships through contract broiler farming.
2. Modernization of production practices.
3. Import of Pure lines / grandparent stock.
4. Least cost feed formulation.
5. Vaccines against major diseases.
6. Availability of support services.
7. Improved quality breeder management.
8. Developments in poultry processing.

The contract broiler farming system has played a major role in the spectacular growth especially in Southern and Western states with almost 75 % of broiler meat being produced under contract farming. During the last three decades, there have been major changes in structure, size and number of broiler farms. Now a typical broiler farmer raises 5000 to 50000 for a weekly cycle compared to few hundred in 1990s. Due to modernization of production and management practices, the body weight which was achieved at 8 weeks of age during the 1980s is now realized in 35 to 40 days of age.

The leading states in poultry meat production are:

1. Andhra Pradesh (Hyderabad- Vijayawada belt)
2. Tamil Nadu (Coimbatore – Salem belt)
3. Maharashtra (Pune- Nasik- Mumbai belt)
4. Haryana (Gurgaon- Yamunanagar belt)

The Broiler Coordination Committee, Coimbatore sets the broiler prices for different regions and price varies daily. These rates are considered the benchmark rate for broilers in India.

1.5 INSTITUTIONS SUPPORTING POULTRY FARMING

In India, poultry academic and development institutions promoting poultry production are classified into the following categories:

1.5.1 Veterinary Universities and Colleges

Veterinary colleges under State Agricultural Universities (SAUs) or State Veterinary Universities (SVUs) deal with training in poultry courses during undergraduate veterinary education and specialized post-graduation programmes in poultry science. There are about 44 veterinary colleges spread in 12 veterinary universities and 16 Agricultural Universities in the country. Poultry Science or Livestock Production and Management

Notes

(LPM) departments in these colleges offer technical support and training programmes to the farmers. You may contact nearby veterinary college for poultry training or for information or assistance in poultry farm establishment.

1.5.2 Poultry Academic and Research Organizations (Under ICAR)

The Central Avian Research Institute (CARI) under Indian Council of Agricultural Research (ICAR) conducts research and offers Master's and Doctorate programmes in Poultry Science and Short-Term Specialized Training programmes to graduates as well as Short-Term Training on Poultry Farming to interested farmers. Another institute of ICAR is Project Directorate on Poultry (PDP), Hyderabad dealing with research and training in Poultry Science (Table 1.5)

Table 1.5: Poultry research organizations in India

State	Institute/Organizations
Uttar Pradesh	CARI, Izatnagar, Bareilly-243122 Phone Number : 0581- 2301220; 2301320 E-mail : cari_director@rediffmail.com Website: http://www.icar.org.in/cari/index.php
Andhra Pradesh	PDP, Rajendranagar, Hyderabad-500 030 Phone Number: 040-24015651; 24017000 E-mail: pdpoult@ap.nic.in Website: http://www.pdonpoultry.org/pdpnew/

1.5.3 Central Poultry Development Organizations (DAHR, Ministry of Agriculture & Farmers Welfare, Govt. of India)

During the 10th Five Year Plan, it was decided to combine all the existing 13 Central Poultry Development Organizations (CPDO) region-wise into 4 Centers (Table 1.6) so as to convert the poultry developmental activities into a single window system. Their major objective now is only to encourage rural poultry and training programmes. These Centers are now being used for diversification production programme as one of the thrust areas by taking up duck, turkey, Japanese quail and Guinea fowl farming.

Table 1.6: Central poultry development organizations

Eastern Region	Central Poultry Development Organisation, Bhubaneswar -751012
Northern Region	Central Poultry Development Organisation, Industrial Area, Phase-I, Chandigarh-160002
Southern Region	Central Poultry Development Organization, Hessarghatta, Bangalore - 560 088
Western Region	Central Poultry Development Organisation, Aarey Milk Colony, Mumbai-400065

INTEXT QUESTIONS 1.2

Notes

1. Expand the following:

   (a) CARI .....

   (b) CPDO .....

   (c) ICAR .....

   (d) PDP .....

   (e) AICRP .....

   (f) LPM .....

   (g) KVS .....

   (h) NECC .....

2. Fill in the blanks

   (a) India is the ..... largest producer of poultry meat in the world

   (b) The per capita availability of poultry meat is ..... kg

   (c) The recommended level of meat consumption / person / annum is ..... kgs.

   (d) ..... sets the broiler prices for different regions.

   (e) The Eastern Region's Central Poultry Development Organisation is located at .....

WHAT YOU HAVE LEARNT

Let us recapitulate and enlist salient points we have learnt through this lesson:

- Poultry is one of the fastest growing sub-sectors of Indian agriculture today.
- The organized poultry sector is contributing nearly 70% of the total output and the rest 30 % by the unorganized sector. Within poultry sector, 2/3 rd of the output is contributed by poultry meat sector and rest 1/3rd is from egg production.
- India is the 3rd largest producer of eggs in the world (83.64 billion eggs) with per capita availability of 68 eggs.
- Andhra Pradesh is leading state in egg production followed by Tamil Nadu, Maharashtra, West Bengal, Haryana and Punjab, which accounts for 80 % of eggs produced in India.

Notes

- An increase in per capita availability of one egg will generate 50,000 more jobs.
- India is the 4th largest producer of poultry meat in the world (with 3.04 million tonnes) and per capita availability of poultry meat is 2.50 kg.
- The leading states in poultry meat production are Andhra Pradesh, Tamil Nadu, Maharashtra, and Haryana.
- The reasons for increased poultry productivity are: strong private sector participation; investments by public & private sectors; improvements in genetic potential, feeding, management, healthcare, contract farming etc among others.
- For table eggs, National Egg Coordination Committee (NECC) fixes and publishes daily prices for each of the major production and consumption centers.
- The Broiler Coordination Committee, Coimbatore sets the broiler prices for different regions and price varies daily. These rates are considered the benchmark rate for broilers in India.

SUCCESS STORY

Shri Sanjeev Sarkar (Age: 32 years, Ed. Qualification: B.Com, Village: Chanduiya, Puranpur, Distt: Pilibhit (UP) - A successful broiler farmer. Starting with 100 CARIBRO Dhanraja broilers in 1995 after receiving Poultry Farming training from CARI with limited capital and land, has presently been the owner of 15000 broilers per cycle. He is always in touch with CARI for CARI germplasms and technical support. Besides commercial broiler farming, now he has the working capital to have agency of commercial feeds and poultry medicines. Now his annual income is about Rs. 3.5 lakhs. (Source : www.icar.org)

TERMINAL EXERCISE

1. What is the contribution of poultry sector to national economy and employment?
2. Explain are the reasons for improved poultry production.
3. Why the poultry productivity varies in different parts of the country?
4. What is the current status of egg production in India?
5. Discuss the current status of poultry meat production in India.
6. Enlist the leading poultry meat producing states in India.
7. Discuss the national institutes supporting education, research and training in poultry farming.

ANSWERS TO INTEXT QUESTIONS

Notes

1.1

1. (a) 180 (b) NECC (c) 68
2. (a) True (b) False
   (c) True (d) False

1.2

1. (a) Central Avian Research Institute
   (b) Central Poultry Development Organisation
   (c) Indian Council of Agricultural Research
   (d) Project Directorate on Poultry
   (e) All India Coordinated Research Project
   (f) Livestock Production & Management
   (g) Key Village Scheme
   (h) National Egg Coordination Committee
2. (a) 4^{th}
   (b) 2.50
   (c) 11
   (d) Broiler Coordination Committee, Coimbatore
   (e) Bhubaneswar

Notes

2

SYSTEMS OF POULTRY FARMING

In the previous lesson, you came to know that the common birds reared under poultry farming for meat and eggs include chicken, ducks, emu, quail, geese and turkey. This lesson will help you to recognize farming of these major birds with comparative advantages. The lesson will also deal with the different systems of poultry farming in detail. Each system has its own characteristics, but whichever system you are selecting to rear your birds it must be comfortable for them in order to produce well. Economics and your convenience should also be considered before deciding the rearing system.

OBJECTIVES

After reading this lesson, you will be able to:

- identify different species reared under poultry farming;
- explain different systems of poultry farming;
- describe the characteristics of each system.

2.1 DIFFERENT SPECIES FOR POULTRY FARMING

2.1.1 Broiler/Layer Poultry Farming

Based upon the requirement of meat and egg in your area, you may opt for starting either:

- Broiler farming for meat, or
- Layer farming - for eggs (table and hatching eggs), production of replacement pullets and chick production.

Besides the nutritive value, eggs have many industrial uses in preparation of adhesives, printer inks, shampoos, soap, varnishes, vaccines, etc. The egg shells are used as mineral-feed for animals and birds. The feathers are used for making various goods such as cushions, mattresses, pillows etc.

Farmers can rear the birds under free range/ extensive, semi-intensive, and intensive (deep litter/cage) systems. In the next section under this lesson we discuss in detail about these systems.

Fig 2.1: Chicken farming in deep litter and cage systems

2.1.2 Duck Farming

The ducks occupy second place to chicken in population in the country. They are reared mainly for egg and meat purposes. Duck production is mostly concentrated in the eastern and southern states like Assam, Manipur, Tripura and West Bengal followed by Andhra Pradesh, Bihar, Jammu and Kashmir, Karnataka, Kerala, Odisha, Tamil Nadu, and Uttar Pradesh.

Fig. 2.2: Duck farming

The duck rearing is more popular due to the following advantages:

- Availability of ponds and waterways as Chickens do not flourish in marshy wetland area, which are ideal for duck rearing.
- These watershed areas in addition to lakes and ponds provide algae, earthworms, fungi, insects, small fishes, snails, water weeds etc., as natural food for the ducks and thus reduce the feed cost.
- Ducks lay about 160-180 eggs in a year.

Notes

- Ducks also enrich the soil by their droppings while foraging.
- Duck eggs are heavier by 15-20 grams than chicken eggs.
- Requires less care and attention in management.
- Comparatively, ducks are more resistant to diseases than chicken.
- Majority of ducks lays eggs before 9.00 A.M. which helps in easy egg collection as well as saves labour cost.
- Acts as biological vector and control many diseases by destroying snails.
- Suitable for mixed farming system such as duck-cum-fish farming.

2.1.3 Emu Farming

The emu is another latest addition to poultry species for commercial use. The body weight of an adult emu is about 50-60 kg and their height is around 1.70-1.95m and out of which least 35 kg of fresh meat can be extracted. Emu meat costs around Rs 550-600/kg. Emu chicks cost more than Rs. 1,500 and bigger birds cost Rs.7,000 to 9,000 depending upon their weight. The birds lay eggs every third day in winter. Its egg weight is 0.7 to 1.0 kg. Areas where water is available in abundance are the best places for emu farming, which is not labour-intensive. The following are the advantages of emu farming.

- Emu meat contains low amounts of fat and cholesterol.
- Emu oil is also estimated to be highly medicinal value and is gaining its popularity in the pharmaceutical industry.
- Colourful emu eggs are used for ornamental purposes.
- Emu birds are practically immune to several diseases.

Fig. 2.3: Emu Farming

Notes

2.1.4 Geese Farming

Male geese are known as gander and the females are called geese. In India, the Brown-backed and White geese are found. Some of the specific advantages of geese farming are as follows:

- Hardy and can easily adapt to different feeding and management conditions.
- Have the ability to digest 40-50 % crude fiber; as such, the feed cost can be reduced by incorporating large quantities of high-fiber containing forages in the feed.
- Geese meat has high caloric value.
- Goosling (young geese) can attain a weight of 5 kg at 8 weeks of age with the feed conversion efficiency of about 3.0 kg.

Fig. 2.4: Geese farming

2.1.5 Guinea Fowl Farming

India has a large population of guinea fowl and ranks third after chicken and duck. It is well adapted to diverse agro-climatic conditions prevailing in arid and semi-arid regions and also well accepted by the marginal farmers as well as other vulnerable groups such as small-scale poultry enterprises raised under free-range in the states of Madhya Pradesh, Punjab, Uttar Pradesh and some parts of India. Lavender, Pearl and White are the three commonly known varieties of guinea fowl in India. The advantages of guinea fowl farming are:

- They are hardy, disease resistant, need low input and has unique ability to survive and thrive under sub-optimal management and feeding conditions because of its foraging habit.
- Meat is tender but pinkish red or dark in colour and having flavour of game bird.

Notes

- They are Seasonal breeder and lay eggs between March and September.
- The production starts by 30 weeks of age and lays 130-170 eggs in the first years. The average egg weight is 43-48 g.
- They are highly resistant to viral diseases and therefore, they are generally raised without any vaccination.

Fig. 2.5: Guinea fowl farming

2.1.6 Quail Farming

Japanese quail is mostly reared in India for meat and eggs. The reasons for popularity of quail farming are as follows:

- They are hardy and it can adapt to various environments.
- They do not require specially designed house.
- They are fast growing birds, mature in about six weeks and are usually in full production by about seven weeks of age. The live weight of mature bird is 120-150 g for male and 150-180 g for female.
- They are prolific layers produce three to four generations per year and lay 260 eggs in their first year of laying.
- The adult quail consumes 20 to 25 g of feed per day and egg weight is 10 to 12 g.
- They need less floor, feeder and water space in comparison to chicken and ducks.
- They are more resistant to diseases than chickens.
- They require less capital investment.

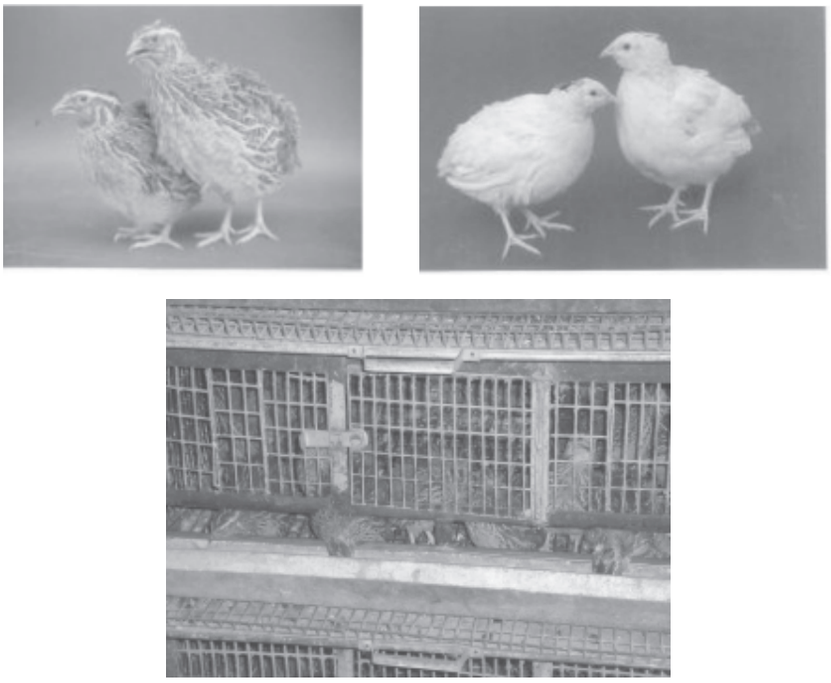


Fig. 2.6: Quail farming

2.1.7 Turkey Farming

Turkey farming is mostly reared for meat purpose. In India, turkey production is still in its initial stage. Since the turkey hens are bigger in size, their cut-ups can be marketed in various attractive packaging suited to the individual consumer. They are more resistant to disease than chicken and therefore, rarely suffer from diseases. The turkey farming has the following benefits:

- Grows very fast.
- Can be reared under semi-intensive system in the backyards.
- Turkey egg weighs 1.3 times more than the chicken egg.
- More resistant to diseases than the chickens.
- Better forager than chickens.
- Turkey meat contains very less fat as compared to meat of other avian species.

Fig. 2.7: Turkey farming (Semi-intensive and deep litter systems)

Notes

INTEXT QUESTIONS 2.1

1. Fill in the blanks

   (a) Poultry farming can be done for ..... or .....

   (b) ..... is ideal area for duck rearing.

   (c) ..... contains low amounts of fat and cholesterol.

   (d) The young Geese is called .....

   (e) Guinea fowl lays eggs between ..... and .....

   (f) Quails mature in ..... weeks and are usually in full production by about ..... weeks of age.

   (g) ..... contains very less fat as compared to meat of other avian species.

2. State True or False

   (a) The purpose of broiler farming is to produce meat.

   (b) Ducks occupy second place to chicken in population in the country.

   (c) Majority of ducks lays eggs before 9.00 a.m. which helps in easy egg collection as well as saves labour cost.

   (d) Quails are reared for meat and eggs.

   (e) Turkeys are reared mostly for meat purpose.

2.2 POULTRY FARMING SYSTEMS

Poultry farming is practiced under a wide range of conditions, which can be classified into the following broad farming systems:

(i) Extensive system (Free-range extensive and Backyard extensive systems)

(ii) Semi-intensive system, and

(iii) Intensive system.

In earlier days, poultry were primarily reared as backyard unit. They used to be scavenging in the morning hours and by the evening they return home to be kept under a night shelter with some water and left-over food or grains. You might have seen such backyard poultry units even now in some villages. These birds are hardy and no expense is involved in the rearing of such birds. However, they produce less number of eggs and meat. Under emergency, they can be easily sold. The system of rearing birds under these conditions is broadly called as extensive poultry farming system. But as the scientists improved the efficiency of the birds to produce more eggs and meat, the ability of the birds

Notes

improved, their requirements also increased in terms of housing, feeding, breeding, healthcare and overall management. The systems of rearing birds under these improved conditions are broadly called as semi-intensive or intensive poultry farming system.

The system of housing being practiced by the poultry farmers is the broad basis for the classification of extensive / semi-extensive or semi-intensive / intensive poultry farming. Let us discuss briefly these systems.

2.2.1. Extensive System

Under free-range extensive system, the birds are not confined and can scavenge for food over a wide area. Rudimentary shelters may or may not be provided to the birds. The birds may roost outside, usually in trees, and nest in the bushes. The flock may comprise birds of different species and varying ages.

Under backyard extensive systems, poultry are housed at night but allowed free-range during the day. They are usually fed a handful of grain in the morning and evening to supplement scavenging.

Broadly no scientific housing, equipment, feeding and for that matter, disease control measures are followed. Many local (Desi) birds are being reared in our country in this way. Most of these birds are reared for hobby and whatever is obtained from them is taken as bonus. In each unit, the number of birds reared will be limited to a maximum of 10 to 15.

Fig. 2.8: Extensive system of rearing poultry and turkey

Notes

Advantages

- No need of a separate house for the birds.
- No need of a balanced feeding because they graze and eat outside.
- Cost on feeding is virtually negligible since only left-over feed or grains will be given to the birds.
- As the birds are exposed to sunshine, they can produce their own Vitamin D.

Disadvantages

- Birds are likely to be eaten away by predators like dogs, eagles etc.
- There can be losses due to theft.
- They are exposed to all diseases; some of them can spread to humans also.
- More likely to have parasites both inside (endo-parasite) and on the body (ecto-parasite).
- They may not get proper food.
- Due to above factors, they produce very few eggs; say about 50 to 60 in a year.
- They weigh very less; about 1.0 to 1.2 kg when they are sold after 18 months of age.

2.2.2 Semi-intensive System

It is also called semi-extensive system. This system consists of a separate shelter for the birds during the night in which water and some feed is provided. Litter material is spread on the floor. This shelter will be fenced all round giving sufficient area for the birds to graze during the day. Obviously, area available for grazing depends on the land covered by the fence. However, this system is popular for rearing turkeys and ducks than chicken. In case of ducks, a pond for them to swim may also be provided.

Fig. 2.9: Semi-intensive system of housing poultry and turkey

Notes

Advantages

- Birds need some care at least during the night.
- Even during the day, due to fencing, chances of theft are also minimized.
- Fencing also limits predator attacks and diseases.
- As the birds are exposed to sunshine, they can produce their own Vitamin D.

Disadvantages

- Requires more land.
- Predator attacks are not totally restricted.
- Losses due to theft also are not eliminated due to fencing alone.
- Unless specific vaccination program is followed, the birds are also exposed to diseases. They are also more likely to have parasites both inside and on the body.
- They may not get proper food, because only during night, some feed is given which need not be a standard one.
- They also produce very few eggs; say about 50 to 60 in a year with less weight.

2.2.3 Intensive system

Due to improvements in the ability of birds to grow and produce, extensive and semi-intensive systems are not commercially practiced in our country. The word "Intensive" means more concentrated or more numbers per unit area or more intensity. Therefore, in all the systems under this category, more birds can be reared in a given area than in semi-intensive or extensive systems. They are restricted into a house where they are provided food, water and all other requirements. Therefore, intensive system can also be called 'in-house system'.

Fig. 2.10: Intensive system of rearing poultry

In the intensive system of rearing poultry, the following are practiced:

- Deep litter system
- Cage system
- Slat system
- Alternate system

Notes

In India, deep litter and cage systems are more popular and mostly practiced. Therefore, in the following sections, these two systems are discussed in detail for your understanding, while the others are discussed in brief.

2.2.3.1 Deep Litter System

In this system, birds are left free on the floor. To avoid cleaning of the floor every day, a soft bedding material is spread on the floor which can absorb moisture on the floor. This material is is called as "Litter material". It forms a very good manure. Since the litter becomes deeper day by day, the system is referred to as "Deep litter system". Birds do scratch and peck in the litter and even get certain vitamins and unknown growth factors while doing so! Most of the broilers in India are being reared under this system.

Fig. 2.11: Deep litter system of rearing poultry and turkey

Characteristics of Good Litter Material: A good litter material should:

- be light in weight;
- be fairly coarse to prevent caking;
- be highly absorbent;
- dry rapidly by releasing absorbed moisture into the incoming air;
- be soft and compressible;
- be cheap;
- form part of the manure;
- be easily available during all times of the year.

Commonly Used Litter Material

Paddy straw, ground nut shells, wood shavings, maize cobs, maize straw etc. can be used as litter material but paddy straw is by far the most commonly used.

Notes

Fig. 2.12: Litter material with broilers

Advantages

- Deep-litter keeps cool during summer and warm during winter. Hence, the birds will be comfortable during all seasons.
- They can move freely, also adds to their comfort.
- Birds derive certain un-identified growth factors.
- There will be no incidence of swellings or damaged breast region in case of broilers.
- Usually, there will be no problem of ammonia accumulation and house-flies in a well-managed deep-litter flock.
- Incidence of broken eggs is very minimal.
- There is no problem of caged layer fatigue.
- There is uniform distribution of light in the layer house.
- Initial investment is less when the land cost is low.

Disadvantages

- Less number of birds can be housed in the same space than in cage system.
- Building dimension will be higher than cage system. Therefore, cost of construction of building increases.
- There will be more feed wastage due to spilling from feeding trough.
- Birds consume more feed since they move about more freely wasting some energy.
- Litter-borne diseases especially coccidiosis can occur.
- Diseases spread faster due to free movement.
- Cannibalism (pecking and eating), if starts, will be severe when compared to cage system.
- More number of unclean or dirty eggs are produced.
- Birds consume more feed per dozen eggs.
- Broodiness (sitting on eggs to hatch) can be a problem.
- Nests have to be provided and the eggs have to be collected regularly.

Notes

- There is a chance of egg-eating vice, especially when the eggs are left in nest boxes or on floor for a long time.
- Fighting among birds is possible.
- Requires more labour than cage system

2.2.3.2 Cage System

Increase in cost of land and availability and wages of labour has made litter system costly. Therefore, alternate systems in which birds are totally restricted to meshwork compartments (cages) were introduced. This saves the cost of litter material, reduces labour requirement and building cost. Most of the layers are grown in cages all over the world.

Cages suitable for all age and types of chicken are available. But, in our country, cages are popularly used for layers, whereas, others are generally reared on deep litter. Even in cages for layers, 3- bird cages are more popular than 1, 2, 4, 15 or 30-bird cages. Cages housing 15 or 30 hens are popularly called "Community or Colony cages".

Fig. 2.13: Cage system of housing

Advantages

- This system can accommodate more number of birds in a given space than any other system.
- Movement of birds is restricted and hence they consume less feed when compared to other systems.
- There will be less wastage of feed because movement is restricted.
- No problem of litter-borne diseases, especially coccidiosis.
- Spread of disease is slower than other systems.
- Incidence of cannibalism is minimum.
- Birds lay more and heavier eggs.
- Consume less feed per dozen eggs produced.
- Eggs will be cleaner than in other systems.
- Broodiness is avoided.
- Labour requirement is minimum.

Notes

Disadvantages

- Birds are uncomfortable because they are not able to move freely.
- Birds suffer from boredom. It is common to fix a coloured plastic wheel in all cages so that the birds can peck at them and play; but it cannot substitute for free movement and association between birds.
- During summer, birds are most uncomfortable due to high temperature. If humidity also is high as is expected in coastal places, so the birds feel very uncomfortable.

2.2.3.3 Slat System

Most of the advantages of cage system were due to the fact that birds do not come in contact with litter or faecal material. Similarly, there are disadvantages in cage system due to restriction of bird's movement within the cage. Hence, a system in which the birds are reared on raised floor (made of mesh work) allowing faecal matter to collect in a pit underneath was developed is called slat system of poultry farming.

Slats can be made of wire or wood or high-impact plastic or any other strong material. They must be 2.50 to 5.00 cm wide and 2.50 cm apart running lengthwise of the building. They are fixed at 68 cm (2¼ ft) above the floor to allow collection of manure over a period of one year for which the birds are grown. The slats should be strong enough not to sag due to weight of the birds and their own. In general, this system is a combination of most of the advantages of both deep-litter system and cage system.

Fig. 2.14: Slat system

Notes

Advantages

- Floor space required is approximately midway between deep-litter and cage systems.
- Coccidiosis can be avoided.
- Usually, there will be no problem of ammonia accumulation and house-flies in a well-managed all-slat flock.
- Number of broken eggs is very minimal.
- No problem of caged layer fatigue.
- Uniform distribution of light in the layer house.

Disadvantages

- Costlier than deep-litter system.
- Breast blisters may increase especially when slats are made of wire.
- Feed must be accurately balanced since the birds do not get unidentified nutrients from the litter.
- Initial investment is higher than deep-litter system.

2.2.3.4 Alternate Systems

In some western countries, welfare of birds grown in cages has become big concern. Consumers are willing to pay for cage free eggs like in extensive system. Hence, birds are reared in specialized systems called barns, aviary or free range with good feed and disease control. Here, bird's comfort is the main criterion and their production can be less than that in intensive systems. Such systems are not practiced in our country yet.

INTEXT QUESTIONS 2.2

1. Fill in the blanks

   (a) The three types of poultry farming systems are ....., ... and .....

   (b) Birds are to be provided with vitamin D through feed or water in ..... system.

   (c) Two major sub-systems of rearing poultry under intensive system are ..... and .....

   (d) ..... is commonly used litter material in deep litter system.

2. State True or False

   (a) The system of housing being practiced by the poultry farmers is the broad basis for the classification of extensive / semi-extensive or semi-intensive / intensive poultry farming.

Notes

(b) Under intensive system, the birds are not confined and can scavenge for food over a wide area.

(c) Many local (Desi) birds are reared in extensive system in our country.

(d) Semi-intensive system is also called semi-extensive system.

(e) In our country cages are popularly used for layers.

WHAT YOU HAVE LEARNT

Let us recapitulate and enlist salient points we have learnt through this lesson:

- There are different systems of rearing of poultry viz. free range (extensive), semi-intensive, and intensive (deep litter/cage system) systems.
- The system of housing being practiced by the poultry farmers is the broad basis for the classification of systems of rearing of poultry.
- Under free-range extensive system, the birds are not confined and can scavenge for food over a wide area. Rudimentary shelters may be provided, and these may or may not be used. The birds may roost outside, usually in trees, and nest in the bush. The flock contains birds of different species and varying ages.
- Under backyard extensive systems, poultry are housed at night but allowed free-range during the day. They are usually fed a handful of grain in the morning and evening to supplement scavenging.
- Semi-intensive system consists of a separate shelter for the birds during the night in which water and some feed is provided. Litter material is spread on the floor. This shelter will be fenced all round giving sufficient area for the birds to graze during the day.
- In intensive system more birds can be reared in a given area than in semi-intensive or extensive systems.
- In the intensive system of rearing poultry, different sub-systems include: Deep litter system; Cage system; Slat system, and; Alternate system.
- In India, deep litter and cage systems are more popular and mostly practiced.
- In deep litter system, birds are left free on the floor with litter material to absorb moisture.
- Paddy straw, ground nut shells, wood shavings, maize cobs, maize straw etc. can be used as litter material and paddy straw is by far the most commonly used.
- In cage system, birds are totally restricted to meshwork compartments (cages) to save the cost of litter material, reduce labour requirement, building cost and improved hygiene of the eggs produced.

Notes

- Most of the layers are grown in cages all over the world.
- A system in which the birds are reared on raised floor (made of mesh work) allowing faecal matter to collect in a pit underneath is called slat system of poultry farming.

TERMINAL EXERCISE

1. Write any four advantages of duck and turkey farming.
2. What are different poultry farming systems?
3. Write briefly about extensive system of poultry farming.
4. Write the advantages and disadvantages of semi-intensive system of poultry farming
5. What are the characteristics of good litter material?
6. Differentiate between deep litter and cage system of poultry rearing.
7. Write a short note on the following:
   a) Broiler/ layer poultry farming
   b) Duck farming
   c) Emu farming
   d) Geese farming

ANSWERS TO INTEXT QUESTIONS

2.1

1. (a) egg production & meat production
   (b) Marshy wetland
   (c) Emu meat
   (d) goosling
   (e) March and September.
   (f) six, seven
   (g) Turkey meat
2. (a) True (b) True (c) True
   (d) True (e) True

Notes

2.2

1. (a) free range/ extensive, semi-intensive, and intensive systems.

   (b) intensive system

   (c) deep litter system and cage system

   (d) Paddy straw

2. (a) True (b) False (c) True

   (d) True (e) True

Notes

3

POULTRY HOUSING

Suitable poultry housing is very important for long term viability of poultry farming business. You are now aware that poultry birds can be raised in both free range and indoor production systems. In case indoor production system, it is very crucial to manage the environment. Poultry need accurate management and environment for better production and welfare. Whether the poultry raised in indoor or outdoor system, make sure the well management, ventilation, lighting, temperature and litter condition. For sustainable commercial poultry production, planned and proper designed poultry housing is very essential to keep the poultry birds healthy and productive. In this lesson we will learn the basics of site selection for poultry farm, principles of housing and environmental conditions and hosing systems of poultry.

OBJECTIVES

After reading this lesson, you will be able to:

- outline salient points on site selection;
- explain the principles of housing and environmental conditions;
- discuss the housing systems in poultry.

3.1 SITE SELECTION IS A VITAL INVESTMENT

The following points should be considered for selection of site for establishment of a poultry farm:

(a) No Previous Poultry Activity

(i) The area should be at a safe distance away from the existing poultry to save birds from any infections.

(ii) It should ascertain that no poultry activity is associated with the site previously.

(iii) It should be away from where poultry traffic passes.

Notes

(b) Soil Structure of Land

(i) As far as possible harder soil site should be chosen. Black cotton soil increases construction cost.

(ii) An elevated area should be preferred.

(iii) Drainage should be faster and water accumulation pits should be less. Low lying area will always create problems of flies, mosquitoes and mud.

(iv) Land should be even and not rocky.

(c) Easy Approach to Farm

(i) While planning the poultry business transport facilities should be kept in mind.

(ii) A well connected road should be available towards the poultry farm for smooth farm functioning.

(d) Water Source is Life Line

(i) Without adequate water resource the existence of farm can not be imagined.

(ii) Plenty of water should be available to fulfill the needs of drinking, cleaning of sheds, equipments and for summer cooling.

(iii) Quality of water, especially its mineral content and bacterial load should be minimum.

(e) Isolation from Human/Animal Accommodation

(i) Farm location should be away from human and animal habitations as they act as vectors for many diseases.

(ii) Farm itself may generate obnoxious smell especially in rainy season.

(iii) Animal residence specially dairies may not only create filthy environment and transmit ticks/lice and even increase dangerous gases level in the area, hence isolation from them is must.

(iv) Less the human/animal movement better for your farm.

(f) Availability of electricity

(i) Check in advance the availability of 3-phase electric line.

(ii) Electricity availability ought to 24 hours or less by 20% but light should be available in night and after noon.

(iii) Less electric light hours means more use of generator set i.e. extra expenditure.

DO NOT DO IT

(i) Start raising chicken close to older farm.

(ii) Neglect soil drainage.

(iii) Select black soil and low lined area.

(iv) Assume water will be available.

(v) Believe that electricity shall be available soon.

Notes

INTEXT QUESTION 3.1

Fill in the blanks

(a) Hard soil will influence .....cost.

(b) A well connected road is required for ……...

(c) Water for poultry farm should have minimum ……and …….

(d) Electricity should be available for ..... hour in poultry farms.

(e) Infective parasite may travel in to farm through .....

3.2 HOUSING

The following principals for housing and environmental conditions are important for making comfort housing for birds and easy functioning of poultry farming.

(a) Physical protection

(i) Inside the shed rodent control is a priority consideration. The shed should be rodent proof.

(ii) Snakes & reptile may creep inside the shed from rat holes or damaged wire netting.

(iii) No open water pits should be left for attracting wild flying birds or wild cats.

(b) Floor Space requirement

(i) Broiler birds need floor space as per age or targeted body weight to be raised for marketing.

(ii) The floor space for layer chick varies with age. It also varies depending on the type of floor used in the house.

(c) Long term investment should be proper

(i) Your planning for housing should be on long term basis. Temporary arrangement should be discouraged.

(d) Automation saves labour/recurring cost in large farms

(i) Automatic or guided drinking water metal/cemented channels will save labour.

(ii) Feeding as far as possible should be on conveyor belt type. In small farm automatic out-letting round plastic feeder on deep litter/slat floor is appropriate.

(iii) For feeding caged layer moving trolley/belt system may be installed.

Notes

(e) Comfortable environmental conditions

Following points should be considered while providing conductive environment:

(i) **Temperature:** Body temperature of birds is generally between 105-106°F and that of day old chick 103.3°F. The chicken's body temperature is influenced with environmental temperature.

(ii) **Ventilation:** Good ventilation maintain normal gaseous environment & minimize obnoxious gases concentration. The following desirable levels of various gases may be maintained:

(a) Oxygen -20%

(b) Carbon-dioxide - Less than 0.5%

(c) Ammonia- Less than 25 ppm

(d) Methane - Less than 1.0%

(e) Hydrogen sulphide- less than 40 ppm.

(iii) **Shed direction:** Orient the shed in East - West direction so that direct sunlight does not fall on the side opening during day time specially during summer days.

(iv) **Relative humidity:**

(i) High temperature and high humidity is undesirable.

(ii) Desirable relative humidity inside shed should be 60-70%.

(iii) In deep litter the litter moisture should not be more than 25 percent.

(iv) Cake in litter show higher humidity which favours growth of disease causing organisms such as fungus, molds and coccidia.

INTEXT QUESTION 3.2

Fill up the blanks

(a) The site of poultry farm should be away from ..... accommodation.

(b) Normal body temperature of hen is ..... °F.

(c) The poultry shed should be oriented in ..... direction.

(d) Carbon-di-oxide inside shed should not be more than ..... percent.

(e) Main obnoxious gases in poultry farms are (i) ..... (ii) ..... and (iii) .....

(f) ..... Relative Humidity is desirable inside the shed.

Notes

3.3 HOUSING OF BIRDS

The basic functions of a good poultry house are as follows:

(i) Comfortable and relaxing to the broiler/layer bird.

(ii) Able to provide sufficient space for feeders and waterers.

(iii) Cool in summer and warm in winter & less humidity in rainy seasons.

(iv) Protection against direct sunlight, rain and wind.

(v) Always should be dry with least dampness.

(vi) Sensible air circulation.

(vii) Rodent, wild flying bird and local birds should have no excess inside shed.

Let us discuss the following housing systems for rearing of poultry:

(A) Deep Litter House

The side walls north-west direction are open and covered with wire netting to the height of 6-9 feet above the ground level. The ground level should be 1.5 - 2.0 feet above the ground to protect from entry of rain water. The other features of deep litter house are as follows:

(i) The width of shed should be usually less than 30 feet.

(ii) The side walls should be 2-3 feet high and above it wire net should be fixed.

(iii) The floor should be cement concrete.

(iv) The roof should be of asbestos sheets supported by iron pipes/angles.

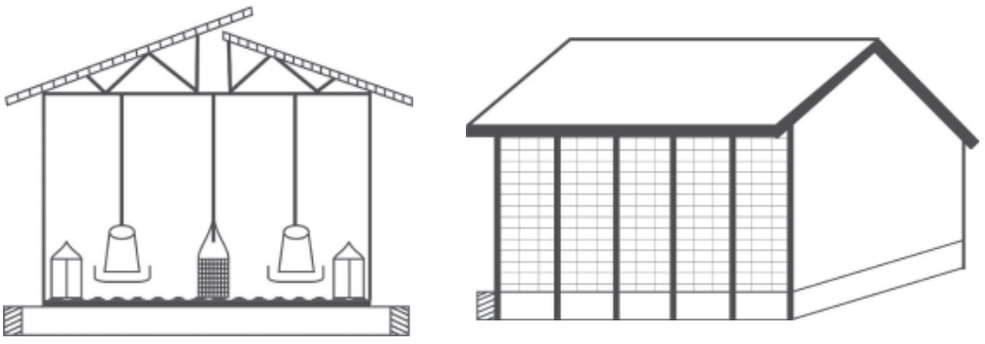


Fig. 3.1: Deep litter shed

(v) Deep litter system is used for housing layer flocks (from day old age to 72 weeks of age) and broilers both.

Notes

(vi) On the floor litter is spread initially 1½ - 2 inches thick and with advancement of time it is supplemented till its thickness reaches 6-9 inches in depth by fresh litter material. Commonly used litter materials are rise-husk, wood-shavings and saw dust.

(vii) The floor space needed per bird for layers and commercial broiler are as under in square feet.

	Layer	Broiler
Chicks upto 5 weeks	0.3	1.0
Chicks upto 7 weeks	0.6	-
Grower (8 - 20 weeks)	1.0	-
Laying birds/Adult	1.5 - 1.75	-

In shed where automatic feeder and waterer are used the space requirement per bird declines proportionately.

(viii) The deep litter absorbs dropping moisture and reduce its weight. A layer hybrid voids about 60-75 kg wet faeces which contains about 85% moisture producing 12-15 kg dry matter. A broiler voids about 0.75 - 1.25 kg dried faecal material in 5 weeks period.

(B) Housing on Wire Cages

As you know many types of cage housing is under practice. It can be prepared for broiler, layer chicks & growers raising in large numbers.

(a) Raised platform layer cage house

Nowadays raised platform layer cage house is very popular. Let us know its salient features:

(i) The platform to fix cages is raised 6-10 feet above ground level on all sides.

(ii) Raised platform keeps away the birds from obnoxious gases, makes it easy to remove collected faecal matter mechanically, and due to free movement of air, oxygen and carbon dioxide levels remains optimum.

(b) Cages for broiler rearing

In India method of rearing broiler in cages is less prevalent but in developed countries it is a normal practice. The salient points of cages are as follows:

(i) The cages with the size of 1½ x 4 x 1½ ft^3 are arranged in a row in open side sheds in single or two tiers. Each compartment house may accommodate 15-20 broilers and 25-30 layer chicks.

(ii) Chicks are placed on day old age and remain in cage till age of disposal. Automatic watering system and feeder belt system/manual is arranged as per the size of operation.

(iii) In developed countries removable welded wire or plastic coated coup cages of 18 x 18 x 48 inches^3 to accommodate 20 broilers (1.5 kg each) are used. These are fitted with automatic waterer and feeder.

(c) Cages for egg production

It is well known that the revolution in egg production is due to cage rearing. In a smaller place by providing 60-66 square inches of space per bird in 3 tiers, enormously increase the utility of space. Cages can be used for chicks, growers and layer independently or jointly. Let us examine housing need for each category.

1. Chick Raising Cages

(i) Day old chicks can be raised up to 6 weeks of age on wire cages.

(ii) Usually cages are of size 48" × 36" × 12". In each cage 31-40 chicks are placed or 20-40 sq. inch space is given per bird.

(iii) To provide heat a bulb of 60-100 watt is placed hanging from top inside the cage or complete house is heated.

(iv) These cages can be placed as 2 or 3 tiers, if no electricity problem exists.

2. Grower Raising Cages

You can house growers in specially designed grower-cages. Few salient points are as follows:

(i) Normal size of grower compartment is 1½ × 3 ft^2 for 18 pullets.

(ii) These are like layer cages with two exceptions i.e. the cage floor welded wire mesh in 1" × 1" in place of 1" × 3". Secondly are devoid of egg-slant in front for rolling out the egg outside the sitting area.

(iii) Cages can be fixed in 2-3 tiers.

3. Layer Raising Cage

In a shed pullets are usually housed in groups of three in 16" × 12" × 18" sized compartment. Each bird receives 60-66 sq. inches space for housing.

(i) Each adult female is provided with 3" length feeder space across cage length and 2" running length running waterer space in galvanized channel.

(ii) Layer cages in open shed system are organized in 3 tiers, however, in automatic controlled shed may accommodate 6-8 tiers as per facilities.

(iii) Cage floor welded wire mesh size is 1" x 3" whereas other side could be 2" × 4" or 3" × 4" size depends as per bird's size at the time of housing which reduce cost also.

(iv) Cage housing increased the density at least three times to that of deep litter but have easier management of flock and minimize labour cost.

(v) Availability of feed, water and space need for comfortable housing are fulfilled leading for more cleaner eggs and minimum feeder wastage.

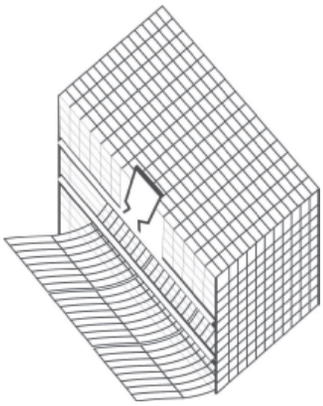


Fig. 3.2: Welded mesh wire cage for 3 layers

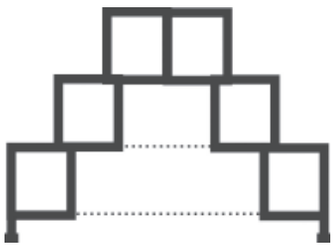


Fig. 3.3: Three tier arrangement

(C) Slat System of Housing

This housing system is an improved modified method over that of deep litter system. Here a portion of the deep litter shed is raised above the ground and welded metal / wooden pieces is fixed. Other features of slat system of housing are:

(i) Commonly 40-60 percent area of shed is converted as slatted floor.

(ii) Wooden pieces of 1–1¼ inch width x 1" thick and about 6 ft. long pieces are fixed at a distance of 1–1¼ inches on a base giving it a shape of channel.

(iii) The slat of 1" × 1" wire welded mesh of 10 gauge thickness can be used to form slatted floor.

(iv) The area of slatted floor is made in the middle of shed length leaving space for deep litter at all the four sides. The slatted floor can also be prepared close to one wall. The side wall height of deep litter house should be 2-3 ft.

(v) Below the slatted floor the covered area is for faecal collection. The birds prefer to rest on slatted floor.

(v) Waterer / water channel are usually located on slatted area.

The slatted floor can be used for rearing commercial broiler and layer flock and it can accommodate 25-30 percent more birds than the simple deep litter shed. As maximum faecal dropping is collected inside slatted floor, the deep litter area remains less dirty.

INTEXT QUESTIONS 3.3

Fill in the blanks

(a) The height of side wall in a deep litter house should be ..... ft.

(b) Initially depth of litter material should be ..... inches.

(c) The main function of litter is to ..... faecal moisture.

(d) On an average a broiler chick voids about ..... kg dried faecal matter upto 5 weeks of age.

(e) Faecal matter contains about ..... moisture.

(f) Practically ..... percent area is covered with slat.

(g) The area under slatted floor remains ..... than whole deep litter shed.

(h) In slatted floor you can house ..... more broilers.

(i) Day-old chick can be raised in chick cages upto ..... of age.

(j) Grower/broiler cages are devoid of ..... .

(k) Each adult layer is provided ..... linear inches feeder space in cages.

WHAT YOU HAVE LEARNT

Let us recapitulate and enlist salient points we have learnt through this lesson:

- Site selection for starting a poultry farm is a long term investment. Care is required while location selection based on land type, availability of natural resources, electricity facilities & transportation facilities.
- Proper care should to be taken while planning deep litter/slat floor shed. In open houses both open side west-south fitted with wire net with 2'–3' ft wall.
- Saw dust or rice husk is good material for use as litter material. Continued maintenance and cleaning of shed is needed.
- Recommended space is essential for housing the birds. Slatted house can keep more bird and uncovered area is more cleaner than in full deep litter. Also, there are different types of cages for broiler and layers.
- Raised platform 6–9 ft above ground level are easy for faecal matter disposal.

TERMINAL EXERCISE

1. Outline the features for the site selection in poultry farms.
2. Explain the principals for housing the poultry.
3. What are the comfortable environmental conditions for good poultry housing?
4. What are the functions of a good deep litter shed?
5. What benefits you drive from automation of feeding and watering.

Notes

6. Discuss the housing needs of chicks and growers briefly.

7. How welded wire mash cage housing save space?

ANSWERS TO INTEXT QUESTIONS

3.1

(a) construction

(b) smooth poultry farm functioning

(c) mineral content and bacterial load

(d) 24 hours

(e) Animals

3.2

(a) human

(b) 105-106^{0}F

(c) East-West

(d) 0.5%

(e) Ammonia, Methane, Hydrogen sulfide

(f) 60-70%

3.3

(a) 2-3 feet

(b) 1.5 -2.0 inches

(c) absorb

(d) 0.75-1.25

(e) 85%

(f) 40-60

(g) cleaner

(h) 25-30%

(i) 6 weeks

(j) Egg slant

(k) 3 inches

Notes

4

COMMERCIAL POULTRY BREEDS

You might have seen many types of poultry in your area. There are hundreds of poultry breeds in existence which have been domesticated for thousands of years. These are distinguishable breeds which are present in different geographical areas and are selected for desired characteristics based on regional types with distinct physical and behavioral traits.

In this lesson we will learn the classification of different birds as per their commercial use and identification of commercial poultry breeds based on their distinct features.

OBJECTIVES

After reading this lesson, you will be able to:

- classify the birds as per their commercial use;
- identify commercial poultry breeds;
- distinguish basic features of broiler and layer commercial hybrids.

4.1 ORIGIN AND CLASSIFICATION

Domestication of poultry seems to have undertaken in the South East Asia. It dates back to 3200 BC. By 1000 BC, poultry were known in India.

Poultry are classified based on the ability of the birds to produce a product of commercial value as describe below:

Notes

Type	As layer	As broody hen	As table bird	General remarks
Egg	Very good	Poor	Poor	Light body, active
Dual	Good	Good	Good	–
Meat	Poor	Good	Very good	Large body body with plenty of flesh on breast
Game	Poor	Good	Very good	Powerful built
Miscellaneous	Poor	Indifferent	Very poor	Delicate build, bright plumage, small size
Desi	Poor	Very good	Poor	–

HISTORICAL DEVELOPMENT IN INDIA

Village Poultry Keeping

(i) Commercial Poultry Production in India is barely about 40 years old. Previously sporadic farms and village level poultry were main source of egg and meat.

(ii) Indigenous/desi breeds were popular under scavenging system.

(iii) Indigenous breeds have notable hardiness and but low productivity.

(iv) Dual purpose breeds namely Rhode-Island Red, New Hempshire, Succex and other fancy breeds were raised under back yard system of rearing.

Modern Hybrid Keeping

(i) All modern breeds have originated from Red Jungle fowl.

(ii) In the year 1956, Ist batch of hybrid chicks were imported under exchange programme by government and located at veterinary colleges and government farms.

(iii) Commercial hybrid breeds in India were imported in 1972 and gradually dual concept of poultry started vanishing.

(iv) At present we can raise hybrid chicken for meat (Broiler) or chicken for eggs (Layer) from day-old age.

OFFICIAL OR STANDARD CLASSIFICATION

This classification is internationally accepted and is based on class, breed, variety and strain.

(i) **Class**: Relates to official or standard classification with which various groups of birds can be distinguished largely on the basis of geographical regions from where they have originated, eg. American, Asiatic, English and Mediterranean.

Notes

(ii) Breed: Breed is defined as a group of chicken having similar visible characteristics (plumage, body shape, weight and comb pattern) and invisible (production traits) transferred and shared characteristics to offspring.

(iii) Variety: Variety is a sub-division of breed, mostly differentiated by plumage, colour or special formation of comb. e.g, White Leghorn, Black Minorca, White Cornish, Red Cornish, Single Comb Rhode Island Red.

(iv) Strain: Strain is a population originating from a small number of individuals isolated within a breed that reproduces itself for well defined characteristics, eg. Star Cross White, Star Cross Brown, Star Brow, etc.

(v) Hybrid: A hybrid is a synthetic bird produced by mating between two or more non-related strain birds, utilizing heterosis for superior productivity performance. Hybrid chicken is produced for increasing quality and production by inseminating with same or other breed strain. Hybrid chicken becomes more productive than their parents.

(vi) Layer Hybrid: Layer hybrid are made for producing more eggs by inseminating with same or other selected breeds.

(vii) Broiler: Broiler is 6-8 weeks of aged chicken weights between 2-2.5 kg which are used for only meat production.

(viii) Growing Chicken: Chicken aged between 9-20 weeks of age are called growing chickens.

Classification According to Origin

According to origin the chicken are of four types.

- Asiatic: Brahma, Longson, Cochin, Asil etc.
- English: Austrolorp, Cornish, Dorking, Orpington etc.
- Mediterranian: Leghorn, Minorca, Ancona, Fayoumi etc.
- American: Road island red, New hampshire, Plymouth rock etc.

INTEXT QUESTIONS 4.1

Fill in the blanks

(a) The mother of all poultry breed is .....

(b) ..... is the origin of poultry.

(c) A bird raised for meat and egg both is called ..... purpose breed.

(d) ..... breeds are more hardy but have low productivity.

Notes

4.2 BROILER BREEDS IN COMMERCIAL MEAT PRODUCTION

The modern commercial hybrids are bred for their well defined traits. In this section you will know the names and the present day productivity norms of a broiler chick.

(a) Meat type breeds

Cornish, Plymouth Rock, Sussex, New Hempshire etc. are pure bred meat purpose breeds. Few of these especially Cornish and Plymouth Rock pure breeds have been used to develop synthetic broiler hybrids.

(b) Commercial broiler hybrid breeds

Exotic breeds

(i) Ross

(ii) Vencobb 100, 200, 300, 400, 500

(iii) Anak

(iv) Peterson

(v) Hypeco

(vi) Starbro

(vii) Lohman

(viii) Hubbard

Indian breeds

(i) IBL

(ii) Krishi Bro

(iii) Kegg Bro

At present commercially Vencobb, Ross and Lohmann breeds are popular in India. The Indian bred hybrids are preferred in hilly areas of North East India.

CHARACTERISTIC OF BROILER BREED

Broiler breeds are specific. Modern broiler provides quick financial returns. It can be raised in smaller area on floor & cages. The knowledge of broiler breed traits is important which make them as specific breed. Few characteristics are:

(a) Broiler Growth

Broiler grows very fast. A day old chick of 40 g weight would grow close to 1.0 kg in less than 28 days. Few breed may attain 1.0 kg body weight in 24-25 days i.e. average per day body weight gain is about 40 g.

Notes

(b) Feed Requirement

- To sustain the growth, 3 types of feed i.e. prestarter, starter and finisher should be fed. The projected growth cannot be achieved without providing appropriate quantity and quality of feed timely.
- The broiler chicks are very efficient in converting the feed into growth of body tissue especially bones and muscle i.e. the edible meat components. The best breeds are those which are efficient in feed conversion i.e. need less feed in gaining body weight.
- Modern hybrid needs about 1.4 - 1.6 kg feed to produce 1 kg live weight.

(c) Livability

- Genetically broilers are bred for high viability. As number of live birds at the disposal age determine net gain.
- Low mortality (2-3 percent) but no morbidity is desirable.
- The main concern would be to check skeletal abnormalities (viral/ bacterial/ nutritional), ascites (water belly, oedema disease, high altitude low oxygen phenomenon at 1400 m) during practical management.

(d) Body Shape

The broilers are raised for three different purposes:

- Dressed birds.
- Cut parts: For this purpose the fullness of each part with meat is desirable. Few breed are excellently bred for above types of chicken meat.
- Broiler strains like Rose, Lohman and Peterson are bred specially for production of boneless meat. These breeds have long plumy protruding breast which have maximum share in boneless meat production.

(e) Breed Suitable For Housing System

- Broilers in India are mostly raised on deep litter on open types of housing sheds under all-in all-out system.
- Intensive raising in Battery 2 tier cages is commercially popular.
- Recent method involves raising of 16-20 broilers chicks in a movable plastic cage fitted with feeder and water. The chicks will be shifted to slaughter house in the same cages, once placed.
- The broiler breeds are especially bred for their Immuno competency to bear stress of closed cages.
- The main problems are skeleton defects and brushing of skin causing degradation of dressed carcass.

(g) Sex-Dimorphism

- The males grow faster than females.
- At marketable age this difference is about 16-20%.

Notes

- The breed those have less sexual dimorphism in body weight show minimum competition stress within a flock. Younger the dressing age the less is sexual dimorphism in body weight.

DO NOT DO IT:

(i) Use any breed for meat purpose.

(ii) Keep skeleton defective chick.

(iii) Over crowd the chicks in ill ventilated shed.

(iv) Under feed the chicks.

INTEXT QUESTIONS 4.2

Fill in the blanks

(a) Cornish and Plymouth Rock breeds are used to develop .....

(b) ..... are popular hybrid commercial breeds in India.

(c) ....., ... and ..... are required feed for good broiler growth.

(d) ..... mortality but ..... morbidity is desirable for broiler breeds.

4.3 LAYER STRAINS SUITABLE FOR EGG PRODUCTION

Layer breeds show hardiness, high productivity, low mortality and less requirement of feed to grow and produce eggs. They are raised on deep litter or on wire cages. They may be divided into

(a) Pure Bred Layer Breed

If you prefer to keep pure-breeds, then selecting a commercial pure-breed is probably a better option, and these include the Rhode Island Red, Sussex, Wyandotte, Leghorn, Australorp and Rock. They are all ideal egg producers, but be careful when choosing, as many exhibition breeds are bred purely to a show pen standard, and egg-laying capabilities often suffer as a result.

(b) Commercial Layer Hybrids

Few layer hybrids in the market are as follows:

International breeds

(i) Babcock

(ii) Bovins

(iii) Rani Shaver

(iv) Decalb

(v) L.S.R.

Notes

Indian breeds

(i) B.V. - 300 (WLH)

(ii) ILI - 80

(iii) ILM - 90

In India commercially B.V. 300 (white leghorn) from a private hatchery is most commonly used for production of white shelled eggs. The Indian bred ILI-80 and ILM-90 have regional acceptability.

CHARACTERISTICS OF LAYERS

Let us discuss the specific layer breed traits as follows:

(a) Body Weight

- The day old chick should be of 32-35g on an average, and at 28 days average should be 1.2-1.3 kg.
- The body weight at 18-weeks i.e. at the point of start of laying should be around 1.2 kg.
- At 40 weeks the weight should be about 1.40 kg and at 72 weeks around 1.5 - 1.6 kg.

Optimum body weight of breed should be achieved for good performance. Under weight bird should be separated at 15-16 weeks and should be put on special feed schedule for two weeks to make them grow. This condition is generally found in over crowded flock or less feeding space.

(b) Very Early Sexual Maturity

- Pullet should produce its Ist flock egg at 18th week of age and reach 50 percent egg production between 21-22 weeks.
- 85-90 percent production should be at the age of 23-25 weeks.
- In summer due to longer day length pullet mature early which you should guard carefully.
- Early sexual maturing pullets lay small sized unsellable eggs.

(c) Egg Number

- Eggs sold in the market are either white shelled or brown shelled.
- Commercially white shelled eggs are lighter in weight than brown shelled.
- Most of the commercial companies breed both types of layers.
- In Indian market eggs between 45-60 gms (white shelled) are preferred and are sold at similar price. Whereas, grading of egg weight for sale is practiced in developed countries.

Notes

(d) Feed Conversion

(i) White egg shelled breed such as B.V. 300 consume 5.6 kg feed up to 18 weeks of age thereafter 41.0 kg up to 72 weeks.

(ii) On an average feed consumption of layer breed should be 105-130 g during different period of laying cycle.

(iii) Average metabolic energy content should be 2600 kilo-calorie per kg of feed.

(iv) Less feed consumption denote illness whereas high energy feed and excess shows low energy content of feed.

As the feed conversion efficiency is genetically inherited hence, it will differ among breeds.

(e) Immuno Competence

- Most of modern breeds are bred for high Immuno-competence that means inherited quality to fight stress and produce antibodies against infection.
- The breed should show superior response to vaccination i.e. production of antibodies.
- Continuous high antibody level needed for protection of bird for longer period.
- Livability of a good breed should be 95% up to 18 weeks of age and thereafter 1/2 - 3/4% natural loss per month up to 72 weeks. The pullet chicks of known high Immuno competence should be purchased.

(f) Egg Number Determines Net Gain

- Egg production in other words is number of sellable egg which is basic criteria in selection of a layer breed.
- Phenotypically developed comb size and redness may be judged for laying status. Under developed or shrunken comb at 22-24 weeks indicate culls.
- 50% production indicates that 95% plus pullet have started laying eggs.
- At peak point the flock average should be 90% plus production which should continue at least up to 42-45 weeks of age that will mean persistency is good.

DO NOT DO IT:

(i) House broiler female for egg production.

(ii) Mix brown and white egg layer in a shed.

(iii) Prepare feed without expert advice.

(iv) House over weight and under weight chicks together.

(v) Force to lay eggs earlier than breed specific.

Notes

INTEXT QUESTIONS 4.3

Fill up the blanks

(a) Layers are raised on ..... or on .....

(b) ..... is most commonly used for production of white shelled eggs.

(c) A layer attains around ..... kg at 72 weeks.

(d) In summer pullets mature ..... due to longer day length.

(e) White shelled eggs are ..... in weight than brown shelled.

4.4 BREEDS FOR RURAL POULTRY PRODUCTION

Backyard farming has over the years contributed to a great extent to the agrarian economy of India. In the same way, rural backyard poultry production plays a vital role in the rapidly growing economy. It provides livelihood security to the family in addition to securing the availability of food. Unemployed youth and women can also earn an income through backyard poultry farming.

Improved Breeds in Market

Improved breeds for rural poultry are:

From Government/Universities:

Desi broiler type

Giriraja (Banglore), Chabro (Chandigarh), Nirbheek (Izatnagar), Nandnum-99 (Chennai)

Desi layer type

Hitkari, Upkari, Cari Gold (Izatnagar) Grampriya (Hyderabad), Krishna-J (Jabalpur), Kalinga Brown (Bhuvneshwar), Swarndhava and Giririani (Bangalore), Gram Laxmi (Kerala), Rajasri (Hyderabad), Vanraja (Hyderabad)

From Private Hatcheries and breeding firms:

Broiler type

Kuroiler (Kegg, Delhi), Rainbow (Indobro, Hyderabad).

Dual purpose

Satpura Desi (Yashwant Agri, Jalgaon, Maharastra)

Above breeds are recommended for low-input technology birds eligible for use in central and state government development projects.

INTEXT QUESTIONS 4.4

Notes

Fill in the blanks

(a) ..... provides livelihood security to the family in addition to securing the availability of food.

(b) Giriraja is a ..... poultry breed.

(c) Vanraja breed is meant for ..... purpose.

(d) Cari Gold poultry breed is developed from .....

(e) Dual purpose hybrid bred by private agency is ..... breed.

WHAT YOU HAVE LEARNT

Let us recapitulate and enlist salient points we have learnt through this lesson:

- Broiler breeds are specifically bred for fast return. Cornish and Plymouth Rock breeds are commonly used for development of hybrid broiler breeds.
- Layers breed two types of eggs i.e. white shelled or brown shelled eggs.
- Leghorns were bred to produce modern commercial layers.
- Layer breed lays 300 plus eggs up to 72 weeks of age. White egg layer body weight is less than brown breed. Desi breeds produce less egg and are slow growers.
- There are many approved hybrid breeds/varieties for use in rural poultry production. Cross bred and synthetic hybrids, breeds improved in egg number by 300 percent and in body growth 65% are sustainable in market competition.
- As an industry it is important that the private sector is emerging in rural poultry production.

TERMINAL EXERCISE

1. Discuss the classification of poultry based on the commercial products obtained from them.
2. Explain the commercialization of poultry farming in terms of poultry breeds.
3. Describe the standard classification of poultry.
4. Differentiate between a variety, strain and hybrid.
5. Describe three important features of good broiler breed.

Notes

6. Describe three main characteristics of a layer breed.
7. Name three breeds recommended for rural poultry sector.
8. Discuss that the less body weight sex dimorphism is a desirable broiler traits.
9. Enlist the recommended poultry breeds under the following heads:
   (a) Broilers (Desi & Hybrids)
   (b) Layer (Pure breed & Commercial hybrids)
   (c) Improved rural breeds

ANSWERS TO INTEXT QUESTIONS

4.1

(a) Red jungle fowl
(b) South East Asia
(c) dual
(d) Indigenous

4.2

(a) synthetic broiler hybrids
(b) Vencobb, Ross and Lohmann
(c) Prestarter, Starter and Finisher
(d) Low , no

4.3

(a) deep litter, wire cages.
(b) B.V. 300 (White Leghorn)
(c) 1.5-1.6
(d) early
(e) lighter

4.4

(a) Backyard poultry
(b) broiler
(c) egg
(d) Izatnagar
(e) Satpura Desi

5

POULTRY FARM EQUIPMENTS

In our day-to-day routine activities, we use many appliances/equipment and utensils for our wellbeing. Similarly, in a Poultry farm, it is essential to use a number of appliances/ equipment and utensils in order to keep the birds comfortable and to perform the routine management. Use of appropriate equipments in a poultry farm will help in:

- Saving time, labour and cost.
- Easy functioning of the farm.
- Providing comfort to the birds.
- Maintaining the health of the birds.

Different types of equipment and utensils are required for different activities and for different age groups. For example, brooder is used only for chicks and helps in providing heat to the chicks in order to keep them comfortable. Therefore, it is important to learn about the different equipment and utensils required in broiler and layer farms. Thorough knowledge on the poultry farm equipment will also help in understanding the quantity required, their placement and uses of each one of them. In this lesson, your will be introduced to different farm equipment (Fig. 5.1) which are commonly used in a poultry farm.

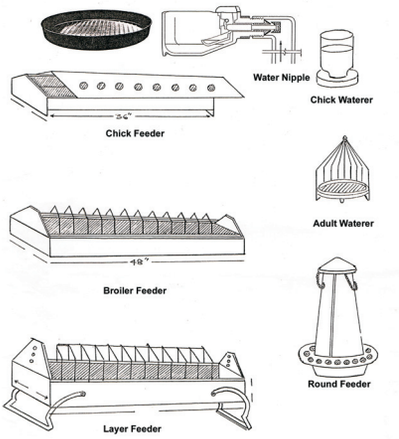


Fig. 5.1: Common equipments used in a poultry farm

Notes

OBJECTIVES

After reading this lesson, you will be able to:

- identify different equipment and utensils used in a poultry farm;
- explain their characteristics and uses in routine farm activities;
- care and maintain these equipment and utensils.

5.1 EQUIPMENTS USED IN A POULTRY FARM

In India, generally, broilers are reared on the floor (deep litter system) and layers in cages. Therefore, the requirement of some of the equipment in broiler farm varies from that of layer farm. In this section, you will learn about the different equipment used in a broiler and layer farm.

5.1.1. Broiler Farm

(i) Brooders: The newly hatched chick's body temperature regulatory system is not well developed and hence they should be provided warmth especially during the first 3 to 4 weeks of age. Under natural conditions, hen provides warmth to the chicks. Whereas, in a poultry farm, brooder acts like an artificial hen and provide heat/ warmth to the chicks and also acts as a source of light. A brooder consists of a heating source, reflectors to reflect the heat and light towards the ground and other accessories like stand, light and heat adjusting devices (thermostats) etc. There are different types of brooders available in the market and the details are discussed below:

- **Canopy Brooder:** It is an inverted umbrella-like ("canopy" shaped) equipment (Fig.5.2) made up of Galvanized Iron (GI) or bamboo basket (2 to 3 feet in diameter) with 3 electric bulb points.

Fig. 5.2: Canopy brooders

- **Reflector Brooder:** This electrical brooder consists of a rectangular shaped reflecting surface (Fig.5.3), a bulb point to fix an electric bulb and a thermostat for regulating temperature. Though they are durable and reliable, they are expensive.

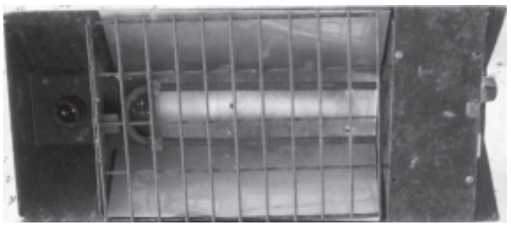


Fig. 5.3: Reflector brooder

Fig 5.4: Infra-red bulb brooder

- **Infra-red Bulb Brooder:** This type of brooder uses infra-red bulb (Fig.5.4) as heating source. The infra-red bulbs with 150 and 250W capacities are available in the market.
- **Battery Brooder:** As the name suggests, a battery brooder (Fig.5.5) consists of 3 to 4 tiers (rows) of batteries (brooding space). Each tier consists of a 'heating space' and a 'run space'. Heating space which accounts to one-third (33%) of the total space consists of a reflector brooder. Run space which occupies two-third (67%) of the total space is used for feeding, watering and movement of birds. Generally, they are used for brooding Japanese quails.

Fig 5.5: Battery brooder

Now, you may ask two questions:

- Do we need to use all the types of brooders in a farm? and
- How many brooders to be purchased?

The answer is NO. A farmer can choose any one of the brooders mentioned above as per the requirements and availability. Thumb rule is that one brooder is required for every 200 to 250 chicks initially, depending on the local environmental conditions.

INTEXT QUESTIONS 5.1

Fill in the blanks

(a) Generally, broilers are reared on the ..... and layers in .....

(b) ..... acts like an artificial hen and provide heat/ warmth to the chicks.

Notes

(c) ..... brooder is an inverted umbrella-like equipment made up of Galvanized Iron (GI) or bamboo basket.

(d) Initially one brooder is required for every ..... chicks.

(e) Battery brooder is commonly used for brooding .....

(ii) Brooder Guard: Chicks are very active, roam aimlessly and may move away from the heating source and feed/water. Therefore, brooder or chick guard (Fig. 5.6) is used to restrict the movement of chicks to keep close to the brooders and feed and water source as they are very active sand may move away from the heat source, feed and water. Generally, brooder guard is a circular arrangement made up of a number of rectangular structure (wire mesh or thin sheets of metal or cardboard or bamboo mat) each measuring about 2 ft x 1 ft linked by hooks. However, varying heights and lengths are available in the market depending upon the requirement and age of the birds. As the chick grows, the area provided to the chicks within the brooder guard also changes accordingly.

Fig.5.6: Brooder guard

(iii) Feeders: Feeders are equipment used for feeding the birds. They may be conventional or semi-automatic and are available in various designs and shapes. Feeders are used both in the brooder house and broiler house. Chick feeder normally is 3-5 feet in length and 1½" - 2" in depth are fitted with strong wire pieces to prevent entry of chicks inside the feeder. Two types of feeders are used for broilers viz. linear (long) feeders made of iron and circular feeders made of high-impact plastic. For raising large number of chicks in a commercial broiler farm, automatic feeding system can be fitted having feed trough, chain with pulley, tube and conveyed belt.

- **Linear feeders:** They are straight, wedge-shaped (Fig.5.7), placed on the floor and usually made of Galvanised Iron (GI) or locally available materials like wood, bamboo etc. One of the major advantages of linear feeder is that birds can feed on either side of the feeder and hence, total feeding space available will be two times the length of the feeder. However, the main disadvantage with the linear feeder is that birds may try to enter into the feeder and search for grains or may topple them resulting in wastage of feed. Therefore, grills are provided to prevent the entry of birds into the feeder. In addition, linear feeders need to be filled to ½ or 1/3 level every day. The dimensions of linear chick feeder and linear broiler feeder are tabulated below:

Notes

Feeder	Length(cm)	Width(cm)	Height (cm)	Grill space
Linear chick feeders	60 to 75	7.5 at the base and 10 at the top	5	2.5 cm apart
Linear broiler feeders	90 to 150	15 at the base and 25 at the top	7.5 to 10	5 cm apart

In both type of feeders, grill can be easily opened for filling of feed and adjustable stands are fixed to the base at suitable intervals to facilitate raising of the level at which feed is available for the broilers.

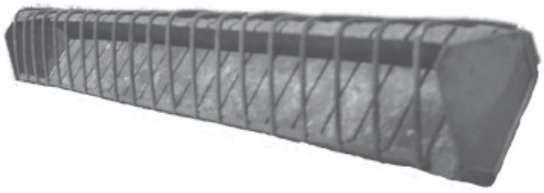


Fig. 5.7: Linear feeder with grill

- Circular feeders: They are circle-shaped and usually made up of strong plastic (Fig.5.8). They are also called "hanging feeders" because they are usually suspended (hanged) from the roof or pipeline and never kept on the floor. Circular feeders have a base plate and a bell portion. Since they are hanging and feed is supplied through pipeline, as and when feed is consumed by the chicks, the feed freely flows from the bell on to the base plate and hence feed is available all the time. The major advantages of circular feeder is its easy maintenance, feed is available round the clock and 30% more birds can stand and eat when compared to linear feeders. They are available in different sizes and usually bright coloured (red or blue) to attract broilers, especially chicks to the feed. When completely full, depending on age and number of birds feeding on them, the feed will be sufficient for 4 to 7 days.

The feed should be available at the level of the back of birds in order to minimize feed spillage. At the beginning of brooding, the base plate should be about 5 to 6 cm (2 to 2½ inches) above the floor and should be increased as the birds grow. For adjusting the height of the feeder, simple clamps are provided in the feeder.

Fig.5.8: Circular feeder

- **Types of feeder to be used:** Since both the types of feeders are having their own advantages and disadvantages, a farmer can choose any one type of feeder depending upon the requirement and availability.

- **Number of feeders required:** The number of feeders required depends on the type of feeder used (linear or circular) and the age of the birds. In case of linear feeder, about 30 broilers up to 4 weeks of age can eat in one linear feeder. One circular feeder is sufficient for 28 chicks and therefore 36 feeders are required for 1,000 chicks. Similarly, for broiler birds at market, one circular feeder is sufficient for 19 birds and therefore 54 feeders are required for 1,000 birds.

(iv) Drinkers or waterer: Drinkers are the equipment used for providing water to the chicks and birds. They are of two types viz. linear and circular. However, circular drinkers are more commonly used than linear drinkers. Linear drinkers are placed on the floor and circular drinkers ("Hanging drinkers") are hung from the top and are connected to an overhead tank. Similar to feeders, circular drinkers should be kept at an appropriate height so that water is available at the level of back of the birds. There are different types of circular drinkers available in the market.

- **Fountain drinker:** They are manual drinkers used for chicks during first week of brooding and are kept on the floor (Fig.5.9). One of the main advantages of fountain drinker is that when a chick or bird drinks water, it automatically comes out of the holes similar to the fountain and hence the named "fountain drinker". It is also easy to give vitamins, medicines or vaccines through this drinker. One fountain drinker is sufficient for 100 chicks and therefore for 1,000 birds, 10 foundation drinkers are required.

Fig. 5.9: Fountain drinker

Fig. 5.10: Bell drinker

- **Bell drinker:** They are bell-shaped (Fig.5.10), bright coloured (red or blue), made up of high-impact plastic and are required after one to two weeks of poultry age. They are hung from the top and never kept on the floor: Similar to the feeders, height of the drinker can be adjusted using simple clamp mechanism and the rate of flow of water is adjustable by a valve. One bell drinker is sufficient for 94 broiler chicks and therefore for 1,000 birds, 11 bell drinkers are required. Similarly, one bell drinker is sufficient for 57 broiler birds, and therefore, 18 bell drinkers are required for 1,000 birds.

For selecting the type of drinker to be used in a broiler farm, there is no hard and fast rules and you can choose any type of drinker depending upon the requirement and availability.

Notes

INTEXT QUESTIONS 5.2

Fill in the blanks.

(a) ..... is used to restrict the movement of chicks to keep them close to the brooders and feed and water source.

(b) ..... are straight, wedge-shaped, placed on the floor and usually made of Galvanised Iron or locally available.

(c) Circular feeders are ..... coloured in order to attract birds.

(d) One circular feeder is sufficient to feed ..... chicks and ..... broiler birds at market age.

(e) ..... are manual drinkers used for chicks during first week of brooding and are kept on the floor.

5.1.2 Equipments in a Layer Farm

A layer farm has two types of houses viz. brood-grow houses (BGH) and layer house or cage layer houses (CLH). Different equipments are required in each of the houses, as explained below:

(a) In Brood-Grow House

The equipments required are same as discussed in a broiler house (see Section 5.1.1). However, the requirement of feeder and drinker space are different and therefore, only the number of each of them required changes.

(i) **Brooders:** Same as discussed under broilers (see Section 5.1.1).

(ii) **Brooder Guard:** Same as discussed under broilers (see Section 5.1.1).

(iii) **Chick feeders:** Same as discussed under broilers (see Section 5.1.1). Each hanging feeder is sufficient for about 28 birds and therefore about 36 feeders are needed for 1,000 birds.

(iv) **Grower feeders:** These are similar to hanging feeders for broilers but are of larger diameter.

(v) **Drinkers:** Each bell-drinkers is sufficient for about 62 chicks and for 1,000 chicks about 20 drinkers are needed.

(b) In Layer House

Layers can be reared on deep litter system or cage system. Cage system of rearing is more popular for layers than deep litter system. The equipment used varies depending on the system of rearing. For example, in deep litter system, feeders, drinkers and nest boxes are required. Whereas, in cage system, the cage itself contains drinker, feeder and egg

Notes

collecting space/tray. Let us learn about the different equipment required in a layer house covering both the systems.

(i) Feeder: If the layers are reared on deep litter system, individual plastic round layer feeder storing 7-10 kg feed is hanged in a row. One feeder is sufficient for 30-40 layers depending on weight/size of bird.

(ii) Drinker: Bell drinker as discussed in broiler house is used.

(iii) Cages: Layers are generally housed in cages. The most commonly used are 3-bird laying cages as compared to 1, 2, 4, 15 or 30-bird cages. A 3-bird laying cages measures 45 cm (18 inches) in width, 38 cm (15 inches) in depth and 40 cm (16 inches) in height. Each cage has provisions for the birds to eat (feeding channel), drink (nipple drinker) and egg collection. The maximum number of tiers of cages generally adopted is 3. Therefore, 3- tier cage can be arranged in the shape of 2 L and 1 M (Fig.5.11).

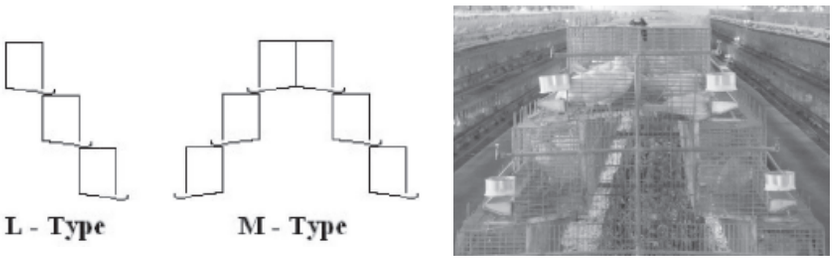


Fig. 5.11: A 3-tier cage arrangement

- Feeding Channel: Long aluminum/galvanized sheet feeding channel (Fig. 5.12) are fitted in the front side of the cage which runs along the width of the cage and 15 cm (6 inches) above the egg collection channel. The birds consume feed by bringing their heads out through the mesh in front from the feeding channel.
- Drinkers or Watering Channel: Aluminum water channel (Fig. 5.12) can be fitted with fixed 7.5 to 10.0 cm above the feeding channel. However, such water channels are not preferred due to many disadvantages like, requirement of daily cleaning of the channel, overflowing of water leading to high humidity, fly and odour problems as well as occasional empty channels leading to thirst and reduced performance. To overcome these problems, nipples drinkers are used nowadays in the cages.

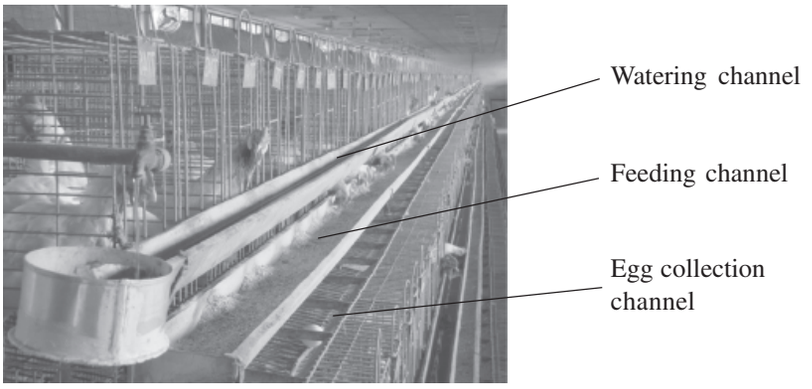


Fig. 5.12: Cage with feeding, watering and egg collection channels

Nipple drinkers: This type of drinkers which is fitted inside the cages at the top edge in the front end of the cage look like a nipple and therefore it is called "nipple drinker" (Fig. 5.13). When a bird presses the nipple with its beak, water automatically comes out. Though they can be used for any type of housing system; they are most commonly used in cages. They are fitted inside the laying cage at 5 cm above the head of the birds so that they can easily hit at the nipple. One nipple drinker in each cage housing 3 layers is sufficient.

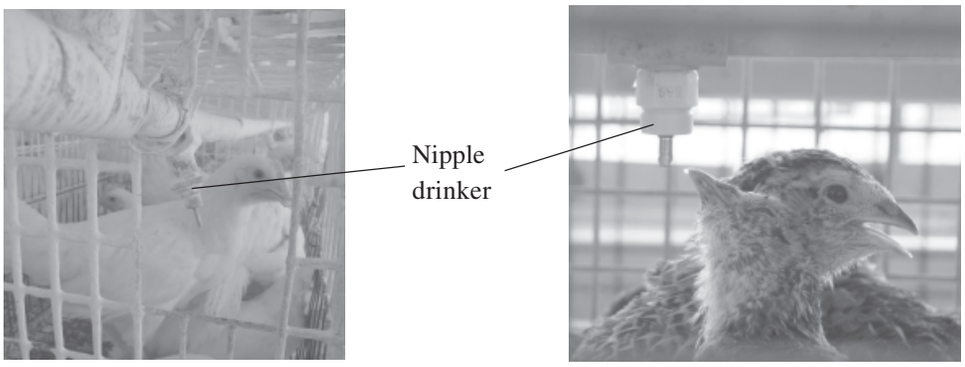


Fig. 5.13: Nipple drinker

- **Egg collection channel:** For collection of eggs, the floor of the cage projects by 15 cm (6 inches) with a gradual slope (Fig. 5.12, 5.14) for easy rolling of eggs.

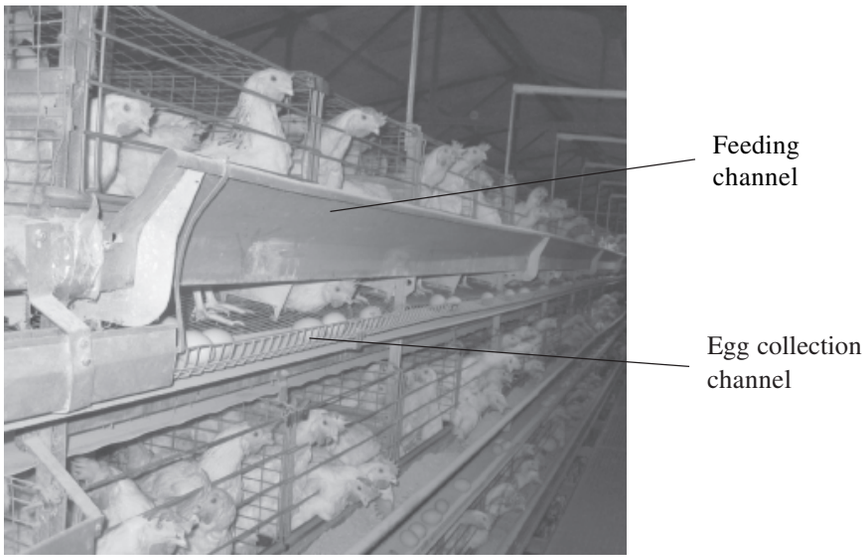


Fig. 5.14: Cage with egg collection channel

(v) Egg filler flats: They are rectangular trays with depressions to hold eggs. They are made of plastic (Fig. 5.15) or paper pulp (Fig. 5.16) and can hold 30 eggs. Plastic ones are common because they are durable and easy to clean and maintain. However, paper pulp trays reduce breakage of eggs during transportation and are environment-friendly. Eggs are directly collected and transported in egg filler flats.

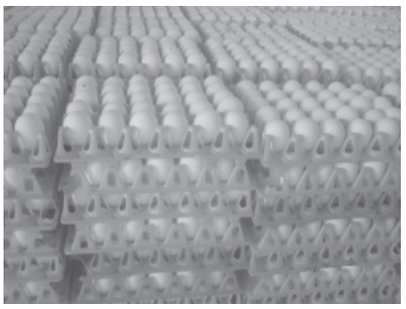


Fig. 5.15: Plastic egg filler flats

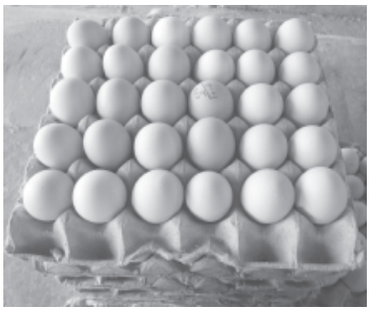


Fig. 5.16: Paper pulp egg filler flats

(vi) Nest box: Nests (Fig.5.17) are not required when the layers are grown in cages. However, if layers are grown on deep litter system, nests at the rate of 30/ 100 layers have to be provided. In order to get clean and undamaged eggs and to avoid floor eggs, they are constructed or placed inside the shed for laying hens. The sitting place should be isolated, slightly of less light, with soft bedding. Open nest box and colony nest boxes made of iron shed with roll-out egg system are preferred. The colony box of size 2' wide and 4-6 ft in length with partition at 12x 14" distance inside are generally recommended. Nests should have an inclined roof because layers have a tendency to fly/perch and sit on the nests and may lay eggs.

Fig. 5.17: Nest box

(vii) Candler: It is an electric equipment (Fig. 5.18) which produces a beam of light when passed through an egg in dark environment and helps to get an idea about the internal quality of eggs. It is a simple technique used to easily identify cracks in the shell and other defects inside the egg without breaking open the egg. Candling of eggs helps to remove/eliminate cracked eggs or eggs with foreign matter inside like blood spots, meat spots etc. and used in the grading and sorting of eggs.

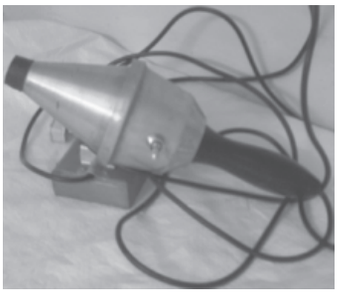


Fig. 5.18: Candler

INTEXT QUESTIONS 5.3

Notes

Fill in the blanks

(a) Each bell-drinkers is be sufficient for about ..... chicks.

(b) One circular feeder is sufficient for ..... layers depending on weight/size of bird in deep litter system.

(c) In layer farm, the most commonly used are ..... bird laying cages.

(d) ..... drinker is fitted inside the cage at the top edge in front end of the cage.

(e) For collection of ..... the floor of the cage projects by 15 cm (6 inches) with a gradual slope.

5.2 OTHER EQUIPMENTS USED IN POULTRY FARM

In addition to the equipment described above, for routine farm activities, the following equipments are required:

(i) Automatic vaccinator (Fig.5.19): It is used during vaccination for injecting different doses of vaccine to a large number of birds within short period.

Fig. 5.19: Automatic Vaccinator

Fig. 5.20: Blow lamp

(ii) Blow-lamp: Blow-lamp (Fig. 5.20) also known as flaming gun is used for disinfection and control of parasites. Usually, kerosene or gas is used in blow-lamp. It is used to flame metal frames or on GI. In either case, after cleaning and disinfection, blow-lamp can be used on the area.

(iii) Buckets: They are vessels made up of plastic or metal used for carrying feed/water and other materials from one place to another.

(iv) Catching mesh and catching hook: They are used in broiler farms in order to catch the birds for shifting or routine examination or administration of medicines. Catching mesh (Fig.5.21) consists of several pieces of meshwork (2.5×2.5 cm^2 or 7.5×7.5 cm^2) measuring 60×60 cm^2 beaded on all sides to protect from sharp edges. These pieces (about 8 to 10 in number) are linked through rings, so that they can be folded and spread whenever needed. When birds need to be caught, they are

Notes

moved to a corner of the shed, and the catching mesh is spread leaving as much space as possible all round so that the birds cannot escape. Catching hook is a hook with a long handle which can be used to catch the birds by the leg.

Fig. 5.21: Unit of catching mesh

(v) Crates (Transportation cages): Crates (Fig. 5.22) are box-like structures made of meshwork or plastic used for transportation of birds. Plastic crates are preferred due to their light weight, durability and easy to handle and clean. The bottom of the crates should be made of meshwork (2.5×2.5 cm^2) so that the birds are comfortable in it. All sides of crates should have good ventilation. For loading and unloading, an opening with a lid is provided on the top of the crate. A crate of dimensions 90 x 45 cm^2 and of height 30 cm can easily accommodate 10 to 15 broilers depending on body weight.

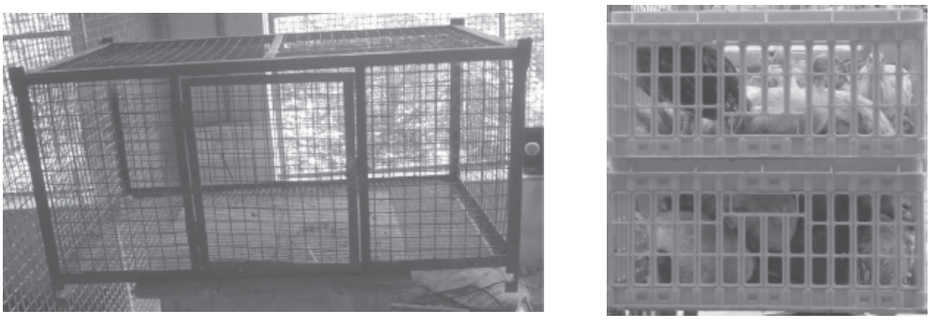


Fig.5.22: Crates

(vi) Curtains: Curtains are used to prevent entry of cold wind into the poultry shed during winter conditions (Fig. 5.23). This is particularly necessary during the first 2 to 3 weeks of age when the chicks cannot maintain their body temperature efficiently. Arrangement to close the sidewalls and open in part or full by rolling down as the day progresses is also necessary.

Fig. 5.23: Curtains

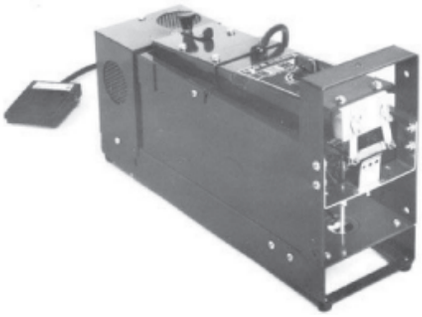


Fig. 5.24: Electrical de-beaker

(vii) Debeaker: Debeaker is used to trim the beak of the birds in order to prevent becking and also to reduce feed loss. It is generally used in layer farm. It is of two types – manual and electrical beak trimmer. Electrical debeaker (Fig. 5.24) is usually mounted on to a stand of convenient height (0.60 to 0.75 m) with a peddle connected to the top of the unit with a chain. When the operator presses the peddle with his/her foot, the hot blade slides down cutting the beak placed over a small platform in the equipment.

(viii) Heating equipment: In regions where extreme cold weather conditions are experienced, electric room heaters are employed to maintain comfortable room temperature for the birds. However, in north India, Bukhari is commonly used in winters inside the poultry sheds to keep birds warm during nights. Bukhari is a traditional heat generating equipment made up of a burning chamber for burning wood or saw dust with a chimney at the top. However, the major disadvantage is that it generates poisonous gases and may results in huge death of birds if used in a closed room.

(ix) Refrigerator: A refrigerator is essential in a poultry farm for storing vaccines and other medicines.

(x) Shovel and raking tool: Shovel (Fig. 5.25) is used in poultry farms for removal of manure. Raking tool (Fig. 5.26) is made up of iron rod with sharp projections fitted with iron or wooden handle. In broiler farms, where the birds are maintained on deep litter system, raking tool is used for raking or mixing the litter to prevent cake formation and to keep the litter dry. If raking is not done regularly, bird's droppings will mix with the litter material resulting in cake formation.

Fig. 5.25: Shovel

Fig. 5.26: Raking tool

(xi) Sprayers: Sprayers are used for disinfection of building, birds, men, material and surrounding areas. Though different types of sprayers are available in the market, hand-operated sprayers (Fig. 5.27) which can be carried on the back are the most ideal for poultry farm operations.

Fig. 5.27: Sprayer

(xii) Sprinklers and foggers: Sprinklers and foggers are used to provide cooling effect to the birds in hot dry weather conditions. Whereas, in hot-humid conditions, commercial irrigation sprinklers should be used only on the roof tops during afternoon hours (Fig.5.28). If very hot weather is expected, foggers can be used to spray fine mist of water directly only on the face of the birds (Fig. 5.29). Since the bird's feathers are water-proof, foggers should not be used to wet the feathers.

Fig. 5.28: Sprinkler on the roof top

Fig. 5.29: Fogger over the cage

(xiii) Thermometer: It is a small device used for measuring temperature. Most commonly used thermometer in the poultry shed is wet and dry bulb thermometers (Fig. 5.30) used for measuring temperature and humidity.

Fig. 5.30: Wet and dry bulb thermometers

(xiv) Trolley: A small vehicle with two or four wheels (Fig.5.31) operated manually to transport cages/crates and other heavy objects from one place to another.

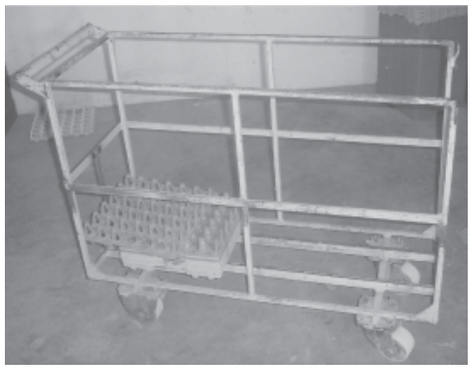


Fig.5.31: Trolley

(xv) Weighing balance: Weighing balance (Fig. 5.32) is used for weighing of the birds and feed. Nowadays, balance with a digital display is available at affordable price. If a farmer wishes to sell broilers on retail, a 5 kg or 1 kg balance is required. However, if the birds are sold wholesale, a spring balance with a sensitivity of 100 or 25 g is advisable.

Fig. 5.32: Weighing balance

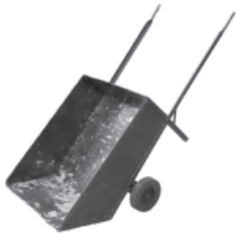


Fig. 5.33: Wheel barrow

(xvi) Wheel barrow: It is small hand operated vehicle with a single wheel in the front and two supporting legs and two handles at the back (Fig. 5.33). It is used to carrying poultry farm waste from the shed to the place of disposal or plate form balance.

Notes

5.3 CARE AND MAINTENANCE OF EQUIPMENTS/UTENSILS

Care and maintenance of equipment and utensils in proper condition is essential for the safety of the birds and longevity of the equipment and utensils. For effective utilization of these equipment and utensils, the following should be practised:

- Only the required number of equipment/utensils should be used in the shed.
- All the equipment and utensils should be thoroughly cleaned, disinfected and dried before use.
- Equipment and utensils should be cleaned regularly.
- Do not shift or use the equipment and utensils from one shed to another without cleaning and disinfection as they may act as a source of spreading of disease.
- Do not use broken or defective equipment/utensils as they may harm birds.
- Immediately dispose and replace broken or defective equipment/utensils.
- After use, equipment especially those with sharp edges should be kept in a safe place out of reach of the birds.
- Electrical equipment like debeaker should always be kept in working condition.
- Fragile equipment/utensils like egg filler flats should be handled gently and carefully to avoid breakage.
- Equipment/utensils made of iron like feeder should be kept dry to avoid rusting.

INTEXT QUESTIONS 5.4

Fill in the blanks.

(a) ..... is used for disinfection and control of parasites in a poultry farm.

(b) Crates are box-like structures made of meshwork or plastic used for ..... of birds.

(c) ..... is used to trim the beak of the birds in order to prevent pecking and also to reduce feed loss.

(d) Sprinklers and foggers are used to provide ..... effect to the birds in ..... weather conditions.

(e) ..... is a small hand operated vehicle used to carrying poultry farm waste from the shed to the place of disposal.

WHAT YOU HAVE LEARNT

Notes

Let us recapitulate and enlist salient points we have learnt through this lesson:

- In a Poultry farm, be it broiler or layer farm, it is essential to use a number of appliances/equipment and utensils to keep the animals comfortable and for routine management.
- The requirement of some of the equipment in broiler farm varies from that of layer farm depending on the system of rearing.
- Different equipment used in a broiler farm are brooders, brooder guard, feeders and drinkers or waterers.
- Circular feeders and bell drinkers are more popular than linear feeders.
- Different equipment used in a layer farm are brooders, brooder guard, feeders – chick/grower, drinkers, cages with feeding channel, nipple drinker and egg collection channel, egg filler flats, nest box and candler.
- Other equipment commonly used in a poultry farm are automatic vaccinator, Blow lamp, buckets, catching mesh/hook, crates, curtains, debeaker, heating equipment, refrigerator, shovel and raking tool, sprayers, sprinklers/foggers, trolley, weighing balance and wheel barrow.

TERMINAL EXERCISE

1. Describe the different types of brooder and indicate their uses.
2. Why grills are provided in the linear feeder?
3. At what height the circular feeder should be hanged and why?
4. Why nest boxes are required when the laying birds are reared in deep litter system?
5. What are the advantages of plastic and paper pulp egg filler flats?
6. Why raking tool is used in a broiler farm maintained in deep litter system?
7. What are the equipments used during winter season to maintain comfortable room temperature for the birds?
8. Explain the uses of following equipments used in poultry farm:
   (a) Brooder guard
   (b) Circular feeder
   (c) Fountain drinker

(d) Bell drinker

(e) Egg collection channel

(f) Egg filler flats

(g) Candler

(h) Automatic vaccinator

ANSWERS TO INTEXT QUESTIONS

5.1

(a) floor and cages

(b) Brooder

(c) Canopy

(d) 200 to 250

(e) Japanese quails

5.2

(a) Brooder or chick guard

(b) Linear feeders

(c) bright (red or blue)

(d) 28 and 19

(e) Fountain drinkers

5.3

(a) 62

(b) 30-40

(c) 3

(d) Nipple

(e) eggs

5.4

(a) Blow lamp

(b) transportation

(c) Debeaker

(d) cooling; hot dry

(e) Wheel barrow

6

MANAGEMENT OF CHICKS AND BROILERS

You will be surprised to know that the knowledge of Science and Mathematics you have gained during your Higher Secondary education is very useful in understanding the Science behind the Art of Poultry Farming.

Let us make a beginning-taking example of growing vegetables. First, you would sow the seeds and provide the needs of the seeds. The seeds germinate and you will take care of the seedlings till they grow by providing the required manure, water, protection from diseases and pests etc. After the plant matures, it starts yielding the vegetables which you will harvest. At each stage, specific practices are prescribed to get the maximum yield. They are referred to as "Package of Practices". On the same lines, for rearing chicken for egg production also specific practices are prescribed.

Management of any domestic animal consists of four pillars ("ings") viz. heeding (giving support or taking care), feeding (offering proper food), breeding (scientific reproduction) and weeding (culling or removal of undesirable animals). In the Lessons to come, we will be discussing about heeding of chicken for eggs and meat production or in other words "Management of chicken for eggs and meat". The topic is grouped as follows:

1. Management of Chicks and Broilers (from hatch to 6 or 8 weeks of age)
2. Management of Growers (after 8 weeks to 16 weeks of age)
3. Management of Layers (17^{th} weeks till end of lay i.e. 90 weeks of age)

In this Lesson, we are going to discuss about Management of Chicks and Broilers from hatch to 8 weeks of age.

OBJECTIVES

After learning this lesson, you will be able to:

- explain science and art of rearing chicks and broilers;
- make suitable arrangements before and after arrival of chicks / broilers;
- manage the chicks / broilers during brooding period (up to 6 or 8 weeks).

Notes

6.1 MANAGEMENT OF CHICKS

The management of chicks includes the brooding and rearing which is the care and management of young chicks after hatching. The care and management of chicks during initial part of thei r life constitutes brooding. Successful brooding will lead to the production of healthy pullets and they in turn will show their full potential during laying in terms of egg and meat production.

The following management should be done during rearing of chicks:

1. Preparations before the arrival of chicks
2. Management after the arrival of chicks
3. Cleaning and disinfection of the house to make it ready for the next batch

Let us know each of the above requirements in brief.

6.2. BEFORE THE ARRIVAL OF CHICKS

Before the arrival of chicks, you need to make suitable arrangements which are as follows:

1. Brooder house should be cleaned and disinfected.
2. Feeders and drinkers should be cleaned and disinfected followed by sun drying.
3. House must be thoroughly examined for leaking roof and gutters, drafty doors, functioning of fans, switchboards, shutters etc. The floor may be given a coat of lime solution.
4. Floor of the building has to be cleaned with a suitable detergent and disinfected with a commercial product suitable for floor cleaning.
5. All weeds and debris, if any, surrounding the building must be cleared and the area sprayed with a commercial disinfectant.
6. Checking of brooders, feeders, drinkers and other equipment required during the brooding period.
7. New and clean, dry, mould-free absorbent litter has to be spread evenly on the floor making a thickness of about 6 to 8 cm; care has to be taken not to close all the windows when the litter is being spread so that dust can settle down easily.
8. Paper is spread on the litter (Read Section **6.3.8** below).
9. Brooder, feeders and drinkers are arranged at least 6 to 8 hours before the arrival of chicks; brooder is put on so that requisite brooder temperature is attained before the arrival of chicks; if required, windows may have to be covered with gunnysacks to conserve heat. This also helps maintain drinking water temperature at > 18°C.

10. The feeders are arranged in the brooding area like spokes in a wheel; with half the length of the feeders inside the canopy area (Fig. 6.1). The drinkers are arranged at the edge of the canopy interspersed between the feeders. This is done to ensure both feed and water within 30 cm (1 ft) of distance from any part of the brooding area, especially at the beginning of brooding. Later on, both feeders and drinkers should be uniformly distributed so that no bird need move more than 3 m to have access of either feed or water.
11. Anti-stress factors (B-complex vitamins, vitamin C, etc.) may be added in water.
12. Feed or maize grit is sprinkled on paper to help chicks identify the feed. During the first few days, it is mandatory that the feed should be available to chicks easily. For this purpose, feed can be kept in inverted chick box lids, egg flats or any such large flat containers.

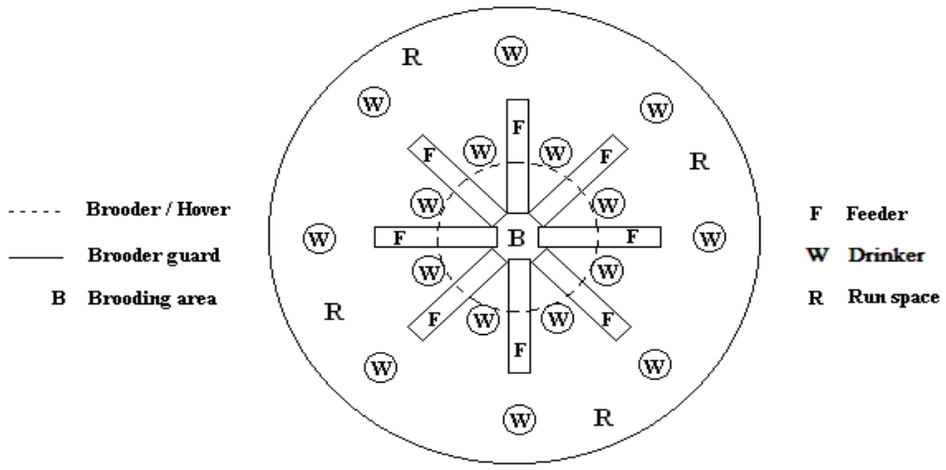


Fig 6.1: Placement of equipment during brooding

13. It is desirable to have a standby generator; otherwise, charcoal/coal, kerosene or LPG must be available to meet emergencies in case of power failure.
14. All data sheets required for recording various events like medication, vaccination, feed consumption, mortality etc. should be kept ready.

INTEXT QUESTIONS 6.1

(a) Four pillars of management of animals are ....., ..., ... and .....

(b) ..... Paper is spread on the litter before the arrival of chicks.

Notes

(c) The drinking water of temperature ..... is ensured before the chicks arrived in farm.

(d) Arrangement of feeders under the brooder will look like .....

(e) At the beginning of brooding, it is arranged such that no chick need move more than ..... to get either feed or water.

6.3. AFTER THE ARRIVAL OF CHICKS

After you have sown the seeds and they have germinated (similar to the chicks arriving in the farm), you would take steps as per the package of practice for the vegetable you are growing. Similarly, after the arrival of chicks the following are practiced:

6.3.1. Release of chicks

1. It is advisable to examine a sample of chicks from each of the chick boxes to ascertain the quality and thriftiness of the chicks; it also helps to note mortality, if any, during transit.

2. It is a good practice to dip the beaks of the newly hatched chicks in water at drinkers and leave them into the brooder area. Otherwise, the chick box can be inverted quickly to dump all the chicks nearby the brooding area.

3. Chicks have to be observed carefully to identify weak ones and also to help those which are not able to reach feed and water.

4. It is equally necessary to observe and ensure that all the chicks are actually eating and watch out for "starve-outs" by examining randomly for well-distended crop (a pouch just below the base of the neck which can be felt by gently pressing on the area).

6.3.2. Brooding

Chicks after hatching need additional heat. You may raise a question; calves, kids, lambs and others do not require any heat after they are born; why do chicks require heat? You are right. There are three reasons for this.

1. If you can remember your science / biology lessons, animals are classified into two groups based on thermoregulation (regulation of body temperature).

   Poikelotherms (Cold-blooded animals): These animals modify their body temperature depending on the surrounding temperature. Reptiles (snakes) and animals lower than them in the evolution ladder belong to this group.

   Homeotherms (warm-blooded animals): These animals maintain body temperature within a small range. Avians and animals above them in the evolution ladder belong to this category. Avians were thought to be evolved from Reptiles (now proved to be from Dinosaurs). Hence, chicken embryos up to 18 days of development are

Notes

poikelothermic and change over to homeothermy only during last 3 days before they hatch. Therefore, their thermoregulation is not completely functional at hatch.

2. Chicks at hatch weigh about 32 to 38 g (Average 35 g). Their body temperature is around 40.0 to 40.5°C which is higher than in other animals.

   To understand further, let us consider a situation: you are given a choice of 20 lit of hot water for bath in 2 buckets of 10 lit each or 10 mugs of 2 lit each. To keep the given water warm during bathing, which one you will prefer and why? By common sense, you prefer 2 buckets of 10 lit each because the water keeps warm for a longer time in them; why? Have you thought over this? It is because the surface area of larger bucket in comparison to the volume (weight) of water is very high in mugs than the large buckets. Therefore, water in mugs gets cooled faster.

   Let us return to the chicks; their body temperature is high, surface area is high and hence, they lose heat quickly.

3. Do chicks have feathers like adult chicken? No. Do you know that the feathers act as good insulating agent; i.e. protection from cold. Therefore, chicks which have only hair like feathers (called as "Down") cannot get insulation like adults.

6.3.3. Brooding temperature

At the beginning, a temperature of 35°C (95°F) is provided which is reduced at a rate of 2.8°C (5°F) per week till the end of brooding. However, you would also get a doubt as to why brooding temperature is reduced every week. Can you imagine the answer with the information available with you? Recall that the newly hatched chick has become homoeothermic only 3 days before hatch. If temperature is not reduced, stepwise, thermoregulatory mechanism will not develop properly and feather growth will be severely affected. Therefore, brooding temperature is reduced at a rate of 2.8°C (5°F) per week till the end of brooding period.

6.3.4. Measuring brooding temperature

Generally, brooding temperature is not measured because the poultry farmer can easily feel whether the temperature is right or not. You may wonder how. Brooding temperature of 35°C is warm for humans and we start sweating lightly inside a brooder house; i.e. in the beginning of brooding, if we feel uncomfortable, the birds will be comfortable (this is referred to as "Chicken sense" of the farmer!). However, if measured by a thermometer, it is at a height of 8 to 10 cm above the litter floor under the brooder (in case of reflector brooder and infra – red bulbs) and at the edge of the canopy in case of canopy brooding. As the birds grow in size, the height at which temperature is measured should also be increased. Measurement should be made at a height where most part of the body is held while standing (i.e. other than head, neck and legs) is likely to be present.

6.3.5. Brooding period (duration)

Brooding period is generally 4 weeks and can be extended if the outside temperature is too low and vice versa).

Notes

6.3.6. Brooding methods

1. *Canopy brooding:* The canopy is hung down from the roof keeping the edge of the canopy about 8 to 10 cm above the litter floor. This facilitates movement of chicks in and out of the brooder at will. Now, the question arises as to why there should not be any holes in the canopy?

   You may have to go back to your science lessons. When we put on the bulbs, how do they heat the chicks? Is it by conduction? Is it by convection? Is it by radiation?

   Bulbs heat the air surrounding then and by convection, the air within the brooder is heated. Now think over; what will happen if there are holes in the canopy. Is warm air is lighter or heavier than the normal air? It is lighter isn't it? Therefore, it goes away from the canopy. What happens then? Vacuum is created and cold air will be sucked in from the surrounding. Consequently, you will be cooling (chilling) the birds instead of giving warmth! The very idea of brooding is defeated! Therefore, unnecessary holes must be avoided in a canopy brooder.

   Wattage and number of bulbs fixed inside a canopy depends on the outside temperature and number of birds under the canopy. Generally, two or three 40 or 60 W incandescent bulbs are used inside a canopy. The canopy is raised as the birds grow and removed after the requisite brooding period. **Number of canopy brooders:** Each laying type chick requires 50 cm^2 of brooding area (and 100 cm^2 of run space). Broiler chicks require 75 and 150 cm^2 of brooding and run space, respectively. For 1000 chicks, it is advisable to have four canopy brooders of 120 cm diameter at one brooder for every 250 chicks. For broiler chicks, one brooder is required for every 200 chicks.

2. *Infra – red brooding:* In this method infra – red bulbs are used. Going back to transfer of heat, can you recapitulate how infra – red bulbs heat? Is there a similar source of heat you have come across? Yes, the Sun isn't it. Sunlight heats through radiation (that is heat transfer without heating the medium through which it travels). Therefore, there is no need of canopy and the birds get heat whenever they come under the infra – red light.

   These bulbs are available in two colors viz. red and white and in two wattages viz. 150 and 250 W. Each chick requires 2 W of infra – red light. Therefore, a 150 W bulb for 75 and a 250 W bulb for 125 chicks are required.

   Advantages of infra – red brooding:

   (a) Since there is no canopy, observation of the chicks is easier.

   (b) Accidental mortality due to improper handling of canopy is avoided.

   (c) Infra – red light has been found to have some germicidal effect and hence survivability of the chicks will be higher in this method.

   (d) If there is any bleeding due to any reason, it looks black under red colored infra – red light and the birds do not get attracted to the blood. Therefore, cannibalism is minimized with red colored bulbs.

   (e) Brooding cost, on a long run, has been found to be lower.

Notes

3. *Reflective (Electrical brooder)*: The reflected heat generated spreads to a larger area by rectilinear propagation. Therefore, a large canopy is not required.

6.3.7. Brooder guard

Note: All round the brooder (Canopy / Infrared bulb / Reflective heater), brooder guard is set in a circular fashion. The brooder guard contains the chicks to the brooding area. It is arranged 60 to 75 cm (1 to 1¼ ft) away from the edge of the canopy. The area under the canopy is called the "Brooding area" and that around the canopy within the brooder guard is called "Run space". The arrangement is such that the run space is twice the brooding area. The diameter can be calculated considering the total area required under brooder and the run space; i.e. 50 + 100 = 150 cm^2 per laying type chick (75 + 150 = 225 cm^2 per broiler chick) in the beginning. As the chicks grow, brooder is raised; the brooder guard is also spread to provide sufficient space for all the birds.

6.3.8. Brooding Comfort

If the brooding temperature is correct, the chicks will move uniformly in both brooder area as well as run space. This is particularly important during the first 8 to 10 days of age because:

1. The paper prevents eating of the litter material by the chicks because they can't identify the feed yet. If they eat paddy husk, they are likely to die due to choking. Feed sprinkled on the paper will be easily visible for the chicks to identify and eat.
2. Paper on the litter also helps observe the birds undisturbed, paper is spread on the litter and is turned after 4 to 5 days and removed after 8 to 10 days. Question comes how the paper helps observation of chicks.

   Distribution of fecal matter in and around the brooder is the indicator of brooding comfort and if paper is not spread, the fecal matter mixes with the litter material. It is diagrammatically illustrated below where the location of fecal matter is represented by chicks (Fig 6.2):

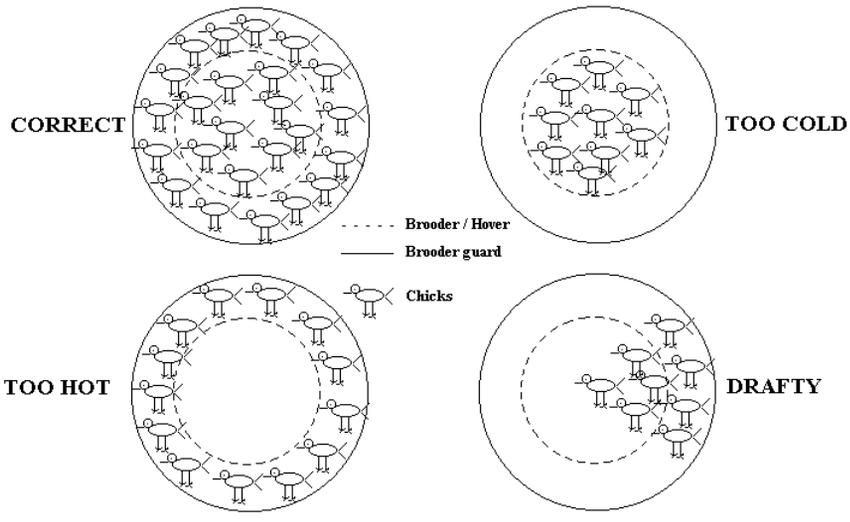


Fig 6.2: Assessment of brooding comfort

Notes

It is interesting that when cold wind blows from right hand side, probably due to leakage through curtains (drafty), the birds lean on the brooder guards.

INTEXT QUESTIONS 6.2

(a) Chicks change over to homeothermy ..... before they hatch.

(b) Brooding temperature at the beginning is ..... which is reduced at a rate of ..... per week.

(c) 250 Laying type chicks require ..... (space) under the canopy and ..... of run space.

(d) 500 Broiler type chicks require ..... (space) under the canopy and ..... of run space.

(e) Infrared bulbs heat by ..... and each 250 layer chicks require ..... (number) ..... (wattage) of infrared bulbs.

(f) Of the white and red colored infrared bulbs, ... is preferred because it will help minimize .....

(g) In case of reflective brooders, heat spreads by .....

(h) Paper spread on litter helps ....., ... and .....

6.3.9. Feeding tips

1. When linear feeders are used, they should never be filled more than 1/3 to 1/2 full except for a few days after beak trimming.

2. The hanging feeders are fixed above the litter floor and never kept on the floor because they have a base plate and a bell portion; both are so designed that there will be free flow of feed from the bell on to the base plate as and when feed is exhausted in the latter through a slit all round. This is primarily facilitated by gravity. Hence, it is necessary that the circular feeders are suspended above the litter floor and never kept on the floor.

3. In addition, it is mandatory that feed is available at the level of the back of the birds. Can you use your common sense and think of the reason for this? If the feed is available at floor level, birds can easily scratch both by beaks and legs. Therefore, to minimize feed spillage especially when mash – type of feed is provided feed is made available at the back of the birds. At the beginning of brooding, base plate will be about 5 to 6 cm (2 to 2½ inche) above the litter floor which will be increased as the birds grow both in height and weight.

Notes

4. A special mention for broilers:

Type	Average weight (g)		Growth rate (g)	
	At hatch	At 6 weeks	Per day	Per hour
Layer chicks	36	450	9.86	0.41
Broiler chicks	40	1900	44.29	1.85

Between 4 and 6 weeks of age, broilers put on as much as 900 g of body weight (about 65 g per day or about 2.75 g per hour!). That means, broilers grow 4 to 7 times that of layer chicks. Therefore, meticulous management is mandatory for all chicks, in general, and broilers, in particular.

6.3.10. Number of feeders

1. **Linear feeders**

Imagine a linear feeder placed inside the poultry house on the litter. Birds can line up on both the sides (length) of the feeder and eat; isn't it? Therefore, total number of birds that can feed on a linear feeder can be calculated by dividing two times the length of the feeder (L) by the feeder space required per bird (F). That is, number of birds that can be fed by a linear feeder = (2L ÷ F). In other words, for "N" number of birds, the number of linear feeders required is given by the formula (NF ÷ 2L).

Feeder space required for layer and broiler chicks is as follows:

Age (weeks)	Feeder space (cm)		Drinker space (cm)	
	Layer chicks	Broilers	Layer chicks	Broilers
0 – 1	1.5	1.5	1.5	1.75 (say 2.0)
1 – 4	2.5	5.0	1.5	1.75 (say 2.0)
4 – 8	3.75	8.0 (4 – 6 weeks)	1.5	2.0

Initially, chick feeders are used till 10 to 15 days of age. The Feeder space required will be 2.5 cm per chick and the length of the feeder is 45 cm. Hence, each layer chick feeder can support (2 x 45) ÷ 2.5 = 36 chicks and 1000 chicks need (1000 x 2.5) ÷ (2 x 45) = about 28 feeders.

In the example considered above, N = 1000, F (for layer chicks up to 8 weeks) = 4 cm, Length of the feeder (L) is 90 cm (3 ft),each feeder can be used to feed (2 x 90) ÷ 4 = 45 and total number of linear feeders required = (1000 x 4) ÷ (2 x 90) = 22.22 or about 25.

For broilers, feeder space required per chick (F) up to 4 weeks is 5 cm and therefore, the above feeder can support 36 broilers and about 30 feeders are required for 1000 broilers.

Notes

2. Circular feeders: Space available around a circular feeder is the circumference of the outer plate where feed accumulates. Therefore, Number of hanging feeders should be the ratio of circumference (πd or $2\pi d$) to feeding space requirement (F).

   However, in any feeder, birds require shoulder space for standing while eating. In case of linear feeders, no matter how far they stand from the feeders, total space (linear cm) available for feeding is same. On the contrary, in case of hanging feeders, since the shoulder will be about 6 to 8 cm away from the head of the bird, 30% more birds can stand radially and feed out of a hanging feeder than that is possible in case of a linear feeder.

   Let us consider the earlier example of 1000 layer chicks. Feeder space required for a layer chick (till 2 months) is 4 cm (linear). Therefore, totally 4000 cm is required. Generally, hanging feeders will be of 35 cm diameter. Each feeder provides 110 cm and due to radial arrangement of birds $110 \times 1.3 = 143$ cm effective feeder space. Consequent on this, each hanging feeder of 35 cm diameter can support about 35 birds; and for 1000 birds about 30 feeders are adequate. Each such feeder can hold about 8 kg of feed.

   For broilers, F = 8 cm, and each feeder can support about 18 broilers and about 56 hanging feeders are required for 1000 broilers.

6.3.11. Tips on drinkers

1. Bell drinkers are so designed that there will be free flow of water over the bell on to the water line as and when water is exhausted through a slit. This slit is controlled by a spring – mounted valve and suitable ballast fixed at the bottom of the drinker. Water flow is primarily facilitated by gravity. Hence, it is necessary that the circular drinkers are suspended above the litter floor and never kept on the floor.

2. Drinkers are also set in such a way that water is available at the level of back of the birds. Can you tell the reason? Birds don't have lips and therefore, they can't suck and drink water. If you have observed birds drinking carefully, you might have noticed that the birds dip their beaks in water and then raise their head so that the water flows down into their mouth by gravity. Therefore, water must be available at the level of back to facilitate birds to drink.

3. Drinkers have to be cleaned and freshwater to be given at least twice a day; similarly, feed is also offered at least twice a day.

   Bell drinkers are connected to water line and hence cannot be dismantled every time they are to be cleaned. As and when required, soap and detergents can be used. Hence, a soft cleaning brush is used to clean the surface *in situ* and the clean-out water decanted to a bucket for disposal.

   Thumb Rule: Surface of clean bell drinkers will be smooth and shining.

Notes

Caution: Care must be exercised to minimize spillage of water on to the litter while cleaning bell drinkers.

4. Care has to be exercised in placing the drinkers – they have to be kept at horizontal place and it must be ensured that water is not flowing out onto the litter.

6.3.12. Number of drinkers

The fountain and bell drinkers are similar to circular or hanging feeders. Therefore, all calculations are similar to those of circular feeders with replacement of feeder space with drinker space. Drinker space (D) required is 1.5 cm per layer chick till 8 weeks of age. Each nipple drinker can support 10 chicks or 5 growers.

In the example considered, let us calculate number of fountain and bell drinkers required.

1. Fountain drinkers: Diameter 21 cm; D = 1.5; number of layer chick each drinker can support about 60 birds; or about 25 drinkers are adequate for 1000 birds. For broilers, D = 2.0; each drinker can support about 45 birds and about 25 drinkers are required for 1000 broiler chicks.

2. Bell drinkers: D = 1.5 cm; Diameter 28 cm can support about 75 layer chick and for 1000 layer chick about 15 drinkers are sufficient. For broilers, D = 2.0; each drinker can support about 60 birds and about 20 drinkers are required for 1000 broiler chicks.

6.3.13. Litter management

Initially, 5 to 8 cm thick litter material is spread which increases to 8 to 10 cm by 6 to 8 weeks of age of birds. Bacteria decompose and convert the litter into crumbly and powdery form referred to as “compost litter “ or “build-up litter “ in about 6 to 8 weeks of time. The fermentation also produces heat which helps drying of litter. Litter management involves following steps:

1. Testing condition of litter

   Litter ideally should have moisture between 25 and 30% and such manure when pressed into a ball in hand and fist is opened, breaks into about three pieces. Whereas, a wet litter forms a solid ball and the dry litter falls out like powder.

2. Raking of litter

   It is a very good practice to wade through the litter during all routine feeding and watering works. By doing so, on one hand, litter is automatically raked and, on the other hand, prevents weight of the farmer moving on the litter cause caking of litter. Even deliberate raking by wading throughout from one end to another is recommended at least twice daily. Frequency can be increased depending on the litter condition.

Notes

3. Maintaining litter in good condition

The following are the precautions for maintaining litter in good condition:

(a) Proper floor space should be provided for birds to ensure normal moisture content in litter.

(b) Proper ventilation should be ensured to remove excess moisture.

(c) The floor should be raised at least 0.3 to 0.5 m above the ground level (Plinth) to avoid seepage of water.

(d) Concrete flooring is preferred; otherwise, thickness of litter has to be increased.

(e) Overhangs to the roof must be able to protect the interior of the house from rainwater.

(f) Leaky and/or overflowing drinkers should never be used; drinkers must be kept on a horizontal plane. Careful adjustment of height, water depth, and other operating factors will help assure minimum spillage onto the litter. Reducing water spillage will: save water, improve bird quality, improve production environment, reduce ammonia release from litter, reduce volume of wet manure cake, and extend time between litter cleanout.

(g) Wet and/or moldy litter should be replaced at once with good dry litter. This is particularly true when bell drinkers leak causing wetness surrounding them. It is also possible that birds during their movement accidentally hit at the drinkers leading to swinging of drinkers and spillage of water.

(h) Litter should be raked several times daily to help drying as well as to prevent caking.

(i) For wet – litter, hydrated lime @ 1 kg or super phosphate of lime @ 0.75 kg/ m^2 can be used. A mixture of wood ash and superphosphate in a ratio of 4 : 1 can also be used.

(j) Other causes, if any, for wet – litter should be checked for, and suitable corrective measures to be taken up. For example, excess salt or potassium in the ration, high temperature leading to excess water intake etc.

6.3.14. Lighting

During brooding 23 hr light + 1 hr darkness is provided. Under canopy brooding, light serves to purpose of both illumination for visibility and also heating the air by convection to provide the required brooding temperature. Under infra-red brooding, light primarily serves the purpose of visibility. You would be curious to know why one hour of darkness at a specified time (preferably during midnight) is recommended. One-hour darkness is mainly to acclimatize chicks for power failure for whatever reasons; this would help minimize panic huddling of chicks and subsequent mortality.

Notes

6.3.15. Other considerations

1. Standard balanced ration (chick starter) has to be offered without any restriction (*ad libitum*).

2. As the birds advance in age, bell/nipple drinkers and linear/hanging feeders can be introduced; replacing part of the existing feeders and waters at a time. Otherwise, birds hesitate to feed and drink on entirely new set up of equipment.

3. Floor, feeder and drinker space must be adequate to avoid unnecessary competition followed by cannibalism (eating one's own species), poor growth and wastage of feed.

4. Standard vaccination schedule have to be practiced to contain diseases; especially Newcastle disease (ND), Infectious Bursal Disease (IBD), Infectious Bronchitis (IB) and Fowl Pox.

5. Proper records have to be maintained with regards to feeding, vaccination, medication, mortality, post-mortem reports (if any), income and expenditure involved during the brooding period.

   Thumb Rule:

   (a) Drinker space required is about the width of the head.

   (b) Feeder space required is about the width at shoulders.

   (c) Floor space required on all-litter system is approximately equal to a square whose side is equal to 1½ times the length of the bird from base of the neck to the tip of pubic bones.

6.4 CLEANING AND DISINFECTION

Fountain (Chick) drinkers are cleaned thoroughly twice a day, once in the morning and in the afternoon while changing the water. Any common detergent soap can be used for washing and cleaning. Chick feeders are washed in soap solution and sundried after every 2 weeks. Circular feeders and bell drinkers used during brooding are dismantled, thoroughly in soap solution.

Fumigate and store the used equipments for next use. All the above equipment are fumigated and stored for next use. Procedure for fumigation (is a process in which an area is disinfected or purified with the fumes of certain chemicals; in poultry operations, formaldehyde is commonly used) is discussed next lesson "Management of Growers".

Overhead water tank may be sanitized with iodine compounds or bleaching powder.

INTEXT QUESTIONS 6.3

(a) Linear feeders are filled up to .....

(b) Feed and water should be made available at the level of .....

(c) Circular feeders and drinkers can accommodate ..... % more number of birds.

(d) Feeder space required layer chicks up to 8 weeks of age is ..... and drinker space required is .....

(e) For layer chicks up to 15 days of age require ..... (feeding space) and a linear chick feeder of length 75 cm can be used to feed ..... (number) chicks.

(f) For broiler chicks, feeder space required up to 3 weeks of age is ..... after which ..... feeder space is required till market.

(g) A fountain drinker of circumference 45 cm is adequate for ..... (number) layer chicks and ..... (number) of broiler chicks.

(h) A hanging feeder of circumference 160 cm can support ..... (number) layer chicks and ..... (number) broilers aged 5 weeks.

(i) A bell drinker of circumference 135 cm is sufficient for ..... (number) layer chicks and ..... (number) broilers ready for market.

(j) Ideal deep litter should have ..... moisture.

WHAT YOU HAVE LEARNT

Let us recapitulate and enlist salient points we have learnt through this lesson:

- Poultry farming is scientific animal management.
- Management of animals includes heeding, feeding, breeding and weeding.
- Paper is spread on the litter; this enables to know about comfort of birds during early brooding.
- Brooding equipments, feeders and drinkers should be arranged and brooder is put on at least 6 hours before the arrival of chicks.
- Feeders are arranged likes spokes in a wheel and drinkers interspersed between them at the edge of the canopy.
- A temperature of 35°C (95°F) is provided at the beginning of brooding and it is reduced at the rate of 2.8°C (5°F) per week till the end of brooding period.
- Brooder is raised and brooder guard spread, as the birds grow older; they are removed after the brooding period.
- A floor space of 900 cm^2 (1 sq ft) per bird till 16 weeks of age and feeder space of 4 cm and drinker space of 1.5 cm is provided per bird till the end of 8 weeks is provided.

Notes

- Linear feeders are filled till 1/3 or 1/2 only to prevent feed wastage.
- Circular feeders and bell drinkers can support 30% more birds than linear ones for the given total feeding / drinking space available because more birds can stand radially around circular feeders and drinkers.
- Feeders and drinkers are arranged such that feed and water are available at the back of the birds.
- Drinkers are inspected for leakage and regularly cleaned.
- Regular inspections have to be made to ensure that all equipment is working properly and all birds are able to feed and drink.
- Feeders and drinkers as well as all other equipment should also be cleaned, washed and disinfected preferably with formaldehyde fumigation.
- Overhead water tank may be sanitized with iodine compounds or bleaching powder.

TERMINAL EXERCISE

1. Why chicks require brooding?
2. Why brooding temperature is reduced every week?
3. Where the brooding temperature is measured? Why?
4. Why canopy brooder should not have many holes?
5. Enlist the advantages of infra red brooding.
6. Why paper is spread on the litter for the first 8 to 10 days?
7. How brooding comfort of chicks can be assessed?
8. Why circular feeders and bell drinkers should not be placed on the litter floor?
9. How do you test condition of the litter and how do you manage wet litter condition?
10. Why feed and water has to be made available at the level of the back of the birds?
11. Discuss the growth rate of broilers as against the layer chicks.

ANSWERS TO INTEXT QESTIONS

6.1

(a) heeding, feeding, breeding and weeding

(b) Paper

Notes

(c) > 18°C

(d) spokes in a wheel

(e) 30 cm

6.2

(a) 3 days

(b) 35^oC; 2.8^oC

(c) 12500 cm^2; 25000 cm^2

(d) 37500 cm^2; 75000 cm^2

(e) Radiation; 2 (number); 250 (wattage)

(f) Red; cannibalism

(g) rectilinear propagation

(h) prevent choke, identify feed and assess brooding comfort

6.3

(a) 1/3 to 1/2 level

(b) back of the birds

(c) 30%

(d) 4 cm, 1.5 cm

(e) 2.5 cm; 60

(f) 5 cm, 8 cm

(g) 39; 29

(h) 52, 26

(i) 117; 88

(j) 25 to 30%

7

MANAGEMENT OF GROWERS

Let us continue from where we left in the previous Lesson "Management of Chicks & Broilers". It is like the seeds which germinated have now become slightly big and are no more as tender as they were at germination. The plants are not yet ready to flower and produce vegetables; but soon they will. In the same way, the growing period follows the brooding period. Probably no other age of chicken commands the respect of the management more than the period between the time they are 6-8 weeks of age and sexual maturity. How well a bird is grown will greatly determine how well it does in laying or breeding house. The chicks now are 8 weeks old and they are sufficiently hardy. They are not yet ready to produce eggs; they need a different managerial approach to make them perform to their best during the next period, the laying period. The growing female birds are also referred to as "Pullets"; pullet is a female chicken under 1 year of age and has not yet started laying eggs.

In this Lesson, we are going to discuss about Management of Growers from hatch after 8 weeks till 16 weeks of age when they will be shifted to cages.

OBJECTIVES

After learning this lesson, you will be able to:

- take care of routine works regarding grower management;
- plan feed restriction for the growers;
- perform beak trimming of the growers;
- perform deworming of birds;
- transfer of birds to Cage Layer House.

Notes

7.1 MANAGEMENT OF GROWERS

During growing period, the routine works of feeding, offering of water, litter management, healthcare and maintenance of records are continued. However, suitable changes are made considering the floor, feeder and drinker space requirement. In addition to these, the birds will be subjected to feed restriction and trimming of beaks during this period.

Let us know each of the above requirements in brief.

7.1.1 ROUTINE MANAGEMENT

(a) Floor space

Floor space required up to 16 weeks is 900 cm^2 (1 sq ft) per bird. For brooding, only a part of the space should have been utilized. Hence, the birds are distributed to the entire area so that the birds receive optimum space to move around freely.

(b) Feeder space

Feeder space required per bird is increased to 6 cm from 4 cm. Circular feeders for growers will be slightly bigger and will have a diameter of 42 cm. That means, a feeder space of 132 cm is available which is adequate for about 28 to 29 growers (say 30 birds). For 1000 growers, about 35 feeders are required. Linear feeders are not commonly used for growers.

Feeders are arranged at the level of the back of birds as done for chicks till 8 weeks. They are filled as and when feed gets exhausted; generally every 4 to 5 days.

(c) Drinker space

Drinker space required is 2 cm per bird (1.5 cm per bird up to 8 weeks of age). Bell type drinkers of 35 cm diameter are used. Each of such drinkers provides 110 cm of drinker space and is adequate for 71 to 72 birds (say 70 birds). For 1000 birds, about 15 such bell type drinkers are required.

Bell type drinkers also are arranged at the level of the back of birds.

(d) Litter management

Same as outlined under "Management of Chicks and Broilers" in the previous lesson.

(e) Lighting management

Specific lighting programs is recommended during growing period. But, in the houses where sidewalls are made of expanded metal, light control is not possible. Therefore, the general practice is not to provide any artificial light during this period.

7.1.2 FEED RESTRICTION

Quantity of feed to be offered at different ages to growers is given by the supplier of the laying type of chicks. It is less than the quantity of feed the birds would consume if they are allowed to consume as much as they want (*ad libitum*). That means, amount of feed given is restricted; i.e. Feed Restriction.

Notes

Methods of Feed Restriction

Feed restriction can be effected by several ways like

1. **Quantitative feed restriction** – Offering 92-93% (commercial egg-type pullets) of the calculated feed requirement / skip-a-day program in which the birds are fed on alternate days from 9 weeks to sexual maturity. Once a pullet lays her first egg; she is referred to as a "Layer".
2. **Increasing fibre content** – Increases bulk in the intestine thereby reducing feed intake. Suppose you eat ragi ball (finger millet flour ball) and rice. In which of these, you would feel hungry faster? Obviously, in case of rice. Why? Because, ragi is rich in fibre which absorbs moisture and swells in the intestines. In the same way, if fibre content is increased, by using ingredients like wheat bran, rice bran etc., the birds eat less.
3. **Reducing protein content** – Proteins are highly essential for growth. Therefore, reduced protein content delays growth and, in turn, sexual maturity.
4. **Reducing lysine content** – Lysine is very essential for growth. Thus, reduction in lysine is same as reducing protein content.
5. **Reduction in energy content** – (similar to increasing fibre)- Under commercial conditions, quantitative feed restriction is commonly practiced on egg-type pullets mainly because it is easier to practice and the chick-supplier will be providing a readymade chart of the quantity of feed to be offered during the growing period.

Effects of feed restriction

1. Delays onset of sexual maturity (age at which 50% of the birds are producing eggs or average of the age at which each of the birds produces her first egg) from a few days to 3-4 weeks depending on severity of restriction
2. Reduces the body weight of the bird at sexual maturity, usually by reduction in body fat.
3. May lead to certain nutritional deficiency / ies.
4. Although cost of raising a pullet is reduced, the additional time required to reach sexual maturity would nullify such benefits.
5. Generally, livability (or survivability) during egg production improves.
6. Egg production is not generally affected.
7. Egg weight normally improves because of delayed sexual maturity. Egg weight is dependant directly on yolk (yellow part of the egg) weight. Yolk comes directly from ovaries by accumulation over a period of time. Therefore, as age at sexual maturity increases, more yolk material is accumulated thereby weight of yolk increases.
8. In the layer house, birds tend to consume less feed per dozen eggs. This is a matter of habit; the layers are forced to consume less than their maximum during growing period. Therefore, they tend to consume less during laying period as well.

Notes

INTEXT QUESTIONS 7.1

(a) Feeder and drinker space requirement of 1000 growers is and ....., respectively.

(b) Number of circular feeders of diameter 42 cm required for 500 growers is ..... .

(c) Number of bell type drinkers with the diameter 35 cm required for 500 growers is ..... .

(d) Quantitative feed restriction of commercial egg type growers is by offering ..... % of *ad libitum* feeding.

(e) Feed restriction is expected to ..... (increase / decrease) age at sexual maturity, ... (increase / decrease) fat accumulation and ..... (increase / decrease) egg weight.

7.2. BEAK TRIMMING (DEBEAKING)

This is popularly known as debeaking. The term "Debeaking" literally means removal of beaks; but it involves the partial removal of the upper and lower beak. Therefore, "Beak trimming" is a better nomenclature. 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. It is performed by using an electrically heated blade (De-beaker).

WHY BEAK TRIMMING?

You may be wondering as why beak trimming is performed. Following are the reasons:

1. A group of birds (flock) in an enclosure (called "Pen") will develop its own social order (peck order) depending on dominance amongst the birds. For this, they may resort to fighting as well. This may lead to injury, bleeding and cannibalism.

2. Some birds develop some vices (bad habits) like feather pulling, vent (anus) pecking etc. This might again result in bleeding and cannibalism.

3. 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 the process, there will be spillage of feed out of the feeders.

   (b) Qualitative: Birds do establish a peck order within the pen. The stronger birds access feed first and preferentially pick and eat the grains (also a natural instinct) if beaks are not trimmed.

All animals primarily eat to satisfy energy needs. It is well known that the grains are energy-rich but poor in all other nutrients. Therefore, stronger birds will get satisfied with less quantity of grains. Hence, the stronger birds become weaker.

On the other hand, weaker birds, reach the feeders after the stronger ones have left; they will be left with only powdery feed which they can't eat because of sharp beaks. Therefore, they also are subjected to nutrient deficiency and become weaker further.

Consequently, the entire flock shows a poor feed conversion (weight gain per kg feed consumption) and you may be at loss.

If the beaks are trimmed, the birds can't 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.

c. Avoid egg – eating vice in the layer house. Birds are very inquisitive. If by chance few eggs are broken or cracked, when the birds look at them, they peck at broken eggs. On seeing the yolk, they peck again. Once they get the taste of eggs, they start pecking at all the eggs. If the beaks are sharp, the shells may crack and the vice is stimulated. Other birds also follow and the vice spreads through the entire flock.

However, in cages, egg eating vice is not encountered because the eggs roll out of the reach of the birds soon after they are laid.

PRECAUTIONS FOR BEAK TRIMMING

(a) How much to beak trim?

Upper beak should be trimmed 6-7 mm beyond the nostril with 2 sec of burning to block or seal blood vessels; this is referred to as "Cauterization" (Fig 7.1). The lower beak should be trimmed only a few mm from the tip only to blunt its tip. In other words, upper beak is trimmed 2/3 and the lower beak 1/3 from the tip to nostrils.

The rule is, "Leave the Lower beak Longer" which can be remembered as "L L L Rule".

Now the question arises, why lower beak is left longer. Imagine a bird with protruding (long) upper beak. Can it eat or drink? Impossible; therefore, lower beak must be left longer than the upper beak.

(b) Before beak trimming

(1) It should be done during cooler hours of the day or when the temperature outside is reducing. This is to minimize chances of bleeding, especially in the cut portion of the upper beak.

(2) Administering vitamin K through drinking water 2-3 days prior to trimming can be considered as an option. Vitamin helps in blood clotting as during beak trimming there will be bleeding especially in the upper beak.

(3) Birds should not be subjected to stress from housing, vaccination or deworming (medications for getting rid of worms in the intestines) during the week prior to or the week after trimming.

(4) Medicines which will give a bad taste to the feed or water should not be provided.

(5) Sick birds should not be beak-trimmed.

(6) Beak trimming is not performed in combination with vaccinations (except for fowl pox) or moving of birds or medication of birds.

(c) During beak trimming

(1) The operator should hold the bird in such a way that it neither shakes ~~it~~ its head nor suffocates. If the bird shakes its head, one can't trim the beaks at all. In that anxiety, untrained operators are likely to grip the birds tightly; thus, leading to death of birds due to suffocation. In such case, the beak trimming will be successful but the bird will be dead!

(2) The beaks are opened with the help of index finger and the tongue is held back. You will be scared to open the beaks; but remember, birds don't have teeth and therefore they can't bite.

(3) 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 sec while holding to effect proper cauterization. Otherwise, birds start bleeding; other birds get attracted to the color; they start pecking at the bleeding bird; cannibalism sets in.

(4) Lower beak is then cut as per the recommendation.

(5) 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. Normally, if performed properly, cauterization will not be necessary.

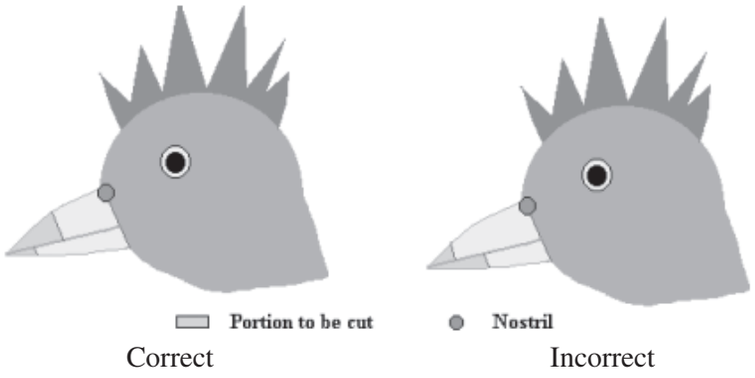


Fig 7.1: Beak trimming – procedure
(L L L rule: Leave Lower beak Longer)

(d) **After beak trimming**

(1) Feeders must be kept full with feed to help birds eat easily; probably this is the only occasion when feeders are full with feed.

(2) Vitamins (B-complex and C) and vitamin K can be given through water to help reduce the stress.

(3) 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/cauterized; otherwise, there is a likelihood of cannibalism.

Caution: Adequate feed depth must be maintained in flocks with long lower beaks. Water must also be maintained at a level that will enable chickens with long lower beaks to drink without difficulty. During periods of high water consumption, it is urgent to increase the water flow so that all birds can drink regardless of their location on the water line.

7.3 DEWORMING

While growing vegetables, you will be regularly removing the weeds. Do you know why? It is to prevent the weeds utilizing the manure provided and obstructing the growth of the desired plant. In the same way, worms (internal parasites), if any, have to be got rid of; the procedure is called "Deworming"

Routine deworming programs are relevant in the control of round worms in most management systems. However, birds in cages are not much exposed to parasite eggs and hence, under practical conditions, they are not wormed. Hence, before transfer of birds to cages from floor rearing, they are advisable to undergo worm treatment; any general deworming agent (fenbendazole, mebendazole, piperazine, Ayurvedic compounds etc) can be used as per manufacturer's recommendations.

Most of such drugs are not palatable (not tasty); hence, birds may be deprived of water for 3 to 6 hrs (depending on weather at that time) before treatment. All drinkers are raised sufficient enough that birds can't access water. Afterwards, they are lowered down to the recommended level (level of the back of birds). Birds quickly drink the medicated water.

After 24 to 48 hrs of medication, by careful observation on the litter appearance of dead/ live worms will indicate that the birds actually had worms. In such case, vitamins, especially A and C are given for 3 days through water to help them recover faster.

Note: same method can be practiced whenever the given medication and or vaccine is not palatable to the birds.

7.4 TRANSFER OF BIRDS TO CAGE LAYER HOUSE

After 16 weeks of age, the pullets will be starting to produce eggs in a couple of weeks or so. Therefore, they are shifted to the Cage Layer House after 16 weeks itself so that they can get accustomed to the new rearing conditions well before they start laying eggs.

Notes

The birds are placed in crates and then shifted to cages. The birds are removed from the crates carefully and placed in cages. All through, care has to be exercised not to injure the birds; especially in the legs and or wings which are held while catching, holding, shifting and transferring.

7.5 CLEANING AND DISINFECTION

(a) Cleaning empty sheds

The following procedures are recommended for a complete housecleaning of floor houses:

(1) Litter should be removed from the poultry house and shifted as far away from the houses as possible, or a minimum of 100 m.

(2) House should be swept thoroughly to clean all floors, lighting fixtures, fan blades, if any. Burnt-out light bulbs replaced and all other bulbs cleaned.

(3) All permanently installed drinkers, feeders, and any other equipment should be scraped, scrubbed, and cleaned. Miscellaneous equipment (brooder guards, jugs, hand feeders) should be removed from the house to permit a thorough job of disinfection. Brooder guards, chick feeders etc. that will be used for the next flock must be soaked, then hand scrubbed and disinfected. GI feeders can be sundried.

(4) The sills of the house should be scraped and cleaned. All material from inside the house and clean up litter, trash, and debris from the outside of the house should be removed.

(5) The ceiling, curtains, walls, feeders, drinkers and other equipment should be thoroughly disinfected with a good disinfectant used at the rate recommended on the label.

(6) Start at the back and work towards the front of the building, spraying the ceiling first, then the walls, and finally the floor.

(7) When the floor is dry, 5 to 8 cm of dry, absorbent litter should be spread.

(8) An approved insecticide should be used on top of the new litter if insects are a problem.

Caution: Insecticides and disinfectants should not be mixed for application.

(b) Disinfection

Disinfection involves the use of a disinfectant that will reduce or kill the pathogens (disease producing microorganisms). Disinfectants are more effective at warmer temperatures. There are several types of disinfectants, and the one chosen should be effective against the disease agent(s) and several commercial preparations are available in the market.

Notes

Table 7.1: Common sanitizers and disinfectants

Compound	As sanitizer	As disinfectant
Iodine or Iodophors or Organic Iodine	Drinking water: 50 to 75 parts per million (ppm or mg per liter)	25 ppm
Chlorines (Bleaching powder (40% active chlorine) is the common compound)	200 ppm	50 ppm
Quaternary ammonia	400 to 500 ppm	200 ppm
Cresols and Cresylic acid		1 liter for 4 to 5 liter oil or 1 liter for 30 liters water; very expensive
Synthetic phenols		1000 ppm; commonly used
Formaldehyde gas fumigation		Commonly used in hatcheries

However, most commonly used are phenols for floor, walls, roof are bleaching powder for water, footbath and buildings. Building and equipment can be fumigated by the formaldehyde gas which is very effective disinfectant.

(c) Formaldehyde fumigation

Formaldehyde fumigation is disinfection by formaldehyde gas and it is employed for disinfecting poultry houses, equipment and other related material, on a regular basis. Formaldehyde (HCHO) is sold commercially as a 40% solution (37% by weight) in water as formalin.

The most popular method of formaldehyde fumigation is to mix the 40% formalin onto potassium permanganate ($KMnO_4$) kept in an earthen pot to liberate the gas.

The reaction is exothermic (heat – producing) and, in fact, the heat generated is useful for the release of the gas. Therefore, the $KMnO_4$ crystals are kept in an earthen pot deep enough to hold the volume several times that of the combined chemicals to avoid the spillage of contents during bubbling and splattering that take place in the process.

The formaldehyde is released instantly and highly irritant to the eyes. Therefore, the doors have to be closed as quickly as possible.

Two parts by volume of formalin to one part by weight of $KMnO_4$ are used. Usually, 40 cc of 40% formalin and 20 g of $KMnO_4$ for every 2.83 m^3 (100 cft) is known as 1X

Notes

concentration. For the same area, if the quantities of the chemicals are doubled, it is called 2X and so on.

For buildings and equipment, a concentration of 3X to 5X is recommended. All windows must be curtained and earthen pots are placed with equal space between them. Formalin is poured quickly from the distant end to the near end of the passage and quickly the door is closed. The time allowed for fumigation is 20 to 30 min. Fumigation should not be done with birds inside the house.

(d) Procedure for restart

The following checklist of procedures should put the house and its equipment back in running order after a cleanout:

1. Make sure that all electrical circuits operate properly.
2. Fill all light sockets with a clean, operative light bulb.
3. Check all water lines for wear, cracks, and leaks.
4. Inspect brooders to ensure they are clean, operative, and accurate.
5. Check the feeding equipment for proper assembly.
6. Operate all equipment to ensure that it runs smoothly and without abnormal noises.

(e) Poultry manure

When the brooder grow house is empty, deep-litter material along with the fecal matter is available. It is converted into good organic manure by the bacteria. This manure can be sold or used as manure if one has his own agricultural land. Manure is considered as a waste; but waste can be defined as a resource in the wrong place. It has nitrogen, phosphorus and potassium (NPK) which are highly essential for plants.

Moisture-free manure (that means dried to remove the 25 to 30% moisture present in deep- litter) has 5.0, 3.9 and 2.4% of N, P and K, respectively.

(f) Quantity of manure produced

It is estimated that each bird consumes about 4½ kg of feed. How much fecal matter do you think each bird might produce? Is it more than / equal to / less than the feed consumed? For your surprise, under ideal conditions, weight of feces produced will be 40% more than the feed consumed! Can you think of the reason for this? Feed has hardly 10% moisture whereas fecal matter has 85% moisture. Out of this 85%, 55 to 60% evaporates; therefore, a good deep-litter will have 25 to 30% moisture. That means, each bird produces about 2.835 kg of manure and with bedding material, about 3 kg manure is produced by a bird till 16 weeks of age. This follows that 1000 birds produce about 3 tonnes of manure.

Notes

INTEXT QUESTIONS 7.2

(a) Beak trimming can minimize ..... and ..... types of feed wastage.

(b) Upper beak is trimmed ..... and lower beak ..... from tip of beak to nostrils so as to leave ..... longer than the .....

(c) Water is withdrawn ..... hours before deworming.

(d) For 3X fumigation, ... of 40% formalin and ..... of $KMnO_4$ are required.

(e) Fecal matter produced by birds is ..... more than the feed consumed and each 500 growers on deep-litter produce about ..... tonnes of manure.

WHAT YOU HAVE LEARNT

Let us recapitulate and enlist salient points we have learnt through this lesson:

- Routine management of growers is just the extension of that during brooding with suitable modifications in floor, feeder and drinker space allowances.
- In addition to routine care of birds, feed restriction, beak trimming and worming are carried out during growing period.
- Commonly practiced feed restriction is quantitative feed restriction as per the recommendations of the chick supplier. It will be generally 7 to 8% less than the feed required for full feeding.
- Feed restriction helps save cost on feeding, cull weak birds early, delay sexual maturity and reduce accumulation of unnecessary fat by the pullets.
- Feed restriction also helps to produce heavier eggs with less feed per dozen eggs.
- Beak trimming is done by an electric beak trimmer during the cooler hours of the day.
- Birds are held securely so that they can't shake their head and at the same time they are not suffocated.
- Upper beak is cut 2/3 and lower beak 1/3 from tip of the beak to the nostrils to leave lower beak longer than the upper beak.
- Birds are dewormed before transferring them to cages.
- Water is withdrawn 3 to 6 hours before giving the medication so that birds drink the medicated water although it may not be palatable.

- When the shed is empty, it must be thoroughly swept, washed and disinfected.
- Feeders and drinkers as well as all other equipment should also be cleaned, washed and disinfected.
- Formaldehyde fumigation at recommended concentration can be practiced for disinfecting house and equipment. Overhead water tank may be disinfected with iodine compounds or bleaching powder.
- Fecal matter produced by birds is 40% more than the feed consumed due mainly to its high moisture content.

TERMINAL EXERCISE

1. What are the advantages of feed restriction of growers?
2. Why birds are beak trimmed?
3. What are the precautions to be taken during beak trimming?
4. What are the recommendations for beak trimming?
5. Write a short note on worming growing birds.
6. List various disinfectants and sanitizers used in cleaning and disinfecting poultry equipment and sheds along with concentrations recommended.
7. Write a brief note on fumigation.
8. Write a short note on manure produced till 16 weeks of age on deep-litter and its manurial value.

ANSWERS TO INTEXT QUESTIONS

7.1

(a) 6000 cm; 2000 cm

(b) 17 to 18

(c) 7 to 8

(d) 92 to 93

(e) Increase; decrease; increase

7.2

(a) Quantitative; qualitative

(b) 2/2; 1/3; lower beak; upper beak

(c) 3 to 6

(d) 120 ml, 60 g

(e) 40%; 1½

Notes

8

MANAGEMENT OF LAYERS

Let us continue from where we left in the previous Lesson "Management of Growers". It is like the seeds which germinated have now become big enough to start producing the vegetable. In the same way, The chicks which now are 16 weeks old and they ready to produce eggs in about 3 or 4 weeks' time. Hence, they need a different managerial approach to make them perform to their best during the laying period. No sooner the pullet lays her first egg than she will be referred to as "Layer".

In this Lesson, we are going to discuss about Management of Layers 17th week and onwards in housed in Layer Cage House.

OBJECTIVES

After reading this lesson, you will be able to:

- take care of routine works regarding layer rearing;
- plan lighting for layers;
- judge layers for production capacity;
- assess performance of layers;
- clean and disinfect cage layer house.

8.1 MANAGEMENT OF LAYERS

During laying period also, the routine works of feeding, offering of water, healthcare and maintenance of records are continued. However, suitable changes are made for birds to be reared in cages.

Let us know each of the above requirements in brief:

Notes

ROUTINE MANAGEMENT

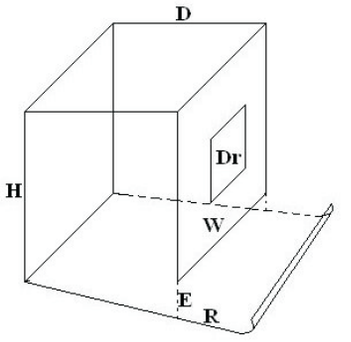
(a) Floor, feeder and drinker space

Laying cages which are most popular are of 3-bird capacity. With the dimensions of 45 cm width × 37.5 cm depth × 40 cm height (18" × 15" × 16") with an inclination in the floor for rolling of eggs and a gap of 7.5 cm (3") in front for the eggs to roll out of the cage (Fig. 8.1).

That means, each bird has 562.5 cm^2 (90 sq inches) of space which is higher than the recommended 255 cm^2 per kg body weight. Layers at the end of production (90 weeks of age) may attain a body weight of 1.8 kg.

Feeding line runs all along the width of the cage parallel to the long axis of the building. Therefore the cages are installed in rows and tiers running parallel to the length of the building with the width facing the passages. Hence, 3 birds get a feeder space of 45 cm (15 cm per bird) which is 1½ the recommended 10 cm per bird.

Regarding drinker space, each cage has a nipple drinker which is sufficient for the 3 birds housed.



W	45.72 cm (18 In)	D	38.10 cm (15 In)
H	40.64 cm (16 In)	E	7.62 cm (3 In)
R	15.24 cm (6 In)	Dr	Door 25 cm x 25 cm (9.8 In x 9.8 In)

Fig. 8.1: Diagram of a 3-bird laying cage

(b) Feeding

The feeder line is same as linear feeders with the only difference in that only one side of the feeder is usable because birds are contained within the cages. Feed is filled only to 1/3 to 1/2 of the depth of feeder and offered at least twice a day at specific time. There is no feed restriction for layers and are offered feed *ad libitum.*

8.2 LIGHTING FOR LAYERS

Light is the most important stimulant for egg production. Hence, special care is essential as far as lighting management in a Layer Cage House.

Notes

8.2.1 Type of bulbs

Incandescent bulbs with flat reflectors are preferred for poultry houses. Why do you think it is so? Why not fluorescent tubes which are far cheaper? Have you noticed the difference between the two types of bulbs? Yes; Incandescent light contains more red color; red color is a better stimulant for egg production. Further, fluorescent light is efficient only when the temperature is around the ideal 21.1°C (70°F).

Why reflectors are required? This is because the birds are in cages located below the light source. Therefore, there is no need of illuminating the roof of the house; instead, it can be reflected downwards so that wattage can be reduced; in turn, power (electricity) consumption can be reduced.

Why flat reflectors are required? This is because the round reflectors create round areas of light and between bulbs, triangular areas of darkness is produced. On the contrary, with the flat reflectors, the entire area is illuminated.

Usually, 40 or 60 W incandescent bulbs are used in layer cage house.

8.2.2 Fixing of bulb and reflector

Bulbs are fixed above the passages only. Why? This is because light is required so that the feed and nipple drinkers are visible and to stimulate egg production through the eyes. If the bulbs are fixed over the cages, only shadow of the cages fall on the birds (eyes). The arrangement of the bulbs in a layer cage house is shown in Fig. 8.2.

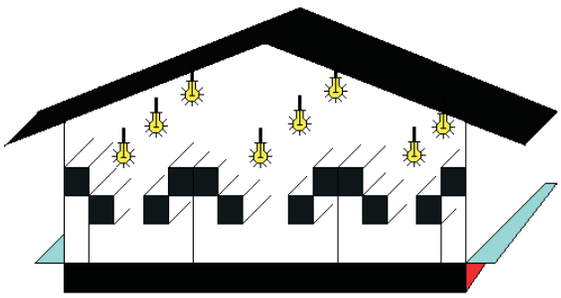


Fig. 8.2: Arrangement of bulbs in a layer cage house

Bulb and reflector are fixed straight from the roof. The bulbs are fixed in such a way that distance between two bulbs in a row is 1½ times the height at which the bulbs are fixed. Bulbs are generally fixed at a height of 2.1 to 2.4 m (7 to 8 ft) height so that it will not obstruct men working inside. Therefore, the distance between two bulbs must be 3.15 to 3.60 m (10.5 to 12.0 ft).

Each of the bulb-reflector assembly is fixed straight from the roof. Can you think of a reason for this? If the bulbs are loose, the assembly will move due to winds or some other reason. It will make the shadows also to move which is likely to frighten the birds resulting in reduced egg production.

The above points are shown in Fig. 8.3.

Notes

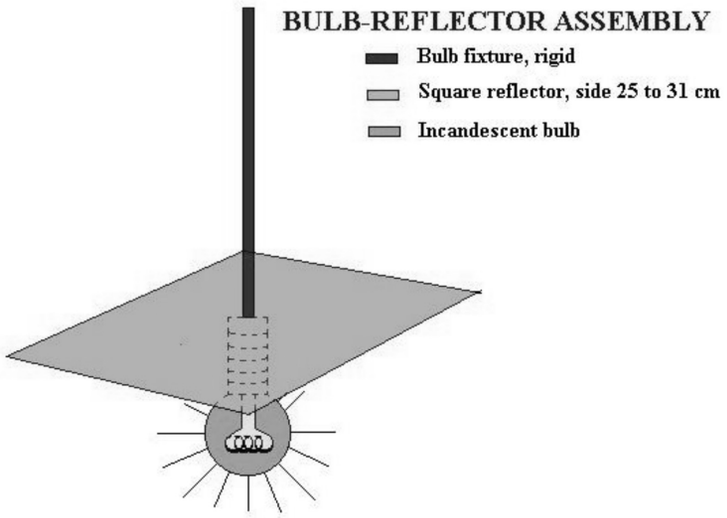


Fig. 8.3: Bulb-reflector assembly

8.2.3 Cleaning of bulbs and reflectors

Cleanliness of the bulb and reflector is also important and clean reflectors, on most occasions, improve the light efficiency by about 50% since they reflect the light that would have been absorbed by the ceiling. Therefore, both bulb and reflectors must be cleaned once a fortnight or more frequently.

8.2.4 Duration of light (Photoperiod)

The total duration of light, including sunlight is referred to as "Photoperiod". A photoperiod of 15½ to 16 hrs is recommended. A sudden change in duration of light and/or feed should not be done and only a gradual change must be made in length of the light day (photoperiod). When the first eggs are laid (about 20 weeks of age), it is advisable to consider the change of lighting program.

The additional light other than the natural daylight may be given either before the sunrise or after sunset or a combination of both; the latter is more convenient as it coincides with normal working schedule. That means 4 am to 6 am and 6 pm to 8 pm. You may install a timer to put on and off the lights at the desired timings.

Hence, under commercial conditions, duration of light is increased by ½ hr per week (from 20^{th} week) till a maximum of 16-17 hr is attained and maintained from then onwards.

A question normally arises; why not 24 hrs light? Layers must never be given continuous (24 hr) light; excess light results in excess feed consumption, fat accumulation, hyperexcitation, cannibalism, prolapse, reduced egg production etc.

Notes

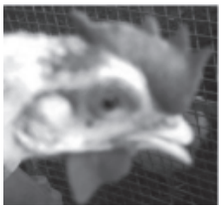
8.3 JUDGING LAYERS FOR PRODUCTION CAPACITY

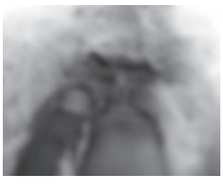
Not all the pullets housed in cages may produce at the same level; some may not be good at egg production. In cages , it is easy to identify such birds because only three birds are housed in each cage. However, it may be required that doubtful birds may be required to be examined to confirm whether they are actually poor layers or not. In such cases, the following description helps differentiate between a non-layer, poor layer and a good layer. Judging layers for current production is undertaken when the birds are 26 to 28 weeks of age.

You may wonder why the birds are not judged at the time of shifting from the brooder house into cage house so that additional handling of birds can be avoided. Nevertheless, 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.

The poor and non-layers identified while judging are removed from house and sold.

Table 8.2. Judging present production

	Good layer	**Poor layer**	**Non-layer**
Comb	Large, red, warm	Small, less warm, shrunken 	Underdeveloped
Reason	A good layer will have more active and well-developed ovary which is responsible for good development of combs and wattles.		
Eyes	Big, bright and active	Comparatively looks smaller and less active	Appears dull and inactive
Reason	Good layers tend to open their eyelids much more than poor-and non-layers in order to receive maximum light stimulus required for egg production.		
Vent	Oblong, moist and pink	Less oblong, maybe moist and pink	Round, dry and has a yellow rim

Reason	When egg is being laid, there will be relaxation of the pubic bones to help passage of egg for egg lay. Since good layers lay frequently, the pubic bones tend to remain relaxed. This relaxation causes the otherwise round vent (cloaca) to become oblong. Added to this, during egg lay, there will be natural secretions lubricate to help passage and laying of egg which makes the vent moist. Pink color is due to loss of pigments from round the vent.Therefore, vent of a laying hen is large, moist, and dilated, and tends to become oblong in shape. In case of non-layers, it will be small, contracted, and dry.		
Distance between two pubic bones	At least three fingers	Less than three fingers 	Maximum one finger
Reason	In case of good layers, due to frequent relaxation of the pubic bones, they become more flexible, thinner and remain separated by a larger distance. In non-layers, the bone will be stout and very hard.		
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
Reason	This is a measure of abdominal capacity. Good layers consume more feed than poor or non-layers and have well developed ovary and oviduct (about 20 times as large as the same organs of a non-productive hen). Hence, there will be some structural change in the skeletal system to accommodate these changes. In addition, due to constant pressure of the organs in abdomen and the weight of egg in the oviduct, the abdominal muscles become flabby in case of good layers.		

Note:

1. One finger is approximately 1¼ to 1½ cm
2. Pubic bones are the bones on either side of vent
3. A non – layer is one that has not at all laid even one egg and a poor layer is that which is producing at a low rate.

INTEXT QUESTIONS 8.1

Notes

(a) Width, depth and height of a 3-bird cage is ....., ... and ....., respectively.

(b) A 3-bird cage provides ..... feeder space per layer and has ..... space for rolling out of egg.

(c) Drinkers in a 3- bird cage house is of ..... type.

(d) Total photoperiod required for layers is .....

(e) Type of bulb preferred in a layer house is ..... which has more of ..... color.

(f) Bulbs have to be provided with a ..... type of reflector of side .....

(g) Bulbs are fixed over the ..... with the ratio of distance between bulbs to that of height of fixing as .....

(h) Bulbs have to be cleaned at least once a .....

(i) Layers are judged at the age of .....

(j) Good layers will have ..... comb, ... eyes and ..... vent.

(k) Non-layers will have ..... comb.

(l) Abdomen of a non-layer will be .....

8.4 ASSESSING THE 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. Of these, 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. Comparing the weekly HDEP and livability records with weekly egg production and livability standards, one can know about the efficiency of his/her farm.

8.4.1 Percent Egg Production

Number of eggs produced can be converted into a percent value based on a) Total pullets transferred to layer cage house; this is called Hen Housed Egg Production (HHEP) or b) Number of birds alive on the day of egg production; this is called Hen Day Egg Production (HDEP). Higher the HHEP or HDEP better is the flock.

Notes

HDEP

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

(B) For a long period = $\frac{\text{Total number of eggs produced over the period}}{\text{Total number of hen days}} \times 100$

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 long period: Similar to hen-housed egg production for one day excepting that the numerator will be the average number of eggs produced per day during the concerned period.

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

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

8.4.2 Feed per Dozen Eggs

From records maintained, this index can be calculated easily as follows:

Feed per Dozen Eggs = 12 × (Feed consumed, kg ÷ Total number of eggs produced). ***Lower the value of this index better is the flock.***

8.4.3 Livability (Survivability)

This is a simple ratio of number of birds surviving to the total birds transferred into the cages times 100. Higher the livability better is the performance of the farm.

8.4.4 Weekly Egg Production and Livability Standards

Table 8.3: 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

Notes

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

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, Standard Livability % = 100 – [0.01 × (Age in weeks – 20)]
4. By definition HHEP = (HDEP × Livability) ÷ 100
5. Weekly egg production per hen = (%HHEP × 7) ÷ 100
6. Generally birds are kept till 72 weeks of age

For example, let us calculate number of eggs produced by 500 hens housed:

Age: 40th week

Expected HDEP: from (chart above) = 93%; Expected 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 can be calculated and cumulative egg production for the given age can be computed.

8.4.5 Other Indices

Other indices which can be practiced are Egg Mass, North's Egg Mass, FCR on Egg Mass, Net Feed Efficiency Index, Egg to Feed Price Ratio, Percent Cracked eggs, Performance Efficiency Index, Stage Break Even Point etc.

8.5 CLEANING AND DISINFECTION

The procedure of cleaning and disinfection of the empty CLH is essentially the same as described in the Lecture "Management of Growers". However, removal of litter is not as easy as in case of BGH. Most of the layer cages are High-Rise or Platform type. In such

Notes

houses, a clear 2 m (6 2/3 ft) will be available under the lowest row of cages; therefore, it facilitates removal of litter.

After cleaning, all the cages should be examined carefully and any repair work needed should be undertaken before disinfection procedures.

In a cage, no litter material is used and hence only fecal matter accumulates under the cages. Such manure has additional uses for biogas (in place of cow dung) production as well. Calculation of amount of manure produced also needs a revisit.

Quantity of manure produced

Each layer, on average, consumes 110 g feed per day. Therefore, in 12 months of production (360 days) totally 110 x 360 = 39,600 g and giving margin to wastage of feed in the routine farm works, each bird consumes 40 kg of feed. As discussed in the lesson "Management of Growers", 40 kg feed results in 56 kg fecal matter (85% moisture) and 25.2 kg (or say 25 kg) of manure (30% moisture) per layer. This manure can be sold or used for biogas production etc.

INTEXT QUESTIONS 8.2

(a) Popular indices for efficiency of layers are ....., ..., ... and .....

(b) 500 Layers in cages consume ..... feed per day and produce about ..... fecal matter which converts into ..... of manure.

(c) Manure from cages can be used as ..... or for .....

WHAT YOU HAVE LEARNT

Let us recapitulate and enlist salient points we have learnt through this lesson:

- Routine management of layers is easier since floor, feeder and drinker space allowances are built-in.
- Most commonly used is 3-bird laying cages.
- Feeder is in the form of a linear feeding line with only one side of the feeder useable.
- Light is an important stimulus for egg production.
- Incandescent light is preferred over fluorescent light because the incandescent light has more red color in it.
- Fluorescent light can be used if the temperature is around 21.1°C (70°F).

Notes

- Bulbs with a flat square reflector of side 25 to 31 cm and are fixed stiff from the roof.
- Bulbs are fixed on the passages of the layer cage house so that the light falls on the feeders and nipple feeders to help stimulate egg production.
- Ratio of distance between two bulbs and the height at which they are fixed is 1½.
- Bulbs and reflectors have to be cleaned at least once a fortnight.
- Totally 15½ to 16 hrs of light (photoperiod) including sunlight is required.
- Assuming 12 hrs of sunlight, balance of 3½ to 4 hrs are provided as 2 hrs before sunrise and 2 hrs after sunset; i.e. 4 am to 6 am and 6 pm to 8 pm.
- Birds can be judged when they are 26 to 28 weeks of age to identify unproductive birds (poor and non-layers).
- Good layers will have well-developed combs and wattles, bright big eyes, oblong, round, moist and pink vent, at least 3 finger space between pubic bones and at least 4 finger space between tip of the breast bone and the pubic bones.
- For assessing efficiency of layers, Percent Hen Housed Egg Production (HHEP), Percent Hen Day Egg Production (HDEP), Feed per Dozen Eggs and Percent Livability are commonly employed.
- Actual HHEP and HDEP can be compared with standard values as another method of estimating the farming efficiency.
- Each layer in cages produces about 25 kg of manure end of laying period.

TERMINAL EXERCISE

1. Draw a diagram of a 3-bird cage and label the parts along with dimensions.
2. Describe the arrangement of bulbs in a layer cage house and support it with a schematic diagram.
3. Why incandescent bulbs are preferred to fluorescent bulbs for layers?
4. Why bulbs are fixed on the platform of the layer cage house?
5. Why bulbs have to be fixed stiff from the roof?
6. Why bulbs need a flat reflector?
7. Compare characteristics of a good and a poor layer.
8. Why vent of a good layer is oblong, moist and pink?
9. Why distance between pubic bones as well as between tip of breast bone and pubic bones increase with soft pliable abdomen in case of a good layer?
10. Calculate the amount of manure expectable from a layer cage house housing 1000 layers.

Notes

ANSWERS TO INTEXT QUESTIONS

8.1

(a) 45 cm, 37.5 cm and 40 cm

(b) 15 cm; 7.5 cm

(c) nipple

(d) 15½ to 16 hrs

(e) incandescent; red

(f) flat; 25 to 31 cm

(g) passage; 1½

(h) fortnight (15 days)

(i) 26 to 28 weeks of age

(j) red, warm, well-developed; big and bright; oblong, moist and pink

(k) underdeveloped

(l) very hard and rubbery

8.2

(a) Hen Day Egg Production, Hen Housed Egg Production, Feed per Dozen Eggs and Livability

(b) 55 kg; 77 kg ; 34.65 kg (about 35 kg)

(c) manure; biogas

Notes

9

POULTRY FEEDING

Feed cost alone constitutes about 65-70% of total cost of production of poultry meat and eggs. Scientific and balanced feeding of poultry is of primary importance to ensure high and continuous production. Since major expenditure in poultry raising is feed cost, economic consideration assumes a vital significance. In the final analysis efficient ration with minimum cost appear to be the principal need of the poultry man. The major nutrient required by poultry is water, protein, carbohydrates, fat, minerals and vitamins. A balanced ration is the one which will supply different nutrients in right proportions according to the requirements for maintenance and various productive functions. The nutrients required by poultry must be supplied in rations through the ingredients available in sufficient quantity economically. Feeding to growing and productive poultry is an important work that is carried out daily at regular interval by trained supporting staff of the poultry farm. In this lesson we will discuss the poultry feed requirements in detail.

OBJECTIVES

After reading this lesson, you will be able to:

- explain the purpose and principles of poultry feeding;
- identify and evaluate the types of feed ingredients;
- explain different methods of poultry feeding;
- formulate balanced rations and feed supplements.

9.1 PURPOSE OF POULTRY FEEDING

Poultry feeding is required for the following reasons:

1. To transfer inedible or less edible products into edible or highly delicious or nutritious food like meat and egg.

Notes

2. To meet the physiological needs of the bird, such as:
   (a) Maintenance
   (b) Heat to produce body temperature
   (c) Energy for action
   (d) Growth
   (e) Reproduction
   (f) Fattening

9.2 PRINCIPLES OF POULTRY FEEDING

The feeding to poultry is dependent on following principles:

1. Birds have no lips and teeth and hence cannot chew the feeds therefore, ration must have mainly concentrates (grains, oil cake, by products).
2. Birds have simple stomach, hence requirements are more precise and specific.
3. Birds have higher rate of metabolism than other farm animals therefore different feed for different class of birds is required as per recommended standards.
4. They are fed in groups.
5. Birds have no sweat glands to cool down their body hence their respiration, pulse rate and body temperature is relatively higher. Consequently their metabolic rate is higher. Accordingly, nutritional adjustments are needed.
6. Feed must be free from Aflatoxins.
7. Clean, fresh and cool water must be made available at all times.
8. Birds are non-ruminants and hence feed must contain not more than 6 to 7 percent of crude fibre.
9. Birds are reared for different purpose (meat, egg etc.) and hence according to purpose, age, breed, size and system of rearing the requirements must be determined with definite ratio of protein and energy.
10. Feed must have all essential nutrients in balanced form.

9.3 TYPES OF FEED INGREDIENTS FOR POULTRY

The type of feed ingredients used in conventional poultry rations usually depends on their availability. Cereals like maize, rice, wheat, oat, barley; cereal by products such as wheat bran or rice polish; and animal and vegetable protein sources like fish meal, soybean oil meal and groundnut cake. The whole ration is fortified with adequate amount of minerals and vitamins. With the cost of feed soaring high and the availability of conventional

Notes

ingredients becoming scarce, intensive and continuous efforts are being made to determine the nutritive value of agro- industrial by products to replace most costly ingredients in rations. The following are some of the feed stuffs used for making poultry rations.

9.3.1 Energy sources

Maize: This is a widely used poultry feed ingredient. It is highly digestible and contains little fibre. It is used as a source of energy and is low in protein, especially lysine and sulphur containing amino-acids. The yellow varieties are good source of vitamin A and xanthophylls. The latter is responsible for the yellow skin in certain breeds of fowl. This will improve the yolk colour.

Barley: Barley is not very palatable because of its high fibre content and should not constitute more than 15% of the ration.

Oat: It should not constitute more than 20% of the ration. Manganese content in it helps in preventing hock disorder, feather pulling and cannibalism.

Wheat: Wheat can replace as a source of energy, but it is very costly.

Wheat bran: It is bulky and quite laxative on account of its high fibre manganese and phosphorus content.

Bajra: This is very useful feedstuff and is similar to wheat in its nutritive value.

Rice: Broken grains of rice can be used for feeding.

Rice polish: This is a very good substitute for cereal grains. It can be used up to 50 percent of the ration. Because of the high oil content, it often becomes rancid on storage.

De-oiled rice polish: Energy content of de-oiled rice polish is low because of the removal of fat, but it is rich in protein and ash content. Its feeding value is lower than of the regular rice polish.

Rice bran: It is used as energy source. Because of high fibre content it can be used only up to 15-20%.

Sorghum: Its feeding value is similar to that of maize, but has higher protein content. It is quite palatable. Sorghum-meal is a good source of some amino acids.

Tapioca meal: Certain varieties contain cyanogenic substances which can be removed during processing of tapioca by sun drying or heating.

Hominy feed: It is the by product obtained during dry milling of maize. This consists of bran germ and part of starchy part of kernels. It resembles maize in composition but is less used due to its high fibre content and lower energy value.

Dried poultry waste: It is high in calcium and phosphorus and contains about 10-12% true protein. If treated properly it can be included in the diet up to 10% without any detrimental effect.

Notes

Fats: Many animal and vegetable fats are used for formulating high energy starter and broiler rations. These include beef tallow, lard mutton fat and many other edible oils. Usually 3-8% is included in the ration. However, the cost of such inclusions vis-a-vis returns should be considered. Since fats are prone to oxidative rancidity, addition of 0.02% antioxidant to the rations will counter cat rancidity.

9.3.2 Protein sources

The protein sources may be classified into those of animal and plant origin. The usefulness of protein feeds depend on their digestibility and the potential to furnish the essential amino acids required by the bird for body growth and production. As a general rule use of two or three protein feedstuffs provides a better assortment of amino acids and other nutrients than a single once.

Vegetable Protein Sources

Groundnut cake

It is quite palatable and is widely used as a source of protein. It contains about 40% protein.

Mustard cake

It is superior to groundnut cake in protein quality and lysine content. However, its use in poultry ration is limited because of glycosides and goitrogens. Even if treated or processed, its use should be limited to 5 percent in chick and not over 10 percent in layer diets.

Soybean meal

Soybean meals contains about 35-40 percent protein and 18-21 percent fat. A suitable heat treatment improves protein quality of the meal. Soybean contain good amount of all essential amino acids.

Sesame meal

It contains about 38 percent protein and can be used in poultry rations.

Sunflower meal

It is superior to groundnut meal in its nutritive value. High fibre content restricts its use in poultry ration.

Cottonseed cake

It is rich in protein content but deficient in lysine. It can substitute groundnut cake upto 15% only. Continuous use of this cake in layers causes yolk mottling on storage of eggs due to gossypol content.

Linseed meal

It is good source of tryptophan. The meals contain the toxic principles cyanogenic glucosids and antipyridoxil factor and can not be used more than 5 percent if not processed. The meal can be rendered non-toxic by boiling.

Notes

Maize gluten meal

These are by products of starch industry and are rich in protein and provitamin A and xanthophylls.

Animal protein sources

Fish meal

Fish meal is one of the best poultry feed stuffs as a source of protein. Most fish meals contain 45-55% protein. The presence of fish scales reduces its feeding value.

Blood meal

Blood collected at slaughter houses is coagulated and dried to produce the meal. Blood meal contains 80 percent protein. It can be included up to 2-3 percent due to unpalatability and low biological value of its protein.

Meat meal

It is usually a slaughter house by-product and is prepared by curing and drying the carcass wastes. It contains 55-65% crude protein content. It can replace fish meal fully in the chick rations. It can be included at 5-10 percent in all poultry rations.

Liver residue meal

It is a by-product of pharmaceutical industry. It can replace all fish meal.

Hatchery by-product meal

This consists of infertile eggs, dead embryos; killed chicks and egg shells collected as wastes during hatchery operations, and have been cooked dried and ground with or without removal of part or its fat. It contains 25-34 percent protein depending upon its ingredients.

Feather meal

It contains 80-85 percent of crude protein and may be used up to 5 percent level in various poultry rations.

Poultry by-product meal

This product is from poultry processing plants. It includes heads, feet etc. It contains 55-60 percent protein.

Bone meal

It is a good source of high quality protein, calcium and phosphorus. This can be included in Poultry feeds at 5-10 percent level.

INTEXT QUESTIONS 9.1

1. Fill in the blanks
   (a) Groundnut cake is widely used as a source of .....
   (b) Blood meal contains ..... protein but can be included only up to 2-3 percent.

Notes

(c) ..... by product of starch industry.

(d) Birds have no ..... and ..... and hence cannot chew the feeds.

(e) Feed cost alone constitutes about .....% of total cost of production of poultry meat and eggs.

2. State True (T) or False (F)

(a) Linseed meal is a good source of lysine.

(b) High protein content of sunflower meal restricts its use in poultry ration.

(c) Cotton seed cake is rich in protein content .

(d) Bone meal is a good source of high quality protein, calcium and phosphorus.

(e) Liver residue meal is a by product of pharmaceutical industry.

9.4 METHODS OF EVALUATING POULTRY FEED STUFFS

1. Appearance

It gives an indication of its feeding value. Products that's off colour or brown instead of their normal colour indicate poor quality of the product. Caked or lumpy material may indicate mouldy or wet product.

2. Odour

This may also help in judging its quality. For example sore smell of molasses indicates the possibilities of toxic nature of the product. Rancid meat meal or fish meal will have a strong pungent odour.

3. Microscopic analysis

You may examine the feed stuff spread out in a thin layer on a white sheet of a paper with the aid of a hand lens. You can detect the amount of fibre or bulk in feed stuff. This method with the help of odour and appearance will give fair guidance in detecting the quality of feed ingredient.

4. Chemical analysis

This includes the determination of proximate principles such as ash, moisture, crude protein, crude fat and crude fibre. This is a better method than all the previous method. However, it is not a completely reliable method since materials may have a good chemical composition but may be poor in biological value.

5. Feeding trials

This is the best measure of value of a feed stuff or ration. It will determine whether it is palatable or not. Tests may be designed to measure its digestibility which is highly desirable, although time consuming.

Notes

Table 9.1. Composition of feed for Broiler and Layer poultry (in% by weight)

Ingredients of feed	Broiler feed (1-6 weeks)	Grower fee d (7-20 weeks)	Layer feed
Yellow maize	25.0	28.0	30.0
Rice polish	26.0	26.0	20.0
Barley or Oat	7.0	7.0	10.0
Wheat bran	7.0	7.0	8.0
Groundnut cake	18.0	16.0	15.0
Maize gluten powder	5.0	5.0	5.0
Fish meal	6.0	5.0	4.0
Meat meal	3.0	3.0	4.0
Bone meal	1.0	1.0	1.0
Calcium	1.5	1.5	2.5
Salt	0.5	0.5	0.5

Table 9.2. Feed requirement for poultry

Age	Feed (gm) per bird
1st week	10-15
2-3rd week	30-50
4-8th week	60- 70
8-20th week	70-90
20 week onwards	110

Table 9.3. Water requirement for poultry

Age	Water requirement per 100 birds/ day (liters)
1-3 week	2-6
3-6 week	7-14
6-10 week	15-20
10-17 week	20-25
18-20 week onwards	25-30
Laying hens	30-35

Notes

9.5 SYSTEM OF POULTRY FEEDING

A well balanced ration improperly fed will not give the most satisfactory results unless proper method is used. Some of the popular methods of feeding poultry are given below:

Free choice system of feeding

This system had been in vague during the older days of poultry keeping. By this method the birds are allowed to have their required individual ingredient kept before them in separate hoppers. This system permits birds to consume ingredient as they wish to balance the ration according to individual needs.

Mash and grain feeding system

This system involves feeding of grain or grain mixture along with balanced mash and is regarded as a slightly better method than the previous. By this one can increase or decrease the protein level as desired. Unless By this method the layers get a mixture of cereal grains as the scratch portion of their diet and a mash made up of ground grains to which protein, mineral and vitamin supplements are added.

Complete mash feeding system (All mash method)

Now a day it is the choice set method of feeding poultry. The mash is fed either dry or wet. Here the texture of dry mash is important and all the ingredients are ground to appropriate particle size mixed in required proportion and fed as a single balanced mixture. This method is desirable for all types of poultry grown under litter and cage system. By this, the birds can not have the opportunity to have selective eating.

In the wet mash system the dry mash is well dampened and wetted with water. This practice involves extra labour. On the other hand, wet mash feeding is reported to improve feed consumption during the hotter months of the year and it reduces feed wastage. It may be impracticable to adopt this system where large flocks to be fed.

Pellet feeding

In this method regular complete mash is first prepared and then rolled into small cylindrical masses called pellets, in a pelleting mill. It is very widely used in western countries. It allows less wastage of feed and does not permit the birds to pick some of the ingredients of their choice and leave others. Lack of dustiness is another advantage of pellet feeding. Improvement in growth rate and feed utilization has also been claimed by some workers. The main drawback of this system is that pellets are expensive. In some cases, cannibalism is also a problem with pellet feeding.

Controlled or restricted feeding

Several types of feed restriction programme can be followed. It is usually followed from 8-20 weeks of age, i.e., during the growing period. Some time sexual maturity of growing pullet is retarded in order to produce larger eggs even during the initial phase of the

Notes

production or to be obtain more eggs during as particular season. The effects of feed restriction of growers may be summarized as follows:

1. Growers fed restrict diets end up with a lower total feed consumption for the rearing and laying phases combined and thus feed costs are relatively reduced.
2. Total feed conversion efficiency for egg production are superior in restricted feed flocks than in bird full fed during the grower phase.
3. Restricted feeding results in higher mortality of chickens during the rearing phase, those these losses are balanced by a decreased mortality in the laying period.
4. Growers fed restricted diets have high peak of egg production as compared to those fed *ad libitum* during the grower phase.

9.6 FORMULATION OF ECONOMIC AND EFFICIENT RATION

Feed formulation

In current situations computers are utilized extensively to formulate least cost poultry ration using linear programming but where such facilities are not available we have to compute the formula by looking into the common poultry feed ingredients available in the locally and their cost. There is no single formula which can be considered best for rapid and efficient growth and egg production. Quality and cost of feed ingredients will greatly affect the formula of economic rations. The objective should be minimum cost. The essential considerations in the formulation of poultry rations are nutritive adequacy and economy. Feed should contain proper proportion of protein, carbohydrates, fats, minerals and vitamins. The best result should be obtained with lowest possible cost.

- Cereals form the principal ingredient of poultry ration feeding a mixture of cereals or their by products instead of any single one is advisable since this may help in making up the deficiency of others and also help in reducing the cost of feed.
- A combination of both animal and vegetable protein should be included to supply adequate balance of amino acids while keeping the cost low.
- Minerals and vitamins should be supplemented in required proportions.
- The feed should contain the necessary bulk to satisfy hunger. Although fibre is poorly utilized a certain amount of it is required in the ration (6-8%).
- During selection of ingredients the digestibility and palatability are of great importance since feed utilization depends upon their factors.

Feed composition tables

Poultry feeds are of following six types-

1. **Broiler Pre-starter:** A ration to be fed to commercial broiler chicks up to the age of 0-10 days.
2. **Broiler starter:** A ration to be fed to commercial broiler chicks up to the age of 11-25 days.

3. **Broiler finisher:** A ration to be fed to commercial broiler chicks from 26 days till marketing.
4. **Chick feed:** A ration to be fed to chicks up to the age of 8 weeks.
5. **Grower feed:** A ration to be fed to growing chicks from 9-20weeks.
6. **Layer feed:** A ration to be fed to laying birds from 20 weeks onwards.
7. **Breeder feed:** A ration to be fed to laying birds maintained for the production of hatching eggs.

Table- 9.5 BIS (ISI) Specification of poultry feed 1992 (Feeding standard)

Characteristics	Broiler Pre-starter	Broiler starter	Broiler finisher	Chick	Grower	Layer	Breeder
Moisture % by wt (max.)	11	11	11	11	11	11	11
Crude protein %	23	22	20	20	16	18	18
Crude fiber % by wt (max.)	6	6	6	7	8	8	8
Acid insoluble ash % by wt (max.)	3	3	3	4	4	4	4
Salt % by wt (max.)	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Calcium % by wt (min.)	1.2	1.2	1.2	1.0	1.0	3.0	3.0
Phosphorus % by wt (min.)	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Lysine % by wt (min.)	1.2	1.2	1.0	0.9	0.6	0.65	0.65
DL-Methionine % by wt (min.)	0.65	0.50	0.35	0.30	0.25	0.30	0.30
Metabolizable energy Kcal/kg (min.)	2800	2900	3000	2600	2500	2600	2600
Manganese mg/kg	90	90	50	55	90	90	90
Iodine mg/kg	1	1	1	1	1	1	1
Iron mg/kg	120	120	90	75	120	120	90
Copper mg/kg	15	12	9	9	12	12	-
Vitamin A IU/kg	6000	6000	6000	8000	6000	6000	8000
Vitamin D_3 IU/kg	600	600	600	1200	600	600	1200

Thiamine mg/kg	6	5	3	5	5	3	-
Riboflavin mg/kg	6	6	5	5	6	6	8
Pantothenic acid mg/kg	15	15	15	5	15	15	15
Nicotinic acid mg/kg	40	40	15	15	40	40	15
Biotin mg/kg	0.3	0.3	0.15	0.15	0.3	0.3	0.15
Vitamin B_{12} mg/kg	0.015	0.015	0.010	0.010	0.015	0.010	-
Zinc mg/kg	50	50	75	60	60	100	-

Having known the essential nutrients and their requirements as well as the common feed ingredient used in poultry feeds and their maximum and minimum limits, ration formulation is a comparatively easier process. For formulating any ration the following information is necessary:

- Type of birds for which the ration is being formulated and their nutrient requirement.
- Composition of feed ingredient.
- Cost of feed ingredient.
- Upper and lower limits of each of the ingredients.
- Feed additive likes minerals, vitamin, coccidiostats, etc.
- Particle size.

Procedure

Mixing their own feed will help to reduce the feed cost for farmers. Before feed mixing procure locally available feed ingredients. The ingredient should be dry of good quality and without any fungal growth. Then compute the ration depending on Bureau of Indian Standard specification. Weigh each feed ingredient and then grind the ingredients separately. Mix the ingredients either by hand or by machine. Add vitamins, minerals or other additives needed during mixing. Then pack the mixed feed, label and store in a dry place.

INTEXT QUESTIONS 9.2

1. Fill in the blanks

   (a) ..... programming is used to formulate least cost poultry ration in computers.

   (b) A ration to be fed to laying birds from ..... week onwards.

Notes

(c) ..... percent level of inclusion of maize in chick feed.

(d) ..... gm feed required for layer after 20 weeks.

(e) The energy requirement for the layer feed is 2600 kcal / kg feed, which is similar to ..... and ..... feed.

2. State True (T) or False (F)

(a) Restricted feeding usually done in laying birds.

(b) Ration to be fed to growing chicks from 4 weeks

(c) Broiler finisher feed contain 20 percent crude protein.

(d) Layer feed contain 8 percent crude fibre.

(e) Mixed feed can be kept for more than two months.

9.7 FEED SUPPLEMENT

The term feed supplement refers to feedstuff that are used to improve the value of feeds. They can be used in small quantities such as minerals, vitamin, feed additive etc.

Feed additive are non nutrients but presence of these substance in the diet may result in higher growth, egg production as well as increased efficiency of feed utilization. Poultry diets formulated to provide all necessary nutrients in proper proportion may also benefit from the addition of these non nutrient additives. Common feed additives used in poultry are antibiotics, coccidiostates, antioxidants and pellet binders etc.

9.8 STORAGE OF FEED

Storing poultry feeds sounds straight forward enough but there are a number of pit falls to watch out for, especially for the newcomer. You will need a well ventilated, cool, dry shed or similar to store it in. To prevent the feed from absorbing moisture, it should not be stored on a cold concrete floor, even if it is a dry floor because it will absorb moisture from condensation. Using a wooden pallet is the preferred method of storing bags of feed but you can improvise using some pieces of wood if you can't get hold of one. This allows air to circulate underneath them and prevents the condensation problem.

The next problem is vermin. Rats and mice will soon eat their way through your precious supplies so if you can, ensure rats cannot get into the storage area and if mice can get in, leave traps set nearby and check them regularly. When setting mouse traps, chocolate is particularly effective and lures mice away from the smell of your poultry feeds. Rat runs and holes should be well baited outside or you should have humane cage traps set and covered over against walls which should keep them away from your feeds. If you want to store 2 or 3 bags, then a good idea is to use a galvanized bins or containers. These are well worth investing in and will prevent rats and mice getting to your food. Rats can chew through wood and plastic but they can't get through galvanized steel.

Notes

Fig. 9.1: Storage of poultry feed

The cheapest option for a bag or two is a plastic waste bin. This will stop mice (the most common problem) so providing you don't have a lot of rats in the area, you should find this a satisfactory solution. For larger quantities that can't be stored in galvanized bins like the 50 bags placed on a concrete floor. Feed is stored on wooden pallets and a gap is left between the bags and the walls of the shed to allow ventilation.

There are metal grills at high level that allow air movement. The shed must be located in the shade so it doesn't heat up too much in the sun or the nutrients in the food will be destroyed.

Storage Time

Finally, keep an eye on the best before dates on the bags of feed. Whilst the feed seems to look alright, many of the nutrients and vitamins will have depleted after the best before date and chick crumbs or growers pellets that may contain added drugs may not be as effective. 3-6 months is the normal length of time you get when buying feed, so make sure you can use the amount you buy before the best before date.

Tips on storing feed

The following guidelines will help to ensure that feed remains fresh, palatable and in optimum condition.

- Store feed in a cool, dry place. Heat and sunlight will dry the feed making it less palatable, and heat combined with moisture from the feed will provide ideal conditions for spoilage.

- Feed sacks that are stored on pallets should have enough room so that air can circulate freely around the sacks. Care should also be taken that the feed sacks are not stacked against walls which will also damage the sack and feed inside.
- Opened feed sacks should be resealed between uses or put into lidded bins. If feed bins are used the bin should always be thoroughly cleaned before it is refilled. Old feed left in the bottom of bins provides the ideal breeding ground for mite.
- The feed room itself should be kept clean and tidy as spilt feed will encourage vermin.
- If you have several sacks of feed make sure you always check the labels and use the oldest feed first. As feed is a perishable product, it is important to use it as soon as possible after purchase.
- The 'best before' date is an indication of the nutritional integrity of the feed, i.e, the vitamin and nutrient feeding value will be at the declared levels. However, it does not provide a guarantee that the feed will still be fit to feed after a period of time. A poorly stored bag of feed can 'go off' in less than a week if stored incorrectly.

INTEXT QUESTIONS 9.3

Fill in the blanks

(a) Feed supplements are used to improve the .....

(b) ..... is the preferred method of storing feed bags.

(c) ..... can be used if 2 or 3 bags are to be stored.

(d) ..... is required to prevent condensation problem in stores.

(e) "....." date is an indication of the nutritional integrity of the feed.

WHAT YOU HAVE LEARNT

Let us recapitulate and enlist salient points we have learnt through this lesson:

- Feed cost alone constitutes about 65-70% of total cost of production of poultry meat and eggs.
- Restricted feeding programme during growing phase is helpful to maintain persistency, increase the production performance during laying and to save the money on feed.
- A balanced ration supplies the different nutrient in right proportion according to the requirement for maintenance and various productive functions.
- The nutrient required must be supplied in ration by ingredient available in sufficient quantity economically.

Notes

- Poultry rations include energy and protein sources and fortified with adequate amount of minerals and vitamins.
- Store feed in a cool, dry place. Heat and sunlight will dry the feed making it less palatable, and heat combined with moisture from the feed will provide ideal conditions for spoilage.

TERMINAL EXERCISE

1. Describe the purpose of poultry feeding.
2. Write the principals of poultry feeding.
2. What are the different types of feed ingredients used for poultry?
3. Write short notes on methods of evaluating the poultry feedstuffs.
4. Describe the systems of poultry feeding.
5. Why poultry feed formulation is required? How it is done?
6. What are the types of poultry feed available?
7. Write short note on
   (i) Feed supplement
   (ii) Storage of feed
8. Explain the guidelines for safe storage of poultry feed.

ANSWERS TO INTEXT QUESTIONS

9.1

1. (a) protein (b) 80 % (c) maize gluten meal (d) lips and teeth (e) 65-70%
2. (a) F (b) F (c) T (d) T (e) T

9.2

1. (a) linear (b) 20 weeks (c) 60 (d) 110 (e) chick, breeder
2. (a) F (b) F (c) T (d) T (e) F

9.3

(a) value of feeds
(b) Wooden pallet
(c) Galavanised bins or containers
(d) Air circulation
(e) "Best before".

Notes

10

POULTRY HEALTH CARE

In the previous lesson, you have learnt about poultry feeding which is one of the most important components of poultry farming. Similarly, maintaining the poultry birds in good health is equally important since it may affect the production and productivity of the birds, which directly affects the economics of the farm. Therefore, due importance should be given to the poultry health care. Generally, diseases are caused by various factors like microbes, parasites, nutrition, management and many other factors. Most of the diseases are caused by microbes like bacteria, virus, fungus and protozoa etc. These organisms are so small that they are not visible to our eyes. They spread rapidly mostly through contact, air, feed and water. Therefore, in order to run the poultry farm in a profitable way, it is essential to follow many biosecurity measures to prevent the occurrence and spread of these diseases. This lesson will introduce you to the most common diseases of poultry and their prevention and control measures.

OBJECTIVES

After reading this lesson, you will be able to:

- differentiate between healthy and sick birds based on signs/ symptoms;
- explain about different diseases and their common signs/ symptoms in poultry birds;
- describe vaccination and deworming;
- discuss about the different methods of delivering medicines/ drugs to birds.

10.1 IDENTIFICATION OF SICK BIRDS

You might have experienced that when you get sick, your activity gets reduced or affected, show less interest in food and water and affects your overall performance. Similarly, when a layer or broiler bird gets sick, it will affect its feed and water intake, which in turn affects the growth and productivity (egg and meat). The birds also show different physical and behavioural signs/ symptoms. It is essential to regularly, observe the birds for both

Notes

physical and behavioural signs for identifying the sick birds. Once the sick birds are identified, they should be removed from the flock to prevent spreading of the disease. The major differences between the healthy and sick birds are tabulated below (Table10.1):

Table 10.1: Difference between healthy and sick poultry birds

Sl. No.	Parameters	Healthy Birds	Sick or Diseased birds
1.	Alertness	Active and alert; highlyresponsive	Dull and less active; less responsive
2.	Feed and water intake	Show interest	Show no or less interest
3.	Behaviour	Move freely	Separate away from the flock or huddle together
4.	Coughing or sneezing or Panting	Absent	Present
5.	Head	Normal and stiff	Bent towards the body
6.	Eyes	Open, bright and clean with no discharge	Closed, cloudy or dull with discharge
7.	Comb and Wallet	Hot, red or pink colour, normal size	Cold, pale or blue or black colour, Swollen
8.	Nostril	Clean, dry and open	Blocked with discharge
9.	Beak	Normal shape, stiff, closed	Twisted or bent, soft and rubbery, open
10.	Skin	Shiny and pink	Dull and yellowish or pale
11.	Feathers	Shiny, clean and fluffy, no ticks/lice/fleas	Ruffled and dirty, ticks/ lice/fleas may be present
12.	Vent or cloaca	Clean with no abnormal discharge	Dirty (soiled) with mucous or bloody discharge
13.	Toes	Straight	Bent or twisted
14.	Droppings	Semi-solid	Green or bright yellow or bloody with diarrhoea

15.	Gait (Movement)	Stiff and erect	Unable to stand or move properly, limping
16.	Egg production	Normal	No or less production
17.	Egg size and shape	Normal size and shape	Small size, abnormal shape
18.	Egg shell	Normal thickness	No shell or thin shell
19.	Body temperature	40.6 to 43.0°C (105 to 109°F)	Above normal
20.	Heart rate	250–300 beats per minute	Above normal
21.	Respiration rate	15–40 breaths/counts per minute	Above normal

It is essential to go around the sheds at least twice in a day, observe the birds carefully without disturbing them and identify the sick birds so that they can be removed from the flock to prevent spreading of diseases.

INTEXT QUESTIONS 10.1

State True or False

(a) Sick birds are highly responsive to stimulus.

(b) Normal heart rate of healthy birds is 90 to 120 beats per minute.

(c) Faeces of healthy birds are semi-solid in nature.

(d) Sick birds separate away from the flock.

10.2 COMMON DISEASES OF POULTRY

Disease mainly refers to discomfort. If a birds is affected by a disease condition, it feels uneasiness and will not be able to perform its normal functions (e.g. egg production) to its full capacity. The most common causes of disease in poultry are microbes (bacteria, virus, fungi and protozoa), parasites, nutrition deficiency and metabolic disorders. Important diseases of poultry, their causes, mode of transmission and common signs are tabulated below (Table 10.2).

Notes

Table 10.2 Important diseases of poultry

Sl. No.	Disease	Birds commonly affected	Mode of transmission	Common signs and symptoms
(A) Bacterial Diseases				
1.	*E. coli* infections	Broilers and layers	Feed, water, litter, hatching eggs	Swelling and infection of the nasal region, watery or yellowish droppings
2.	Infectious Coryza	Broilers and layers	Direct contact, air and contaminated drinking water	Off-feed (show no or less interest in feeding), swelling of face and wattles, nasal discharge, sound while breathing, diarrhoea with bad smell/ odour
3.	Chronic Respiratory Disease (CRD)	Broilers and layers	Contact, air, contaminated equipment, hatching eggs	Decreased feed intake, sound while breathing, discharge from nostril, coughing, sneezing, loss of body weight
4.	Bacillary White Diarrhoea (Pullorum Disease)	Layers, Newly hatched chicks	Hatching eggs; eating of egg and dead birds, wound infection and contaminated feed and water	Weakness, off-feed, huddling together with closed eyes, shrill cry while passing faeces/ droppings (defecating), chalky white diarrhoea in chicks.Depression, off-feed, diarrhoea, dehydration and decreased egg production in adults
5.	Fowl Cholera	Broilers and layers	Contact with contaminated crates, feed, bags, shoes, and other equipment	Fever, gasping, coughing, sneezing, difficulty in breathing, yellow or green diarrhoea, ruffled feathers, lameness and swelling of joints of leg/ wing/comb
(B) Viral Diseases				
6.	Avian Influenza (Bird flu)	Broilers and layers	Direct contact, Air, contact with contaminated equipment and farm staff.	Depression, decreased feed intake, swollen blue combs and wattles, coughing, sneezing, diarrhoea, nervous signs, sudden death and mortality (death) may go up to 100%

7.	Infectious Bursal Disease (Gumboro disease)	Broilers and layers	Water, feed and droppings	Off-feed, depression, dehydration, shivering, ruffled feathers, whitish or watery diarrhoea, and pecking of vent/anus
8.	Ranikhet Disease (Newcastle disease)	Broilers and layers	Air, feed and water, Direct or indirect contact	Difficulty in breathing, Sneezing, gasping, nasal discharge, Greenish diarrhoea, twisting of neck, paralysis of legs/wings and sudden death within 4 to 8 days
9.	Egg Drop Syndrome (EDS 76)	Layers	Hatchery	Loss of colour in coloured eggs, thin and soft shelled eggs or shell less eggs, sudden drop in egg production, small eggs and eggs with poor interior quality
10.	Fowl Pox	Layers	Injured or broken skin	Wart like pox lesions/ swellings on the head and non-feathered regions like legs, feet, eyelids, comb, wattles and vent, coryza-like signs are also noticed
11.	Marek's Disease	Broilers and layers	Air, direct or indirect contact	Enlargement of internal organs, paralysis of legs, skin lesions
12.	Infectious Bronchitis (IB)	Layers	Air, direct or indirect contact	Severe reduction in growth, decreased feed consumption, Respiratory discomfort like gasping, coughing, sneezing, tracheal rales and nasal discharge in chicks. Respiratory symptoms, reduced egg production, especially towards the latter part of the egg production, production of soft-shelled, misshapen or rough shelled eggs in adults

Notes

13)	Lymphoid Leucosis	Layers	Direct or indirect contact, through hatching eggs	Off-feed, pale and bluish combs, loss of body condition, enlarged abdomen and internal organs, nervous sign, watery droppings.
C. Fungal Diseases				
14)	Aflatoxicosis	Broilers and layers	Feed with toxins	Reduced growth and sudden death
15)	Brooder Pneumonia	Layer	Air, Direct or indirect contact	Off-feed, gasping or coughing and rapid loss of body weight
D. Parasitic/Protozoal Disease				
16)	Coccidiosis	Broilers and layers	Feed and water	Birds become pale, dull, move away from the flock to a corner, sleeping while standing, bloody droppings, ruffled feathers, poor growth, reduced egg production and loss of body condition
E. Management Related Diseases				
17)	Leg Disorders	Broilers	Various causes	Bending of legs, impaired walking or refusal to walk
18)	Breast Blisters	Broilers and layers	Poor feathering, hard flooring, increased sitting	Nodule like swelling (blisters) in the breast region
19)	Cage Layer Fatigue	Layer	Rearing in cages	Inability to stand, Thinning of long bones, easy breaking of bones

Notes

INTEXT QUESTIONS 10.2

Identify the disease based on signs/symptoms given below:

(a) Chalky white diarrhoea

(b) Pecking of vent or anus

(c) Thin or soft-shelled eggs or shell-less eggs, sudden drop in egg production in layers

d) Tracheal rales and nasal discharge in chicks

e) Bloody droppings, ruffled feathers, sleeping while standing

10.3. DEWORMING AND VACCINATION

Deworming and vaccination are two important precautionary control measures to be followed in a poultry farm in order to maintain the birds in a healthy and disease free condition.

(a) ***Deworming:*** Parasites particularly the worms also cause huge economic loss to the poultry farmers. These worms once enter the body of the birds through contaminated feed and water will affect the health of the birds and there by resulting in poor growth rate and decreased feed consumption & productivity and sometimes cause mortality (death). Therefore, it is important to prevent the occurrence of worm infestation in birds. Worm infestation can be prevented by deworming the birds regularly. Deworming is the process of administering/ giving an anti parasitic drug to the birds in order to eliminate or prevent the worm infestation.

(b) ***Vaccination:*** For making the poultry farm profitable, it is advisable to follow a famous saying "Prevention is better than cure". It is always economical to prevent the occurrence of disease rather than treating the diseased birds. Disease can be prevented by many ways. The most important and economical ways of preventing some of the deadly diseases like Raniket's disease or Gumboro disease is by administering vaccines. Vaccines are preparations when administered/ given to the birds at an appropriate time and dose (quantity) will help in preventing the occurrence of that particular disease. Vaccines act by stimulating the bird's body immune system. Therefore, even if the vaccine bird is exposed to the disease causing organisms, the immune system developed due to vaccine will help the bird to protect itself from the disease.

Vaccination in Broilers:

Broilers are reared only for about 35 to 42 days of age and vaccinated against the diseases prevalent in area of poultry farm. Generally, broilers are vaccinated against only 2-3 important diseases as tabulated below (Table 10.3):

Notes

Table 10.3: Vaccination Schedule in Broilers

Sl. No.	Name of disease	Age at 1st vaccination	Booster doses	Doses of vaccine	Route of vaccination
1	Marek's disease (In Hatchery)	1st day		0.2 ml (Using sterile ½ inch needle of 20-22 gauge)	Used as Hatchery Vaccination. Nasal or Subcutaneous route in the lower neck region
2	Newcastle or Ranikhet Disease (Lasota/ F1 strain)	5-7th day		1-2 drop	Ocular or Nasal
3	Infectious Bronchitis (If needed than vaccination along with Above vaccine)				Ocular or Nasal
4	HPS vaccine (Hydro pericardium syndrome or leetchi disease)	7th day		0.2 ml	Subcutaneous
5	Gumboro/ IBD	14-16th day	4th Week	1-2 drop	Oral drop/ Intraocular/ Drinking water
6	Ranikhet (Lasota)	28-30th day		1-2 drop	Intraocular

Vaccination in Layers:

The layers are reared till they are of 72 weeks of age. Therefore, they require vaccination against many vaccines and in repeated doses as tabulated below (Table 4):

Table 10.4 Vaccination schedule in layers

Age of the bird	Disease	Route
1st day	Marek's disease	Used as Hatchery Vaccination. Nasal or Subcutaneous route in the lower neck region
5th- 7th day	Ranikhet Disease	Ocular or Nasal
10th day	Infectious Bronchitis	Water
14th day	Infectious Bursal Disease	Ocular or nasal
24th day	Infectious Bursal Disease	Ocular or nasal or water
28th- 30th day	Ranikhet Disease + Infectious Bronchitis	Ocular or nasal or water
5th- 6th week	Coryza*	Sub-cutaneous injection (Neck)
7th week	Fowl pox	Sub-cutaneous injection (wing stab)
9th- 10th week	Ranikhet Disease	Sub-cutaneous injection (wing web)
12th week	Infectious Bronchitis	Ocular or nasal or water
13th- 14th week	Infectious Coryza*	Sub-cutaneous injection (Neck)
17th week	Ranikhet Disease	Sub-cutaneous injection (Neck)
Layer House	Ranikhet Disease	Every 3 months - drinking water
*Not compulsory (Optional) Ocular: A drop into the eye Nasal: A drop into the nostril S/c: Below the skin		

Precautions to be followed before, during and after vaccination:

- Vaccine should be purchased only from a reliable source.
- Batch numbers, date of manufacture/expiry date and supplier's details should be recorded properly for future reference.
- Expired vaccines should neither be purchased nor used.
- Store the vaccine at the temperature of 2-8ºC; they should neither be frozen nor kept above 8ºC.
- Vaccine should not be exposed directly to sunshine or extreme weather conditions.
- Vaccination should be carried out during cooler part of the day.
- All healthy birds should be vaccinated. Sick birds should not be vaccinated.

Notes

- While administering water-based vaccines, water should be withdrawn for 2-3 hours before administering the vaccine.
- Adequate drinker space should be provided.
- Vaccine should be administeredas per the instructions/recommendations of the manufacturer.
- When a vaccine vial is opened, complete contents should be used at once. The vaccine should be opened and mixed just before administering the vaccine.
- The vaccinating equipment must be sterilized. Chemical disinfectants should not be used for sterilization as it will affect the effectiveness of the vaccine.
- Premixed vaccine should be carried in a flask filled with ice water and should be used as quickly as possible; preferably, within two to three hours.
- Empty vials, left-over vaccines and other material containing the vaccine must be burnt and destroyed properly.

INTEXT QUESTIONS 10.3

Fill in the blanks

(a) Vaccines should be stored at .....ºC.

(b) ..... birds should not be vaccinated.

(c) ..... are preparations when administered to the birds will stimulate immune response.

(d) ..... types of birds need to be vaccinated against only 2-3 important diseases.

10.4 DELIVERY MEDICINES/DRUGS FOR TREATMENT OF DISEASES

Medicines/drugs for the treatment and control of diseases can be given to birds in different ways. The method of administration of medicine/drug/vaccine depends on the type and severity of the disease, age or condition of the birds, type of drug/vaccine, etc. The different techniques employed for administering medicine to chicken are described below:

(a) Oral: In this method, medicines aregiven to birds through mouth. It includes administration of drugs/medicines in feed and water. Only few drugs/medicines like mineral/vitamin supplements, growth promoters, antibiotics for preventing the occurrence of disease etc. are given by this method.

(b) Nasal: Here, medicines are given to birds through nostril in the form of droplets or spray using a dropper. Few vaccines are administered by this method.

Notes

(c) Ocular: In this method, medicines aregiven to birdsinto the eyes in the form of eye drops using a dropper. Some of the vaccines are administered through this method.

(d) Injection: Medicines/drugs/vaccinesare administered directly into the body of the birds either into the muscles (intramuscular), under the skin (subcutaneous) or in the webbing of the wing (wing web) in this method. **Administration of medicines through injection method should be done only by a qualified veterinary practitioner.** Always check for the manufacturer's instruction in the medicine/vaccine vial especially regarding the mode of injection.

- ***Intramuscular:*** In intramuscular injection, the medicine/vaccineis injected into the muscles located in the neck or thigh region.
- ***Subcutaneous:*** In this method, medicine/vaccineis deposited in the layer between skin and muscle. Mostly vaccines are administeredby this method.
- ***Wingweb:*** Here, medicine/vaccineis deposited in the webbing of the wing. Few vaccines are administeredby this method.

NOTE:

- Do not treat the birds yourself. It is always advisable to follow the instructions of the registered veterinary practitioner with respect to the administration of drugs/medicines and vaccines.
- It is important to note that the method of administration of drugs/medicines and vaccines should be strictly followed as per the method and instructions suggested by the manufacturer of the medicine or registered veterinarian.
- Changes in the method of administration of drugs/vaccines will not yield the desirable effects/results and may sometimeseven cause serious consequences or even lead to death of the bird(s).

INTEXT QUESTIONS 10.4

Fill in the blanks

(a) By oral route, medicines/drugs are administered through .....

(b) By nasal route, medicines/drugs are administeredinto the .....

(c) By ocular route, medicines/drugs are administeredinto the .....

WHAT YOU HAVE LEARNT

Let us recapitulate and enlist salient points we have learnt through this lesson:

- Maintaining the poultry birds in good shape and health is equally important since it may affect the production and productivity of the birds.

Notes

- Generally, diseases are caused by various factors like microbes, parasites, nutrition, management and many other factors.
- It is essential to follow many biosecurity measures to prevent the occurrence and spread of these diseases.
- When a bird gets sick, it will affect its feed and water intake, growth and productivity (egg and meat).
- The sick birds show different physical and behavioural signs/symptoms. The most common diseases affecting chicken are *E. coli* infections, Infectious Coryza, CRD, Pullorum disease, Fowl cholera, Bird flu, IBD, IB, Ranikhet disease, EDS76, Fowl pox, Marek's disease, Aflatoxicosis, coccidiosis, other nutritional diseases and metabolic disorders.
- The most common methods of preventing diseases and parasitic infestation are vaccination and deworming respectively.
- The most common route for delivering medicines/drugs/vaccines in chicken is by feed and water (oral), nasal, ocular and by injection.

TERMINAL EXERCISE

1. Differentiate between healthy and sick birds with respect to the following parameters:
   - Feed and water intake
   - Feathers
   - Gait (movement)
   - Egg size, shape, shell and production
2. Enlist the common bacterial diseases affecting chicken.
3. Give the common signs/symptoms of
   - Newcastle disease
   - Infectious bronchitis
   - Aflatoxicosis
   - Coccidiosis
4. Differentiate between Vaccination and deworming.
5. Write down the vaccination schedule in broilers.
6. Give the vaccination schedule in layers.
7. What are the precautions to be followed before, during and after vaccination in chicken?

8. List any three parameters/factors on which the method of administering medicines/ drugs depends on.

9. Which is the best method of administering medicines/drugs like mineral/vitamin supplements and why?

ANSWERS TO INTEXT QUESTIONS

10.1

(a) False (b) False (c) True (d) True

10.2

(a) Bacillary White Diarrhoea (Pullorum disease)

(b) Infectious Bursal Disease (Gumboro disease)

(c) Egg Drop Syndrome (EDS 76)

(d) Infectious bronchitis

(e) Coccidisosis

10.3

(a) 2-8ºC (b) Sick (c) Vaccines (d) Broilers

10.4

(a) Feed and water (b) Nostril (c) Eye

11

HARVEST AND TRANSPORTATION

With increasing urbanization, eggs and live birds needs to be packed and transported in good condition to distant places and distributed through retail outlets to consumers. Though we think that, it is very simple and easy to transport eggs and live poultry birds, you should keep in mind that these live birds are very sensitive and the eggs are easily breakable and spoil quickly if not stored and transported properly. Hence, they should be handled, packed, stored and transported properly. You will be surprised to know that, only 10 % eggs and 30% meat are sold as processed product in our country and the remaining are sold without further processing. Therefore, the predominant modes of disposal of chicken in the market are by sale of live bird at the farm and slaughter at retail poultry meat shops. The tasks involved in marketing of eggs include collecting; sorting and grading; packaging on farm or transporting to a grading, packaging and processing plant; storing; moving through wholesale and retail channels; and selling directly or indirectly to consumers. (Fig.11.1).

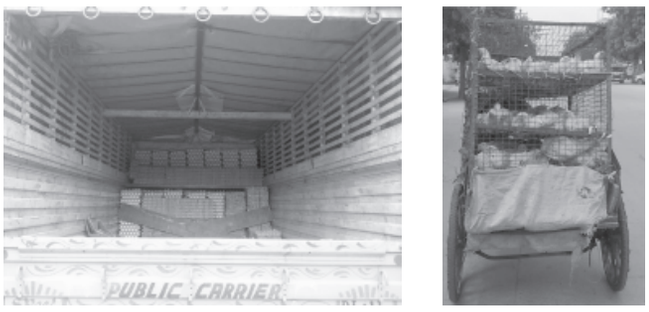


Fig. 11.1: Transportation of egg and live birds

OBJECTIVES

After reading this lesson, you will be able to:

- collect, handle, pack and store eggs before transportation;
- describe the modes of transportation of eggs and live birds;
- take precautions while transportation eggs and live birds.

Notes

11.1 HARVESTING AND POST-HARVESTING OF EGGS

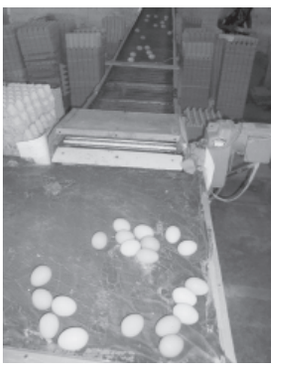
Though, management of laying birds like feeding, care and management etc. are very important activities in a layer farm, harvesting (collection of eggs) and post-harvest activities like handling, storage, packaging and transportation of eggs are equally important for the overall economics of the farm. This section will deal with the egg harvesting and post-harvest activities in a layer farm.

11.1.1. Collection and Handling of eggs

Collection of eggs is one of the major activities in a layer farm since, eggs are the major end product. Since eggs are fragile in nature and can break easily with slight application of pressure, it is necessary to know how to handle eggs during its collection, sorting/ grading, storage, packaging and transportation. The points to be kept in mind during collection and handling of eggs are as follows:

- ***Method of collection:*** In case of small to medium sized layer farms, eggs are generally collected manually (by hand). However, in large layer farms, it is suggested to use automatic egg collection equipment (Fig.11.2) in order to save time, cost and labour.

Manual egg collection



Automatic egg collection equipment

Fig. 11.2: Methods of egg collection

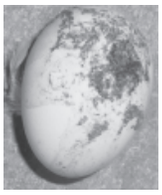
- ***Frequency of eggs:*** Eggs should be collected twice in a day. Eggs are generally collected in the morning and afternoon. Care should be taken to maintain a time schedule for collection of eggs in order to save time and labour.

- ***Equipment/tools/utensil:*** Always collect eggs in an easy to clean and disinfect containers like coated wire baskets or plastic containers. Avoid using metal containers as they are difficult to clean and there are chances of staining eggs from rusted metal and contamination from other materials. Eggs can also be collected directly into the plastic or wood pulp egg filler flats/trays.

  The person collecting eggs should be clean, healthy and in hygienic conditions.

- **Collection:** Collect clean, hygienic and unbroken eggs (Fig. 11.3) separately. Dirty, soiled (Fig.11.3) and broken eggs should be collected separately to avoid cross-contamination.

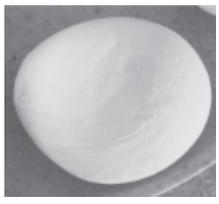
Clean, hygienic and unbroken egg



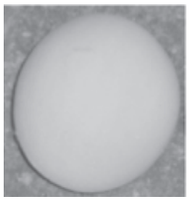
Dirty and soiled egg

Fig. 11.3: Clean and Dirty egg

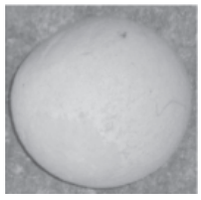
- Defective (Thin shelled, mis-shapen etc.) or broken/cracked eggs (Fig. 11.4) should not be stored and should be discarded immediately.



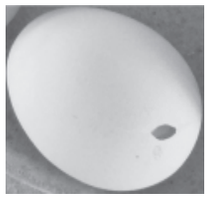
Mis-shapen eggs



Thin-shelled egg



Shell-less egg



Cracked eggs

Fig. 11.4: Defective and broken eggs

- ***Handling eggs:*** Eggs should be handled gently, and very carefully while collecting from the laying cages or from the Nest-box or floor of layer house.
- ***Egg cleaning:*** Eggs which are clean fetch better prices. Therefore, any feather or dirt sticking to the egg should be removed gently without damaging egg coating. It is not advisable to wash the dirty eggs as it will remove natural protective coating and may help in the entry of harmful microbes into the egg through tiny pores present in the egg shell. Excessively dirty eggs should not be cleaned and must be discarded immediately to prevent cross-contamination.

11.1.2. Sorting and Grading of Eggs

Different size and weight eggs fetch different prices. Therefore, eggs should be sorted and graded before marketing to get better price.

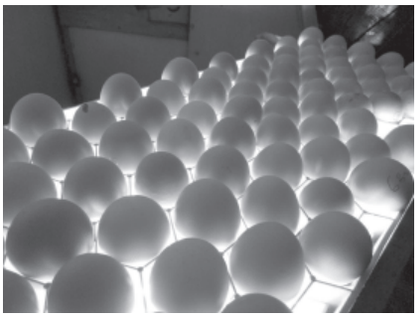
(a) ***Sorting:*** It is a common practice to sort eggs before storing or selling. Eggs can be manually sorted based on the size or weight.

(b) ***Grading:*** Eggs should be graded before packaging or storage based on weight, shell colour & thickness, and interior egg quality (Table 11.1). Commercially, grading of egg is an important step to assess the quality of product for fetching best price and shelf life (storage stability). Grading is universally accepted and considered useful in marketing of any product. Normally, larger eggs fetch better price than smaller eggs. Similarly, dark yellow coloured yolk is always preferable than the dull or light yellow coloured yolk. Brown egg shells are preferred over white colour.

The best and easiest way of grading eggs is by candling using a candler (Fig.11.5). Candler is a small electric tool which produces a beam of light which when passed through

the egg in dark environment helps to get an idea about the internal quality of eggs without breaking open. It is used to remove defective eggs by easy identification of cracks in the shell and other defects like blood spots, meat spots etc. inside the egg.

Individual egg candler



Mass egg Candler

Fig. 11.5: Candling of eggs for grading

Table 11.1: Egg grades based on weight and quality (AGMARK)

Grade	Weight of one egg (g)	Shell	Air Cell	White	Yolk
A- Extra Large	60 and above	Normal, Clean, unbroken with sound shape	Up to 4 mm in depth, regular or better	Clear, reasonably firm	Fairly well-centred, free from defects, outline clear
A- Large	53-59				
A-Medium	45-52				
A- Small	38-44				
B- Extra Large	60 and above	Slightly abnormal, Clean to moderately stained with sound shape	8 mm in depth, may be free and slightly bubbly	Clear, may be slightly weak	May be slightly off-centred, outline slightly visible
B- Large	53-59				
B – Medium	45-52				
B – Small	38-44				

Source: **AGMARK**

INTEXT QUESTIONS 11.1

Fill in the blanks

(a) Eggs are generally collected ..... in small and medium sized layer farms.

(b) Eggs should be collected ..... (frequency) in a day.

(c) ..... eggs should not be stored and should be discarded immediately.

(d) Eggs can be manually sorted based on the .....

(e) The best and easiest way of grading eggs is by .....

Notes

11.1.3 Packaging of Eggs

Proper packing maintains the quality of the product while helping in handling of the product by the consumer. Packing of eggs depends on the design and materials used as:

(1) **Basket:** Transporting to short distances, eggs can be packed in a simple basket. However, its major disadvantage is the damage to eggs since it does not contain any cushioning material such as straw. The risk of shell damage can be easily prevented to a greater extent by packing eggs in a basket cushioned with clean and odourless rice husks, wheat chaff or chopped straw.

(2) **Filler flats/ trays:** The most common method of packing eggs practised in our country is using filler flats. They may be made up of wood pulp, cardboard or plastic mould (Fig.11.6). However, plastic egg filler flats are advantageous as they are reusable and easily washable.

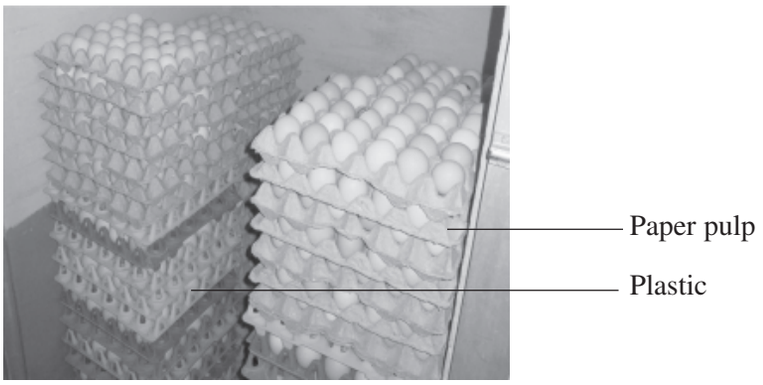


Fig. 11.6: Egg filler flats/Trays

One egg filler-flat can accommodate 30 eggs (Fig.11.7). Usually, filler flats are used for primary packaging and then placed in boxes or cases.

Fig. 11.7: Thirty eggs in one filler flat

Fig. 11.8: Consumer utility packs

- **Card board box:** Ten egg filler-flats can be kept in one card board box and packed nicely with paper packing, saw dust, dry leaves etc.
- **Paperboard:** For retail sale, smaller number of eggs (six to twelve) can be packed in small consumer utility packs (Fig.11.8) made of paperboard or moulded wood pulp so that they are easy to carry. Now-a-days, eggs are packed in small paperboard cases covered with plastic film.

Notes

Take following precautions while packing the eggs:

- Only sound, clean and dry containers free from any undesirable smell and insect infestation or fungal contamination should be used.
- The boxes or cartons should be properly labelled "Eggs Handle with Care".
- The basic information like size, weight, quality/grade description of egg, how to store them and the expiry date should be clearly mentioned on the pack.
- The container may be marked with proper instructions, if any, so that the persons may follow these instructions while loading these products on different mode of transportation.

11.1.4 Storage of Eggs

The production of eggs and meat is not throughout the country. About 60% of total poultry production is from the top five poultry egg or meat producing states *viz.* Andhra Pradesh, Haryana, Maharashtra, Punjab and Tamil Nadu. However, these states together accounts to about 30% of total human population. Therefore, the surplus production of perishable products like eggs certainly needs some holding time in the store house for their disposal or consumption. Refrigeration is the best option for storage of eggs for longer periods. The following points should be kept in mind while storing eggs:

- At farm level, after collection, the eggs should be shifted to holding room maintained at a temperature of about 15°C and 70-80% relative humidity for at least 12 hours before shifting to cold store.
- In the cold storage, egg storage area should be cleaned and dried before arrival of eggs.
- The storage room must be free from tainting products/materials and should be cleaned regularly with odourless detergent/sanitizers.
- The storage area should have adequate power back up.
- The temperature of cold store should be maintained at 4°C and relative humidity between 80-85 per cent.
- In order to maintain the quality of the eggs and to prevent spoilage, it is recommended to maintain proper air circulation in the cold store.
- The eggs placed in cold store should be clean; they must not be washed or made wet.
- Eggs should be stored with the broad end pointing upwards. The quality of shell eggs can be maintained for about 6 months in a cold storage.
- First-in-first-out (FIFO) strategy should be strictly practised so that the oldest eggs are sold first.

Precautions: As eggs have the tendency to absorb odour easily, never store eggs with materials that have distinct odours. Otherwise, the eggs will pick up the odours of apples, fish, onions, potatoes and other food or chemicals with distinct odours.

11.1.5 Transportation of Eggs

Most of the eggs are produced in rural or semi-urban areas, whereas, the consumers are concentrated largely in urban areas. Therefore, the eggs have to be moved from the point of production to the point of consumption. This situation demands use of different modes of transportation. Small quantities can be transported either on head-load, bi/tri-cycles, rickshaws, thelas, tangas, bullock carts (in villages or small towns) etc. However, tractor-trolleys, small vans, trucks, buses, rails, ships and aeroplanes are used for transportation of the major bulk of eggs.

In India, eggs are still transported in open condition and in un-refrigerated vehicles (Fig.11.9). The entire chain of distribution and physical handling up to the consumer is in open climate exposing eggs to varying temperatures during different seasons. Shelf life of eggs is therefore restricted to 11-14 days in summer and 18-20 days in winter. Hence, eggs should be transported in refrigerated vehicles so that their quality does not deteriorate due to high environmental temperatures.

Fig. 11.9: Eggs transported through unrefrigerated truck

It is essential to meet the following three requirements for successful transportation of eggs:

(i) Eggs must be well protected against mechanical damage by choosing the right container and packaging material.

(ii) Care should be taken at all stages of handling, storage and transport. Since eggs are delicate objects, workers handling eggs should be taught about the importance and need for careful handling of eggs. It is essential to have provision for convenient loading platforms at packing stations, loading depots and railing stations, and handling aids, such as hand trucks and lifts.

(iii) Eggs must be protected against exposure to extreme weather conditions as it may deteriorate the quality as well as may cause contamination.

Notes

Do's and Don'ts during transportation of eggs

- While transporting eggs through bicycles, a device such as a special carrier suspended on springs should be used.
- Clean and disinfect all transport -equipment prior to any egg transport, to avoid contamination.
- While loading the egg boxes or cartons in the vehicle for transportation, utmost care should be taken to lift them with gentle handling.
- Adjust vehicle temperature to that of the storage rooms of all supplying farms.
- Avoid sudden temperature changes during loading and unloading.
- Ensure constant and uniform temperature (1 to 4°C) and humidity (80-85%) during transportation.
- Avoid unnecessary delays.
- Avoid shocks and jolts during loading and transport. Use trucks with good suspension and trolleys with shock absorbing wheels. Especially where roads are bad.
- Care is needed to avoid excessive shaking, especially where roads are bad. Egg containers should be stacked tightly and tied down securely to minimize movement. Covers should be used to protect them from the extreme environmental conditions (hot, rain and cold) and adequately support eggs in well designed trays without sharp edges.
- Do not use sloppy trays and avoid overstacking.
- Always transport eggs with small end down, to avoid loose air cells.
- Use temperature loggers during -transport to record any temperature fluctuations.

INTEXT QUESTIONS 11.2

Fill in the blanks

a) The most common method of packing eggs practised in our country is .....

b) One egg filler-flat can accommodate ..... eggs.

c) The temperature of cold store should be maintained at ..... °C.

d) Eggs should be stored with the ..... end pointing upwards.

e) Eggs should be transported in ..... vehicles so that their quality does not deteriorate due to high environmental temperatures.

11.2 HANDLING AND TRANSPORTATION OF LIVE BIRDS

Once the broiler birds attain marketable age (6-8 weeks), they should be properly identified, handled, caught, shifted to crates and transported to the market.

Notes

11.2.1 Identifying fit birds

Only fit birds should be marketed. If the sick birds are sold, it may affect the safety of the consumer. Therefore, only healthy and fit birds should be identified and sold. In a flock of broiler birds which has attained marketable age, it is easy to visually identify healthy and unhealthy birds. Healthy birds will be active and alert, move freely and swiftly, consume feed and water normally. Whereas, sick birds will be dull, move away from the group to corners or huddle together, show no or less interest in feed and water, show discharge from eyes/nose etc., produce abnormal sounds, showing abnormal postures and behaviour.

11.2.2 Handling of live birds

The handling of live birds starts from the production centre (poultry farm) to the point of consumer through the market channels. Handling of birds properly will prevent stress to the birds. Birds selected for slaughter should be procured during the cooler part of the day and transported in crates, preferably plastic crates (Fig. 11.10) so that they may not cause any injury or bruises unlike metallic crates. The overcrowding or overloading of birds should be avoided to a maximum extent; otherwise the breast blister is a very common problem and this may downgrade the carcass.

Fig. 11.10: Crate for carrying live birds

11.2.3 Catching and shifting to crates

For catching a bird from a flock in deep litter system, catching mesh and catching hook can be used. During catching, birds are moved to a corner of the shed, and the catching mesh is spread leaving as much space as possible all round so that the birds cannot escape. The birds are then caught using catching hook or by grabbing the legs with fingers. While catching the birds, handle the bird gently to avoid stress and injury. Heavy broiler birds should be held by grabbing the two legs by both the hands. The light birds should be held by one hand by keeping the abdomen of the bird on the palm of one hand and grabbing two legs of bird in between fingers.

Notes

11.2.4 Transportation of live birds

It is equally important to ensure that the healthy birds reach the consumer or processing plant in sound condition. The quality of birds is affected greatly by the methods employed in transporting them from the farm. Normally, birds are transported through bi/tricycle (Fig.11.11), tractor-trolleys and small vans for shorter distances. However, for distances up to 500 km or 12-15 hours, birds can be transported through road trucks, whereas, for distances over 500 km, it is advisable to transport birds by rail.

Fig. 11.11: Birds transported by tricycle

The following points need to be kept in mind while transporting live birds:

- Handle the birds gently.
- Do not frighten the birds.
- Birds should be procured and transported during the cooler part of the day.
- Live birds must be transported in a manner that allows for plenty of air ventilation to protect the birds from heat stress. Normally, live birds are transported in metallic (Fig.11.12) or plastic crates (Fig.11.13) constructed so that the birds' legs cannot pass through the bars, but air circulates easily.

Fig. 11.12: Metallic crates

Fig. 11.13: Plastic crates

Notes

- Crates of wire netting on a wood frame are safe, light in weight, and suitable for handling and transport. However, it is preferable to use plastic crates since they do not cause any injury or bruises unlike metallic crates.
- The opening of the crate should be easy to open and close and centrally situated so that all parts of the crate are within reach.
- The dimension of one crate should be 1 m long x 1 m wide x 0.6 m height to accommodate 15-20 adult broilers.
- Considerable death losses, broken wings and legs, and bruises result if birds are handled roughly or carried in unsuitable or overcrowded containers. Hence, avoid overcrowding or overloading of birds.
- Live birds should be starved for a period of 6 to 8 hours before slaughter. But, sufficient quantity of drinking water should be provided.

INTEXT QUESTIONS 11.3

Fill in the blanks

(a) ..... birds will be dull, move away from the group to corners or huddle together, show no or less interest in feed and water, produce abnormal sounds, showing abnormal postures and behaviour.

(b) For catching a bird from a flock in deep litter system, ... can be used.

(c) ..... broiler birds should be held by grabbing the two legs by both the hands.

(d) Birds should be procured and transported during the ..... part of the day.

WHAT YOU HAVE LEARNT

Let us recapitulate and enlist salient points we have learnt through this lesson:

- With increasing urbanization, eggs and live birds needs to be packed and transported in good condition to distant places and distributed through retail outlets to consumers.
- Always collect eggs in coated wire baskets or plastic containers. Eggs should be collected twice in a day.
- Collect clean, hygienic and unbroken eggs. Defective or broken/cracked eggs should be discarded immediately.
- Eggs should be graded before packaging or storage based on weight, shell colour & thickness, and interior egg quality. The best and easiest way to grade the eggs is candling using a candler.

- There are different ways of packing eggs *viz.* Basket, filler flats, Card Board Box, Paperboard etc.
- Refrigeration is the best option for storage of eggs for longer periods. The temperature of cold store should be maintained at 4°C and relative humidity between 80-85%.
- Eggs should be stored with the broad end pointing upwards. Eggs should be transported in refrigerated vehicles so that their quality does not deteriorate due to high environmental temperatures.
- Only healthy and fit birds should be identified and sold.
- For longer distances, birds can be transported through road trucks or rail. Live birds are transported in metallic or plastic crates.

TERMINAL EXERCISE

1. What are the method, frequency and equipment/tools used for collection of eggs?
2. Which types of eggs should be discarded?
3. Why it is not advisable to wash dirty eggs?
4. How and why sorting/grading of eggs is done?
5. List the different methods of packing eggs? Which is the best method and why?
6. Why eggs should not be stored along with materials that have distinct odour?
7. What are the precautions to be taken while storing the eggs?
8. Enlist the different means by which eggs and live birds are transported.
9. What are the points to be kept in mind while transporting live birds?
10. Why FIFO strategy should be practised while storing eggs?
11. Why birds should be transported in plastic crates rather than metallic crates?

ANSWERS TO INTEXT QUESTIONS

11.1

(a) manually or by hand

(b) twice

(c) Defective or broken

(d) size or weight

(e) candling

Notes

11.2

(a) egg filler trays/flats

(b) 30

(c) 4

(d) broad

(e) refrigerated

11.3

(a) Sick

(b) catching mesh and catching hook

(c) Heavy

(d) cooler

Notes

12

BIOSECURITY MEASURES IN POULTRY FARM

Biosecurity is a practice designed to identify and control the entry of disease in the farm. The word Biosecurity consists of 'Bio' means life and security means safety. Thus, biosecurity implies safety of bird's life from diseases and disease causing organism. It reduces mortality and morbidity.

Biosecurity is accomplished by maintaining the facility in such a way that there is minimal traffic of biological organisms (viruses, bacteria, rodents, etc.) across its borders. It is the cheapest, most effective means of disease control available. No disease prevention program will work without it.

The aim of this chapter is to assist you in understanding the basic rules for achieving the highest performance level of stock's production performance.

OBJECTIVES

After reading this lesson, you will be able to:

- avoid the incoming sources of contaminations;
- explain biosecurity hygienic programs;
- ensure compliance with appropriate emergency procedures;
- ensure a safe and clean place for birds and poultry workers;
- learn shed cleaning and rodent control.

12.1 BIOSECURITY

Biosecurity at poultry farm has three major components:

1. Isolation
2. Traffic Control
3. Sanitation

Notes

1. Isolation– Isolation refers to the confinement of animals within a controlled environment. The fencing should have to out of reach to other animals. A fence keeps your birds in and also keeps other animals out. Isolation also applies to the practice of separating birds by age group. In large poultry operations, all-in/all-out management styles allow simultaneous depopulation of facilities between flocks and allow time for periodic clean-up and disinfection to break the cycle of disease.

2. Traffic control– Vehicle and transport system in the poultry farm should be managed and controlled properly. Vehicle and transport system should be cleaned and disinfected properly.

3. Sanitation– Cleaning and disinfection are the components of sanitation. For hygiene and disease control, all the equipment, exposed surface, feeder, drinker, shed and cages go through this process.

12.2 INCOMING SOURCES OF INFECTIONS

Following sources of infections at farm need to be examined-

- The human movement, due to their duties, ignorance and carelessness about their role, in transmission of disease may introduce infections from vicinity and village poultry around. Farms clothing and shoes may minimize such incidences.
- Allowing casual visitors and neighbours freely at the bird's housing place is dangerous.
- Recovered carriers within or between flocks is always potent transmitter of disease. Similarly multi aged flock vector at a farm may continuously perpetuate disease at the farm.
- No bird should return back from bird show/ exhibition or laboratory to the farm as both the places may be infected.
- House hold pets, pet fowl, backyard flock and wild birds are important sources for breaking the biosecurity chain.
- Feed, water, rodents and insects may introduce fresh infection at the farm as Salmonella, Ranikhet, Mareks, *E. coli*, Avian Influenza, etc.

  Key elements for ensured optimum performance and for the welfare of bird are isolation, least mixing of flocks, less movements of vectors and proper biosecurity.

12.3 CHECKLIST FOR AN EFFECTIVE POULTRY BIO SECURITY PLAN

Implementing any of these suggestions will reduce the risk of disease entry. Each additional step implemented will further reduce bio security risks.

Movement restriction at poultry shed level:

1. Keep the shed locked at all times.

Notes

2. Footwear dedicated for that shed, foot-dips and hand wash at entrance of every shed should be provided. If felt necessary, farms may have higher norms, like having change room and shower facility even at shed level.

3. It should be ensured that all materials, drugs, vaccines etc., are cleaned and disinfected and they should be have passed a quarantine storage period of 10 days in an especially designed storage room which should be cleaned regularly.

4. Fogging of the populated sheds should be a part of a prevention programme to minimize the risk of contamination. The disinfectant should be used with right dilution as per manufacture's direction**.**

Restriction to visitors:

1. Allow only essential people to contact the poultry kept in the farm.

2. Build a separate demonstration area and birds kept there should not later be stocked with shed-house birds.

3. If visitors have their birds of their own do not allow them to come near to the birds.

4. Allow entry of the visitors in essential situation after taking all bio security measures at farm entry as well after entry into the shed. These measures should include footbaths at the entry of farm and then at shed level. Every visitor may change clothes/cap/footwear, and wear clean and disinfected clothes/ cap and boots. Specific coveralls and footwear for visitors are also to be provided.

Restriction to farm workers:

1. At the outset train the farm workers about the basic tenets of bio security

2. Allow only the employees of that farm to handle the birds on a day-to-day basis.

3. Make sure that employees should not have a commercial or private bird operation as they may transmit disease to the birds kept at the farm.

4. Do not allow farm workers to visit any other poultry farm or places where birds are kept. Similarly, the farm workers should not be allowed to visit the bird shows or bird fairs.

5. Workers engaged in rearing of one poultry species should not be allowed to visit other farms where different poultry species is being reared.

6. All the farm workers should be allowed in the farm after going through all the biosecurity measures as mentioned for visitors.

7. All the farm workers must put off their clothes and boots after finishing their jobs and should go through shower-out policy.

8. All workers must wear clean and disinfected clothes during farm operations.

9. Frequent washing of hands with detergent or soap with sufficient contact time should be encouraged in day to day farm operations.

INTEXT QUESTIONS 12.1

Notes

Fill in the blanks

(a) Confinement of animals within a controlled environment is termed as ……..

(b) …….. and …….. are the components of sanitation.

(c) No bird should return back from …….. or …….. to the farm as both the places may be infected.

(d) …….. of the populated sheds is required to minimize the risk of contamination.

(e) …….. at entrance and exit are essential biosecurity measure.

12.4 BIOSECURITY PROGRAMME

At a farm the biosecurity programme is usually divided into following four important steps (i) Security around the farm; (ii) Cleaning within the shed and around; (iii) Disinfection and (iv) Continuous disinfection programme.

The organic and inorganic dirt/debris in the poultry shed should be removed properly. The details of these programmes are linked with the structural and operational biosecurity measures for the sake of description.

(a) Structural Biosecurity

The poultry farm should meet the following requirements:-

(i) The perimeter of the site must be fenced and all opening must be secured leaving single door for entry and exit.

(ii) A 2.13m perimeter around each shed/building must be kept free of all vegetations including trees; preferably be cemented.

(iii) If the farm has multi-aged birds should follow rigid contamination free movement of vehicle and man power.

(iv) The drainage should be functioning especially where the soil is black or muddy with heavy rainfall.

(v) All structural measures should be taken to prevent flies, rodent, and flying bird entry.

(vi) Foot, vehicle dips and shower at the entrance are essential.

(viii) Provide a close room near main gate for disinfection of any material coming from outside. Unload material in the room, fumigate with Formalin and Potassium Permanganate. Use 1.2 ml formalin (40%) and 0.6 g Potassium Permanganate

Notes

($KMnO_4$) for 1.0 ft^3. Add formalin to potassium permanganate in porcelain bowl kept inside the room (Caution- Never add potassium permanganate to formalin). Fumigate for 20 minutes and then ventilate the room through exhaust fan to allow formaldehyde gas to escape.

(b) Operational Biosecurity

(i) Broiler Units

(a) It is difficult to follow biosecurity where live, culled birds are disposed.

(b) A disease surveillance/hygienic activities of water resources periodically be ensured to control bacterial & fungal load.

(c) All in and all out system of management should strictly be followed.

(d) A seven to ten days empty rest to shed is recommended for disinfectant to act.

(e) Movement of birds among farms must be restricted.

(f) Under threat of disease/infection scientific programme of disease detection, and diagnosis should be implemented.

(ii) Layer Units

(a) In large farms separate grower and layer unit at least 30 meters away should be located with the separate staff.

(b) Appropriate vaccination programme/testing programme be ensured to protect flock against challenges and becoming carriers.

(c) Since rodents are reservoir of salmonella, pasturella and even Mareks disease hence their effective control is essential.

(d) Care should be taken to monitor plastic tray hygiene if the plastic trays are exchanged while selling eggs to middle man. Egg vehicle should not be allowed inside the farm and delivery should be from a safe distance.

(e) Post mortem facilities should be well guarded.

(f) In layer unit the labours are provided with farm dresses especially chapels/ shoes/apron to control entrance of infective agents.

(iii) **Hatchery Units**

The hatchery biosecurity is difficult to achieve unless required measures are taken at each functional steps.

(a) Design of hatchery units should be as per minimum biosecurity needs so that clean and machine areas remained isolated. The dirty area (chick take off, empty egg shell and washing areas) should be looked carefully.

(b) Hatchery waste disposal be away from the main unit.

Notes

(c) At least 30 meter from the main hatchery building should be fenced and kept clear of large vegetation but shrubs and flower plants can be maintained.

(d) Reusable plastic trays, hatchers and setters should be disinfected after each use.

(e) A well drainage system will be asset to each hatchery.

(f) The hatchery sanitation programme should be the integrated part and should be under daily operational system and should be reviewed for addition and for change of the disinfectants.

(g) Cultural test especially for the presence of *Salmonella*, *Pasturella*, Mycoplasma, *Aspergillosis* and other egg transmitting diseases should be regularly adopted.

(h) Single door entry and exit with dress code are essential elements of a good hatchery.

INTEXT QUESTIONS 12.2

Fill in the blanks

(a) The dirty area in hatchery includes ....., ... and .....

(b) Growing and layer units should be at least ..... meter away from each other.

(c) Rodents are reservoir for important virus disease named .....

(d) The common source of transporting infection through egg is ..... among farms.

(e) Broiler should be raised under ..... system of housing.

(f) No vegetation should be inside ..... meter rear the shed.

(g) Recovered birds may act as a ..... for certain diseases.

12.5 HYGIENE MANAGEMENT

The hygiene management programme consist of the following basic elements -

(i) To minimize residual infections of the previous flock either layer or broiler units remained in the bird housing areas;

(ii) The periodical biosecurity efforts for bird's welfare.

Essential structural elements to achieve the optimum cleaning results includes within shed are the concrete floor, cemented walls and the concrete or asbestos/metal roof with the adequate drainage arrangements.

Notes

A. Cleaning Of Deep Litter Shed

(i) The objectives of removing litter materials from shed, carrying it to the safe distance for disposal, and cleaning the shed to make it fit for housing the other batch of flock.

(ii) In deep litter flock where broilers are raised this practice is to be repeated after 4-6 weeks of age whereas in the layers egg production unit the litter is removed after which the birds are removed from the shed.

(iii) However periodical adding of the fresh litter is adopted to dilute the bacterial/ viral load.

(iv) The first action after disposal of birds is to switched off electric systems and then cleaning should be done.

B. Litter Cleaning

(i) Spray water/disinfectant to moisten the litter to minimize dust in air.

(ii) Remove all fittings, feeder and waterers, curtains on windows, partitioning pens, frames and place on a concrete floor.

(iii) Remove litter manually or by scrapper and stack in a trolley and cover with a plastic cover to avoid blowing of litter all around.

(iv) All debris should be removed from cracks, fittings as shafts, beams and windows, cow dung cakes should be removed carefully.

(v) The above steps should be aimed to clean initially in the best possible way and make it ready for further processing.

C. Washing The Sheds, Feeder & Waterer

The following steps should be taken to wash and disinfect the shed.

(i) **Shed**:

(a) First washing should be done with water using pressure pump to clear remaining debris and dust/dirt and then allowed to be dried.

(b) With a pressure pump water and detergent should be sprayed to minimize the bacterial, fungus and viral load. Particular attention should be given to shed fittings. In open house systems washing and disinfection of curtains and temporary fitting are most essential.

(c) Card board material and polythene material should not be reused.

(ii) **Feeder and waterer**:

(a) Reusable material must be soaked in disinfectant after thorough prior cleaning and should be kept under cover, till these are reused.

(b) The automatic feed system must be clean and disinfect i.e. track, chains, hanging feeders, connecting pipes & bins, etc. After disinfecting it is desirable that the sample culture should be carried out to detect bacterial load.

Notes

(iii) Water equipments and storage tanks

They should be drained out and pipe system be thoroughly examined for algae, fungus and buds should be removed and flushed with the detergents. Filling the tanks with sodium hypochloride solution and draining after 24-36 hours followed by fresh water cleaning may assist in obtaining the objectives of cleaning.

D. Cage House Cleaning

(a) (i) The cages are fixed on a 6-9 feet raised platform for welfare of birds and easy disposal of dropping. In summer season when litter is dry is usually removed mechanically and loaded in the trolley for disposal.

(ii) The inside of the cage house the feeder and waterers are cleaned periodically as a routine practice before feeding and watering.

(b) In case of multi tier cage arrangement (i.e. six tier or more) moving belt are provided for taken off the dropping out side shed where usually driers are fitted for the purpose of drying and sterilization with packaging arrangement. These units are supported with a strong biosecurity, isolation and disinfection programme to assist in the welfare of birds.

E. Post-harvest Cleanout Activities In Broiler Farms

In poultry meat sector, cleaning and sanitation are major activities to improve the market value for quality product. It is becoming increasingly important because more spoilable and hygienically sensitive meat products are coming on market. Improper cleanliness leads to contamination of meat and poultry product with pathogenic bacteria. Prepackaged foods (chilled meat, vacuum - or modified - atmosphere packaged sliced meat products) are "ready -to - eat" products. These foods are usually taken right from the package and consumed as they are. Sanitation and cleanliness is also important for these products to prevent cross contamination.

12.6 CONTINUOUS BIOSECURITY PROGRAME

The cleaning and disinfection does not end at the empty shed but you have to be more vigilant on each of the following aspects of probable source of infection.

(i) Maintenance of fresh, clean & wholesome water supply system.

(ii) Spraying outside and inside shed to minimize building viral and bacterial load.

(iii) Foot and vehicle dip at the entrances.

(iv) Poultry farm waste disposal.

(i) Maintenance of Water System:

The water pH should be 6-7 i.e. neither too acidic nor alkali. You should take special care in open storage tanks. It is always a good practice to have water-mineral pathogen analysis. Hard water will create problem to pipe, waterers and even for birds hence

Notes

selection of water sanitizer should be such that it takes care off maximum problems. If proper maintenance is lacking the drinking water may act reservoir of microbial load.

(ii) Spraying:

Two types of disinfectant are required. One to use for surrounding and other on Live birds. Such products are available in market. Fine mist-spraying is desirable.

(iii) Foot And Vehicle Dip:

(a) A cement concrete foot-dip and vehicle-dip and even shower for cleaning spraying are key for safe biosecurity.

(b) The disinfectant used should be such that it takes care of infective agent along with the debris attached with it.

(c) The water-disinfectant dip should be changed once in a day or else depending on movement.

(iv) Poultry Farm Waste Disposal:

(a) DEAD BIRD DISPOSAL

Dead bird disposal should be done scientifically and as early as possible. Throwing dead bird around, giving to dogs or left for flying birds or sale for human use may invite troubles. Hence one of the following procedures may be adopted.

(i) Burial on Farm

In view of pollution regulation the efficient burial system should be developed within a closely fenced area to avoid wild animal, dog & wild bird problem.

A deep pit with narrowing slope towards bottom of minimum 6 x 6 x 10 ft^3 each may be workable. Number of pits may be constructed as per need. In pits regular addition of salt and litter helps faster decomposition.

(ii) Incineration

Incineration is the best method for disposal of dead carcass. Wood, diesel or electric operated incinerator may be build of suitable size.

(b) LITTER DISPOSAL

The litter should be moved on trolley at least 0.13 km from actual birds shed and spread on the land followed by ploughing on burial in a large pit or stacked in an area exposed to sunlight for one month. It is very important that the litter must not be directly dumped on crops or grazing land and not stored at the farm premises except in a deep pit which on completion of the work should be covered with soil.

12.7 RODENT AND PEST CONTROL IN POULTRY SHEDS

A. The poultry house and its surroundings are ideal places for rodents such as rats, mice, mongoose, squirrels due to availability of feed and hiding places. Rodent causes enormous damage to building and also financial losses.

Notes

DAMAGE CAUSED BY RODENT

(i) Eat considerable quantity of feed (10-113 gm/day) and also spoils it by defecation and urination.

(ii) Burrow holes under floor and make pathways for movement.

(iii) Carry poultry infection by acting as carrier of *E. coli*, Mareks etc.

(iv) Rat kills and causes injury to weak chicks. A single mongoose will not only kill chick but kill adult caged birds also.

(v) Rodent movement in night causes panic affecting performance of flock.

CONTROL MEASURES

(i) Construct a rat proof shed.

(ii) Repair holes on floor, damage roof, walls & chicken mash etc. promptly.

(iii) Avoid extra storage of feed in the shed as easy excess to rodents.

(iv) Use rodenticides periodically to keep check on their population.

(v) Use rat traps and facilities provided by government on rat control.

(vi) Remove dead bird quickly else rodent may become carnivores.

B. Pest is an important mechanical vector of many human and poultry diseases. The most common species encountered in poultry operations is house fly (*Musca domestica*). This fly breeds in moist, decaying plant material, spilled feed, waste egg material, wet manure and in cracks and crevices. Eggs hatch into white, cylindrical larvae (maggots) in 12 to 24 hours.

CONTROL MEASURES

(i) Dry manure management is highly effective in reducing pest populations. Eggs are laid on breeding media like manure, hatch out in moist or wet material where they remain until ready to pupate.

(ii) Water management with respect to the moisture content of manure is important for effective pest control.

(iii) Quickly remove dead birds and broken eggs.

(iv) Clean up and dispose of feed spillage immediately.

(v) Treat the flock for diarrhea.

(vi) Avoid high salt content in the feed which may lead to increased water consumption as well as wet droppings.

(vii) Mechanical Control of Pests: Mechanical control can be accomplished through the use of various types of pest traps, electrically operated insects killer (pest ban, pest killers) and mechanical burning. Mechanical burning of flies in their resting areas like chain link mesh, trashes, etc. may be helpful to reduce adult pest population.

Notes

(viii) Chemical Control of Pests: Chemical control consists of the application of insecticides and should always be considered supplemental to sanitation, management options to control pests. Rotational use of variety of different classes of insecticides or pesticides can minimize the chances of developing chemical resistance.

INTEXT QUESTIONS 12.3

Fill in the blanks

(a) The deep litter wastage should be disposed at least ..... away from shed.

(b) The layer cages are fixed about the height of ..... above ground level.

(c) The water used in poultry should have pH of .....

(d) One of the important method of make biosecurity arrangement more effective by proper disposal of ..... bird.

(e) ..... is the best method for disposal of carcass.

(f) ..... is the most common pest sp. encountered in poultry operations.

Biosecurity Check List

1. Do you actually prohibit entry to every one accept worker?
2. Are the foot and vehicle dip are refilled with lime/sanitizer regularly?
3. Do you follow practice of changing clothes and shoes of staff?
4. Do you take pain for thorough cleaning, disinfecting and given at least 7-10 days rest to shed & equipments before housing next batch?
5. Do you keep pest & rodent under control and wild birds away?
6. Do you take precautions in using used plastic egg trays, broiler carrying cages?
7. Do you dispose dead bird properly and quickly?

WHAT YOU HAVE LEARNT

Let us recapitulate and enlist salient points we have learnt through this lesson:

- Biosecurity at poultry farm has three major components as Isolation, Traffic Control and Sanitation.
- Incoming sources of infections at farm by human movement, flocks, house hold pests, water, rodents etc. needs to be examined carefully and avoided.

Notes

- Movement restriction at poultry shed, restrictions to visitors and farm workers needs to be implemented to reduce risk of disease entry.
- At a farm the biosecurity programme is usually divided into following four important steps (i) Security around the farm; (ii) Cleaning within the shed and around; (iii) Disinfection and (iv) Continuous disinfection programme.
- Hygiene management programme minimizes residual infections of the previous flock either layer or broiler units.
- Essential structural elements to achieve the optimum cleaning results includes within shed are the concrete floor, cemented walls and the concrete or asbestos/metal roof with the adequate drainage arrangements.
- The cleaning and disinfection does not end at the empty shed but you have to be more vigilant and follow continuous biosecurity programme for avoiding probable sources of infection.
- Pest and Rodent control reduces feed loss and spread of infection, hence appropriate control measure should be adopted at your poultry farm.

TERMINAL EXERCISE

1. Describe major components of biosecurity at poultry farm.
2. What are the major sources of infection to a poultry farm?
3. Write down the checklist for an effective bio security plan.
4. What are the four steps of biosecurity programme?
5. Describe step wise cleaning procedure of deep litter shed.
6. Describe step wise waterer equipment / channel cleaning procedure.
7. Describe various steps needed for continuous biosecurity of an organised farm.
8. How the rodents and pests can be controlled in a poultry sheds.

ANSWERS TO INTEXT QUESTIONS

12.1

(a) isolation

(b) Cleaning and disinfection

(c) bird show/ exhibition or laboratory

(d) Fogging

(e) Foot dips

Notes

15.2

(a) chick take off, empty shell and washing area.

(b) 30 meter

(c) Mareks

(d) egg plastic tray

(e) All-in-all-out

(f) 2.13 meter

(g) carrier

15.3

(a) 0.13 km

(b) 6 - 9 ft

(c) 6-7

(d) dead

(e) Incineration

(f) House fly (*Musa domestica*)

13

ENTREPRENEURSHIP AND MARKETING

Commercial poultry production is a highly competitive business that involves substantial investment of capital and a considerable element of risk. The demand for high quality eggs and broilers is growing along with the increase in population. Before entering into poultry farming you should calculate its benefits and limitations in advance. Location of the farm, genetic stock, feed quality, size of operation, layout efficiency, mortality rate among the flock and price of the produce (egg and meat) are the major factors affecting profitability in a poultry farm.

OBJECTIVES

After reading this lesson, you will be able to:

- discuss poultry farming economics;
- explain the poultry farming finances;
- gather information about marketing of eggs and broilers;
- summarize different marketing channels available for eggs and live birds;
- explore poultry promotion schemes and bankable project preparation.

13.1 POULTRY FARMING ECONOMICS AND FINANCES

Indian Poultry Industry has three major segments:

- Broilers
- Layers and
- Backyard / family production (both eggs and chicken).

Notes

13.1.1 Broiler Industry

More broiler growers and improved efficiencies have changed the shape of the industry. Feed (65%) and chicks (25%) account for 90% of the broiler inputs and the consolidation started in the production. There is a wide gap between the economics of the smaller units purchasing feed & chicks and the ones using their own feed & chicks. Big companies with larger investments came in and the smaller units compromised on growing the broilers for the company on the contract basis, restricting themselves to the 10% of the production cost. This synergy in the form of "Contract Farming" is an excellent development that took place in India. Farmers with small land-holding find growing broilers on "All-in-All-out" basis for a company, in a poultry house built on the land is giving better and assured returns compared to agriculture which is more nature-dependent and uncertain.

There is a growing trend of integrated contract broiler farming. Under this, poultry farmers invest only for poultry sheds / equipment on their existing land. The Integrator supplies chicks, feed, medicines, provides technical guidance and takes entire production after 5-6 weeks.

The contract farmers are paid growing charges as per agreed rates. This has eliminated the middlemen. Farmer is benefiting from the lesser investment and production cost and also higher productivity which are achieved as a result of integration. However, the farmer may be at a disadvantage if the number of batches supplied in the year by the integrator is less**.**

There are two different points in poultry farming:

1. Poultry farming at smaller scale, where investments are less, profits are less and management is easy.

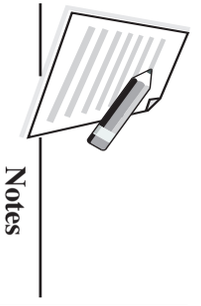
2. Commercial poultry farming, where investment are huge and returns and risks are too very huge. But the management is very extensive. You become careless for one day and all of your hens might be dead the next day.

Notes

Economics of Broiler Farming to Produce 10,000 Broilers Per Cycle

A- Capital Cost

S. No.	Capital Cost (for 08 years)	Rate	Total
1.	On lease 1 acre of the land for 8 year (Ideally it should be in some distant rural areas)	Rs. 10,000/- per acre per year	Rs.80,000/-
2.	Fencing of the 1 acre land	Rs. 25,000/-	Rs. 25,000/-
3.	Construction of the Brooder cum grower house one sq. ft. per bird for 10,000 birds	Rs. 200/- per sq ft.	Rs. 20,00,000/-
4.	Jetpump / Borewell with submersible pump	Rs. 45,000/- + Rs. 15,000/-	Rs. 60,000/-
5.	Water Pipelines in the shed & outside	Rs. 50,000/-	Rs. 50,000/-
6.	Water storage tank installed above the building	Rs. 40,000/-	Rs. 40,000/-
7.	Feeder/ Waterer / Brooder for ten thousand birds	Rs. 10/- per bird	Rs. 1,00,000/-
8.	Electrification	Rs. 50,000/-	Rs. 50,000/-
9.	Feed/ Medicine Store 200 sq ft.	Rs. 200/- per sq ft	Rs. 40,000/-
10.	Office cum product selling room 10×12 feet	Rs. 200/- per sq ft	Rs. 24,000/-
11.	Power back up (Inverter & Generator)	Rs. 20,000/- + Rs. 80,000/-	Rs. 1,00,000/-
12.	Refrigerator	Rs. 11,000/-	Rs. 11,000/-
13.	Miscellaneous Expenditure	Rs. 50,000/-	Rs. 50,000/-
		Total Capital Cost	**Rs. 26,30,000/-**



B. Expenditure

S. No.	Items	Duration							
		1st Year	2nd Year	3rd Year	4th Year	5th Year	6th Year	7th Year	8th Year
1.	Cost of day old chick @ 15/- Rs. (In one year 5 cycles)	Rs. 7,50,000/- (Rs. 1,50,000 per cycle)	Rs. 7,50,000/-	Rs. 7,50,000/-	Rs. 7,50,000/-	Rs. 7,50,000/-	Rs. 7,50,000/-	Rs. 7,50,000/-	Rs. 7,50,000/-
2.	Cost of Feeds 3 kg per bird @ Rs. 18/-	Rs. 27,00,000/- (Rs. 5,40,000/- per cycle)	Rs. 27,00,000/-	Rs. 27,00,000/-	Rs. 27,00,000/-	Rs. 27,00,000/-	Rs. 27,00,000/-	Rs. 27,00,000/-	Rs. 27,00,000/
3.	Miscellaneous Expenditure (i.e. Electricity, Vaccine, Medicine, Veterinarian visit etc.) Rs. 5/- per bird per batch	Rs. 2,50,000/- (Rs. 50,000/- per cycle)	Rs. 2,50,000/-	Rs. 2,50,000/-	Rs. 2,50,000/-	Rs. 2,50,000/-	Rs. 2,50,000/-	Rs. 2,50,000/-	Rs. 2,50,000/-
4.	Wages for three labour @ 7000/- per month	Rs. 2,52,000/-	Rs. 2,52,000/-	Rs. 2,52,000/-	Rs. 2,52,000/-	Rs. 2,52,000/-	Rs. 2,52,000/-	Rs. 2,52,000/-	Rs. 2,52,000/-
5.	Depreciation on sheds , building etc. @ 10%	Rs. 2,63,000/-	Rs. 2,63,000/-	Rs. 2,63,000/-	Rs. 2,63,000/-	Rs. 2,63,000/-	Rs. 2,63,000/-	Rs. 2,63,000/-	Rs. 2,63,000/-
6.	Total Expenditure	Rs. 42,15,000/-	Rs. 42,15,000/-	Rs. 42,15,000/-	Rs. 42,15,000/-	Rs. 42,15,000/-	Rs. 42,15,000/-	Rs. 42,15,000/-	Rs. 42,15,000/-

C- INCOME

S. No.	Items	Duration							
		1st Year	2nd Year	3rd Year	4th Year	5th Year	6th Year	7th Year	8th Year
1.	By sale of broiler birds @ 60/- Rs. per kg for average 1.8 kg bird i.e. Rs. 108 on average Rs. 100/- (In one year 5 cycles)	Rs. 47,50,000/- (Rs. 9,50,000 per cycle taken 5% mortality)	Rs. 47,50,000/-	Rs. 47,50,000/-	Rs. 47,50,000/-	Rs. 47,50,000/-	Rs. 47,50,000/-	Rs. 47,50,000/-	Rs. 47,50,000/-
2.	By sale of manure @ Rs. 05/- per kg	Rs. 5,00,000/- (Rs. 1,00,000/- per cycle)	Rs. 5,00,000/-	Rs. 5,00,000/-	Rs. 5,00,000/-	Rs. 5,00,000/-	Rs. 5,00,000/-	Rs. 5,00,000/-	Rs. 5,00,000/-
3.	By sale of gunny bags	Rs. 1,00,000/- (Rs. 20,000/- per cycle)	Rs. 1,00,000/-	Rs. 1,00,000/-	Rs. 1,00,000/-	Rs. 1,00,000/-	Rs. 1,00,000/-	Rs. 1,00,000/-	Rs. 1,00,000/-
4.	By sale of equipments and other things after completion of Project	—	—	—	—	—	—	—	Rs. 2,00,000/-
5.	Total Income	Rs. 53,50,000/-	Rs. 53,50,000/-	Rs. 53,50,000/-	Rs. 53,50,000/-	Rs. 53,50,000/-	Rs. 53,50,000/-	Rs. 53,50,000/-	Rs. 55,50,000/-

Notes

D- CALCULATION SHEET

S. No.	Items	Duration							
		1st Year	2nd Year	3rd Year	4th Year	5th Year	6th Year	7th Year	8th Year
1.	Capital cost	Rs. 26,30,000/-	—	—	—	—	—	—-	—-
2.	Recurring cost	Rs. 42,15,000/-	Rs. 42,15,000/-	Rs. 42,15,000/-	Rs. 42,15,000/-	Rs. 42,15,000/-	Rs. 42,15,000/-	Rs. 42,15,000/-	Rs. 42,15,000/-
3.	Total cost	Rs. 68,45,000/-	Rs. 42,15,000/-	Rs. 42,15,000/-	Rs. 42,15,000/-	Rs. 42,15,000/-	Rs. 42,15,000/-	Rs. 42,15,000/-	Rs. 42,15,000/-
4.	Income	Rs. 53,50,000/-	Rs. 53,50,000/-	Rs. 53,50,000/-	Rs. 53,50,000/-	Rs. 53,50,000/-	Rs. 53,50,000/-	Rs. 53,50,000/-	Rs. 55,50,000/-
5.	Net benefit	Rs. 14,95,000/-	Rs. 11,35,000/-	Rs. 11,35,000/-	Rs. 11,35,000/-	Rs. 11,35,000/-	Rs. 11,35,000/-	Rs. 11,35,000/-	Rs. 13,35,000/-
6.	Total benefit	—	—	—	—	—	—	—-	Rs. 66,50,000/-
7.	Total benefit per month	—	—	—	—	—	—	—-	Rs. 69,271/-

Notes

13.1.2 Layer Industry

Layer farms are maintained for the production of eggs. The small layer units are becoming unviable. Large units with million birds and 1,00,000 birds in one house are coming up. Approximately 70% of the layer birds were in the states of Andhra Pradesh, Tamil Nadu, Maharashtra & Karnataka in south and only Punjab in the north. The eggs were transported to other states. More production units are coming up in Uttar Pradesh, West Bengal and Bihar now.

Larger units go for bulk purchases, seasonal purchases at harvest and even go for import of feed ingredients. The production costs can be managed. Mechanization in feed production, feeding the birds & egg handling is possible with larger units. Long distance supplies, exports & further processing can be planned with mass production. Larger units can adopt better technology like least cost feed formulations & biosecurity protocols to prevent diseases. The eggs in supermarkets will be graded, cleaned, well packed & labeled for the nutritive value & "use before date." Promotion of egg consumption in mid-day meal schemes, hospitals will boost the demand. Shell eggs & egg products, like pasteurized and processed liquid eggs have good markets in many countries like the Middle-East and Japan. We have to enhance the quality standards to meet the requirement of those countries.

These large houses with mechanization require huge investments. The cost of finance is a large part of production cost of an egg. Social issues around the large farm units like manure handling, labor availability and environment pollution are putting a limit on expansions. The price of feed is increasing. The egg prices also increase but at a low pace. The gap is being met with efficiency in production.

13.1.3 Backyard Production (Both Eggs and Chicken)

The birds available for the Backyard farming are less productive for both eggs and meat but they are hardy to the diseases in comparison to broiler and layer breeds. Now Central Government, State Government and Non Governmental Organizations (NGO) are mainly concentrating towards Backyard Poultry Farming for better nutrition of poor peoples and their economic upliftment. Central Avian Research Institute (CARI) Bareilly, Central Poultry Development Organization (CPDO), DAHDF, Govt. of India and State Agriculture Universities had developed many breeds for the Backyard farming improving their egg and meat production.

"Cluster farming" in rural areas is possible with these chicken for enhancing the meat production in the lines of broiler farming. A group of 8 to 10 farmers or educated youth can form a cluster and grow the birds in groups of 500 to 1,000 birds in low-cost houses as done in broilers. The birds are grown in "All in All out" basis and the producer works by himself. The group can graduate in to "organic chicken" by making their own low-cost feeds without chemicals and antibiotics. The cluster can market the birds in local village mandis or supply them to supermarkets with a brand name. The slow growing multicoloured chicken with tougher meat fetch better price compared to broilers whose meat is tender. This area is developing as a "niche market" with better returns. Brown colour, sturdy layer type birds, laying 300 eggs and more are being considered for "Family Laying

Notes

ECONOMICS OF LAYER FARMING					
	10000 layers in deep litter system				
A.	**FIXED CAPITAL**				
	a	**Buildings**			
		Brooder cum grower house for 10000 birds @ 1.5 sq. feet per bird and rs 200/sq. feet			3000000
		Layer house for 10000 @ 2 sq ft			4000000
		Office cum feed store room of 400 sq feet @ Rs 300/ sq. feet			120000
		TOTAL			**7120000**
	b	**Equipments**			
		1. Cost of equipments like brooders, feeders, waterers @ Rs 20/bird			200000
		2. Cost of electric installation			10000
		Total			210000
		TOTAL FIXED COST			**7330000**
B	**OVERHEAD COST**				
	a	Depreciation on buildings @ 10%			712000
	b	Depreciation on equipments @ 20%			42000
		TOTAL OVERHEAD COSTS			**7540000**
C	**RECURRING EXPENDITURE/WORKING CAPITAL**				
	a	Cost of 11000 day old chicks @ Rs 16/bird			176000
	b	Cost of feed for 11000 chicks @1.5 kg/bird @ Rs 16/kg	chick mash		255750
	c	Cost of feed for 10500 chicks @6 kg/bird @ Rs 14/kg	grower ration		882000
	d	Cost of 2 labours for 5 months @ 2000/month			20000
	e	Cost of medicine, litter, transportation and electricity	2/bird		22000
		COST OF REARING PULLETS TILL POINT OF LAY	**(20 weeks)**		**1355750**
D	**COST OF EGG PRODUCTION (20-72 weeks)**				
	a	Cost of feed for 10000 birds @ 40 kg/bird @ Rs 14/kg			6000000
		Cost of 2 labourers for 12 months @ 2000/ month			48000
		Cost of medicine, litter, transportation and electricity	1/bird		10000
		COST OF EGG PRODUCTION			**6058000**
		TOTAL COST OF EGG PRODUCTION			**8167750**
E	**INCOME**				
	a.	Sale of eggs @290/bird @ Rs 2.5/egg	1% brakage, 99% marketing		7177500
	b	Sale of gunny bags @ Rs 5/kg	9500 bags		49950
	c	Sale of poultry manure @ Rs 500/tonne		500	250000
	d	Sale of culled birds @ Rs 80/bird	(12% mortality)		704000
		Gross return/year			8181450
		Gross Profit	(Income-recurrent expenses)	767700	
		Net profit	(gross profit-operational fixed cost)	13700	
		Profit/year			13700
		Profit per bird			1.37
		Cost of Production of 1 egg		**2.47**	
		Cost of production of 1 ready to lay pullet		**124.58**	

Units." States like Kerala have adopted this system as an "alternative system" of egg production to commercial poultry. Even the products are marketed by the farmers directly in weekly village markets and "Collection Centers" established by government or companies.

13.1.4 Poultry Farm Finances

For poultry farming schemes with large outlays Detailed Project Reports (DPR) are required to be prepared. The items of investment / finance would include construction of broiler/ layer sheds and purchase of equipment, cost of day old chicks, feed, medicine and labour cost for the first cycle. Cost towards land development, fencing, water and electricity, essential servant's quarters, godowns, transport vehicles, broiler dressing, processing and cold storage facilities can also be considered for providing credit. NABARD is the banker of the Banks in Agriculture sector loans i.e. Local Banks provide the loan to the Individual after consent and loan amount from the NABARD. For high value projects, the borrowers can utilise the services of NABARD Consultancy Services (NABCONS) who are having wide experience in preparation of Detailed Project Reports.

INTEXT QUESTIONS 13.1

Fill in the blanks

(a) Broilers are generally grown in ..... system in contract farming.

(b) There are high risk in poultry farming if done at ..... scale.

(c) ..... is an excellent development that took place in India for poultry sector.

(d) The ..... is a large part of production cost of an egg.

(e) The Backyard poultry farmers could easily go for ..... by making their own low-cost feeds without chemicals and antibiotics.

(f) 70% of the layer birds were in the states of ....., ..., ... and ..... in south and only ..... in the north.

(g) For high value poultry projects, the borrowers can utilise the services of ..... who are having wide experience in preparation of Detailed Project Reports.

13.2 MARKETING OF EGGS AND LIVE BIRDS

Marketing is one of the most vital aspects of poultry farming. Presently, there is no organized network for marketing of eggs and live birds. Poultry marketing is predominantly in the hands of few wholesale/private traders and commission agents who have monopolized the business and are operating in various metropolitan cities and towns. Therefore,

Notes

neither the poultry farmers are getting proper returns/income of the produce, nor the consumer getting egg/meat at reasonable rate.

However, National Egg Coordination Committee (NECC) has given scope for the egg producers in the country in getting 70-75% of the consumer money which is much higher than what farmers get for their agriculture produce (30 to 35%). NECC declares prices for eggs based on market dynamics and have participation of farmers, which helps to solve the problem of middlemen to some extent. NECC has about 25,000 layer farmers as members and carries out different programmes such as market intervention, price support operations, egg promotion campaigns, consumer education, market research, rural market development and liaisons with the government agencies on vital issues concerning the industry to declare egg price. Similarly, the BROMARK and Broiler Coordination Committee (BCC) are engaged in price fixation and marketing of broilers in our country. AGMARK is involved in grading and maintenance of quality of egg and meat products.

13.2.1 Marketing of Eggs

Because of the location of farms in semi-urban and urban centers and poultry traditionally developed in concentrated pockets in Andhra Pradesh, Tamil Nadu, Punjab & Haryana and Maharashtra, the availability of eggs is high in the urban and semi urban centers, but in rural centers, North-eastern states and rest of the country, the availability is low. Hence, there is a vast scope to tap these markets.

Egg prices vary from one market to another and from one season to another. For example, in summer, wholesale prices of egg come down to a level which is sometimes lesser than the cost of production. Therefore, proper attention has to be given to efficient disposal of market eggs.

Like other food commodities, you can find various types of markets dealing with disposal of table eggs. You might have seen eggs being sold through daily hawkers, egg-thelas, egg-trollies, groceries-shops, hotels, restaurants etc. In district or sub-division level, eggs are sold in bulk quantities in wholesale markets/*Mandies*. At the village/city level, eggs are sold to the consumers for daily needs mostly through retail shops, i.e. Pan shops, kirana stores, bakeries etc. However, many organized producers market their eggs as a specialty item and receive premium prices. For example, Brown eggs and organic eggs fetches higher prices.

The greater the distance between producer and consumer, the more complex is the marketing organization required to ensure that eggs reach consumers in the form, place and time desired. Broadly, the following are the identified marketing channels for eggs in our country:

(a) Direct Marketing: This is most cost effective method since producers sell eggs directly to consumers and gets 100% profit.

Producer $\longrightarrow$ Consumer

(b) Indirect Marketing: This is the most commonly practised system of marketing eggs in India. This system involves movement of eggs from producers to consumers through intermediaries (middleman) like wholesaler, retailers, commission agents, brokers, transportation companies, cold store etc.

Producer ⟶ Retailer ⟶ Consumer

In this channel, about 12 to 17% of consumer's price is retained by the retailer.

Producer ⟶ Wholesaler ⟶ Retailer ⟶ Consumer

Here, about 25% of the total price paid by the consumer is to be added to the marketing cost as the number of intermediaries involved are large.

(c) Vertical Integration System: This is an emerging system of marketing in layer industry where all the activities of egg production are carried out under single coordinated management. Many large private firms are producing eggs under this system and have established market outlets throughout the country.

(d) Co-operative Marketing: Here, the producer sells eggs through co-operative agency to consumer. About 3,000 small and large poultry co-operative societies have been set up in the country for egg marketing. But, due to their limited operational areas and lack of support either in interstate trade or in export trade, and lack of resources to undertake a total programme of procurement, packaging, storage, transportation and retailing of eggs, these co-operative societies have achieved limited success.

13.2.2 Marketing of Live Poultry Birds

In tropical and dry climates, the most common form of marketing poultry meat is to sell the birds live. Live birds are marketed mostly by big farmers, integrators, private wholesalers and retailers. In the interior pockets, the producers themselves are marketing in small retail outlets and catering to the local requirements. While most of the broiler birds are consumed within the state, surplus broilers at times are sent to other states from top broiler producing states like Andhra Pradesh depending upon the supply and demand position.

Normally, the common practise of selling and buying of birds by the farmers takes place weekly or biweekly in the animal markets or shandies or fairs which are called 'primary markets'. Farmers bring their animals/birds in batches which have attained the slaughter weight or desired age and sell them by direct negotiation mostly to the butchers or local dealers. In addition to buyers and sellers, intermediaries (middleman) are involved in every stage of marketing negotiation.

Broilers normally reach the ultimate consumer through the following intermediaries such as live bird retail outlets, cold storages, hotels, restaurants, clubs, industrial and institutional canteens, government agencies e.g. army, navy, air force, ship chancellors, and hospitals. The broiler market today is largely in the hands of the wholesalers who pick up the birds from the farmer and market either by semi wholesale or retail. When prices are good there is generally no problem. However, during a dull season, it is usual for the wholesalers to delay lifting the birds by as much as 10 days. By this time, the birds are

Notes

heavier than the favoured marketable weight. Live broilers cannot be stored nor are they transportable to remote markets without considerable shrinkage and loss of value. The only alternative is dressing and storage.

Commercially, live birds are marketed through the following marketing channels:

(a) Direct Marketing: Producer (farm) $\longrightarrow$ Consumer

(b) Indirect Marketing: This is the most commonly practised system of marketing broilers in India.

Producer $\longrightarrow$ Broker/Middleman $\longrightarrow$ Wholesale $\longrightarrow$ Retailer $\longrightarrow$ Consumer

Producer$\longrightarrow$Local Trader$\longrightarrow$Wholesaler$\longrightarrow$Meat Producer$\longrightarrow$Retailer $\longrightarrow$ Consumer

(c) Vertical Integration System: This is an emerging system of marketing in broiler industry as in case of layer industry.

Broiler Coordination Committee (BCC) declares the sale price of live broilers from time to time. The wholesale markets for live birds are very few in number, but one can find such markets in big cities and from there, the small shopkeepers of neighboring areas get live birds through agents or brokers or middlemen. Even today, the old system of auctioning chicken by *Kori* (20 birds per kori) without any regard to their weights and grades is in practice in some parts of the country. The live birds are sold by count in *mandi,* but on live or dressed body weight basis by the retail poultry meat shopkeeper. In most of the places, a common market of small and big size for eggs and poultry meat is in operation. Now-a-days, many stockiest who trade poultry and its product throughout the country are available.

13.3 POULTRY PROMOTION SCHEMES AND BANKABLE PROJECT PREPARATION

Poultry promotion schemes are run by the Central Government i.e. Department of Animal Husbandry, Dairying and Fisheries and State Animal Husbandry Departments. Government agencies are mainly promoting backyard poultry farmers. National Bank for Agriculture and Rural Development (NABARD) helps in the development of Detailed Project Report (DPR) through its technical inputs and it could be contacted on the website https://www.nabard.org/english/home.aspx and detail could be enquired from Nearest Nationalized Bank Branch of the area.

Under development of Poultry Estates, two estates were decided to be established on pilot basis in low commercial activity states / region. Grants were provided to the State Governments for promoting smallholder poultry rearing in rural/tribal areas of the country with refinance from NABARD. Central Poultry Development Organizations have been promoting development of poultry through providing quality chicks for identified low-input technology poultry stocks; diversifying poultry rearing towards duck, turkey & emu, quail and guinea fowl; training of trainers, farmers, women beneficiaries, poultry organizations, NGOs, banks, cooperatives and foreign trainees etc. and regular testing of various stocks available in the country to assess their performance.

Notes

Poultry Venture Capital Fund scheme has yielded good result and needs to be continued with thrust on wider publicity and awareness creation among target groups as well as the implementing agencies to derive maximum benefits to diverse stakeholders. Support to rural poultry is also being made available under Swaranjayanti Gram SwarojgarYojana (SGSY) with particular emphasis on group formation of women and the weaker sections. Under Poultry Seed Project being executed by ICAR, rural chicken germplasm is being further improved, multiplied and distributed to various agencies.

INTEXT QUESTIONS 13.2

1. Fill in the blanks

   (a) **.....** is the most commonly practised system of marketing eggs in India.

   (b) In **.....** marketing, producers sell eggs directly to consumers and gets 100% profit.

   (c) **.....** Committee declares the sale price of live broilers from time to time.

   (d) Support to rural poultry is also being made available under **.....** with particular emphasis on group formation of women and the weaker sections.

2. Tick True / False of the following statements

   (a) The greater the distance between producer and consumer, the more complex is the marketing organization required to ensure that eggs reach.

   (b) Vertical Integration System involves movement of eggs from producers to consumers through intermediaries/middleman.

   (c) NECC declares prices for eggs based on market dynamics and have participation of farmers.

13.4 CLIENT RELATIONSHIP MANAGEMENT

The client relationship management is easy by having the soft skills and communication ability. Win the confidence of the "contract farmers" and provide a link with retailers to sell the Poultry and Eggs to the merchants genuinely. Poultry farmer should know the poultry meat and egg merchants needs, wishes and dreams. He or she should be well versed in the value delivered to customers and the problems customers are trying to solve. The farm owner will try to solve customer requests but will proactively offer ideas and insights to improve the customer's issues and challenges. He/ She will follow up on broiler or egg sale on every issue and ensure complete satisfaction and maximum utilization of the product sold to customers.

Notes

WHAT YOU HAVE LEARNT

Let us recapitulate and enlist salient points we have learnt through this lesson:

- Indian poultry industry has three major segments consisting of broilers, layers and backyard poultry.
- "Contract farming" is an excellent development in broiler poultry.
- Large scale layer production is more economical for layer industry.
- The traditional model of poultry i.e. backyard poultry is popular among rural masses of the country. The birds available for backyard farming are less productive for both eggs and meat but are hardy to the diseases in comparison to broiler and layer birds.
- Most common marketing channels for eggs and live birds include Direct Marketing, Indirect Marketing and Vertical Integration System.

TERMINAL EXERCISE

1. Prepare a financial statement for starting a poultry farm of 1000 layers.
2. Prepare a financial statement for a poultry farm of 1000 broilers in all in and all out system.
3. Why backyard farming is still popular in rural areas?
4. Describe the role of following in a poultry farming business :

   (a) NABARD (b) SFAC (c) NECC
5. What are the essential requirements for egg transport?
6. Write a short note on poultry promotion schemes.
7. Identify the agencies involved in marketing of eggs and broilers?
8. Which is the best marketing channel for eggs and live birds and why?

ANSWERS TO INTEXT QUESTIONS

13.1

(a) All in and all out

(b) large

(c) Contract Farming

Notes

(d) cost of finance

(e) organic chicken

(f) Andhra Pradesh, Tamil Nadu, Maharashtra, Karnataka in south and only Punjab

(g) NABARD Consultancy Services (NABCONS)

13.2

1. (a) Indirect marketing

   (b) direct

   (c) Broiler coordination

   (d) Swaranjayanti Gram SwarojgarYojana (SGSY)

2. (a) True

   (b) False

   (c) True

Notes

14

RECORD KEEPING

Records are important to the financial health of a business or operation. Efficient and profitable poultry operations are not guaranteed by good record keeping, but success is unlikely without them. Farm business records keeping refer to documentation of events, business or news that occurs on the farm, and it is a crucial step in the success of every farming business. Farm records keeping will provide you a tool to help in farm planning, farm management decision making, and projection of future profitability of the enterprise, with an aim of maximizing farm profit. This lesson will help you in filing, maintaining, and categorizing inventory, maintaining financial and production information for your flock.

OBJECTIVES

After reading this lesson you will be able to:

- maintain farm records;
- maintain record needed for organic poultry certification;
- register poultry records.

14.1 RECORDS

A good record provides data to assess financial ability of business operation analysis, assists in obtaining loans, measure profitability, file income tax return and overall decision- making process. Two types of records are maintained on farm:

(i) Account records for accountancy and

(ii) Technical records to evaluate performance of birds.

Accountancy records are: (i) Balance sheet (ii) Receipts (iii) Expenses. They are summarized on monthly or yearly basis to show the financial status of the farm.

Notes

Technical records are: (i) Feed record (ii) Grower flock record (iii) Layer flock record (iv) Incubation record (v) Vaccination record (vi) yearly assessment record.

The format of records can be modified as per need and flock size.

14.1.1 Purposes of Records

Records are maintained for following purposes:

- Measure profit and access the financial ability of the business/operation.
- Provides data for business/operation analysis.
- Assists in obtaining loans.
- Measure the profitability of individual operation.
- Assist in analysis of new investments.
- Help prepare income tax returns.

14.1.2 Records to be Monitered

Following records should be monitored on daily basis:

- Feed consumption
- Water consumption
- Maximum and minimum temperature
- Mortality and laboratory diagnostic reports
- Medication
- Vaccination
- Feed, gas, litter deliveries, etc.
- Body weight records
- Record on a flock basis
- Electricity usage
- Gas/oil usage
- Stocking density

14.2 METHODS OF RECORD KEEPING

Traditionally, growers have kept records by hand. In many cases, a hand recording system is still useful for many growers. Yet, the use of computers and computer software has expanded on farms in recent years because of better record accuracy. The farm manager decides on the system that best fits his/her situation.

Notes

Hand Recording System: Characteristics of hand recording system are:

- Low initial out-of-pocket expense.
- Easy to start.
- Requires only pencil & paper.

Computer Recording System: Characteristics of computer recording system are:

- More accurate & faster.
- Tax deductible as an expense.
- Much easier to create analysis.

INTEXT QUESTIONS 14.1

Fill in the blanks

(a) ..... are essential tools for managing a successful poultry business.

(b) The format of records can be modified as per need and ..... size.

(c) Traditionally, growers are using ..... for maintaining records.

(d) Growers are using ..... because of better record accuracy.

14.3 POULTRY FARM RECORDS MAINTENANCE

As discussed earlier, farm records can be broadly classified under two categories:

- Production/ Technical records
- Account records or Financial records

The nature of the records varies, based on the type and volume of the enterprise. However, irrespective of the type and size of enterprises, the basic records to be maintained are as follows:

14.3.1 Attendance and daily wage register

This deals with the number of persons employed daily and wages dispersed to them; including the stamped acquaintance.

14.3.2 Building register

This deals with the various farm buildings and other civil works like well, fencing, roads etc. In this register, you have to maintain the petty repairs and expenditure incurred for their maintenance. Moreover, the annual depreciation on buildings should also be worked

Notes

out every year. After deducting the annual depreciation, the actual worth of the buildings should be brought forward for various accounting purposes.

14.3.3 Equipment register

This includes various farm equipment machineries like feed mill, vehicles, cages, incubators, feeders, waterers etc. The date, source, number and cost of purchase of equipment must be recorded. The repairs carried out along with the details of repairs also must be indicated.The annual depreciation should be calculated for equipment and the actual post-depreciation value for equipment must be brought forward for the next year.

14.3.4 Feed and feed ingredient register

Feed is the major item of expenditure in poultry production. Hence, much care should be exercised in maintaining this register. Few pages must be allotted for each feed ingredient of the feed. For each of these feed items, the opening balance, receipts, issues, storage loss, manufacturing cost and the closing balance has to be maintained.

In the remarks column, the source of purchase, invoice number and date and cost per unit must be indicated. Since the feed ingredient prices vary frequently, the actual ingredient cost for each batch of feed mixed must be taken into account, for accurate calculation.

14.3.5 Feed additives and medicines register

This register keeps track of the various feed additives, medicines, vaccines, disinfectants, chemicals purchased and utilized. The opening balance, receipts, issues, closing balance and a remarks column must be maintained for each item. In the remarks column, the invoice number, date, cost and source of each purchase have to be indicated.

14.3.6 Layer farm register

For each batch, the production performance register has to be maintained from day one to disposal; with the following columns:

- Date, age in days, opening balance of birds, mortality, feed issued, feed/ bird/ day, eggs produced, % Hen-day egg production, Feed/ egg and remarks.
- The remarks column should deal with date of vaccinations, debeaking, medication, post-mortem report if any, sale of culled birds and any other relevant information.
- A separate book has to be maintained for each batch from day one to disposal, so that batch wise economics can be calculated.

14.3.7 Broiler farm records

Before the regular columns, the batch number, source of chicks, number of paid and free chicks received, date of hatch, cost per chick and strain, have to be recorded.

Broiler farm records includes batch wise performance with the following columns:

Notes

- The regular data to be recorded are date, age in days, opening balance of birds, mortality, total feed issued and remarks.
- In the remarks column the medication and vaccination details, cause of death may be indicated.
- These regular columns should continue up to 56 days; but recording should be done until the date of sale.
- Below these regular columns the particulars like total live body weight of birds sold, number of birds sold, per cent mortality, total feed consumed, feed conversion ratio, cost of feed, sale price of broilers sold, cost of chicks and miscellaneous cost (electricity, labour, medicine, vaccination, fuel etc) have to be recorded.
- Based on the above data, the actual cost of production/ kg live weight and the profit/ loss incurred for that batch has to be calculated.

14.3.8 Breeder farm records

The records will be similar to that of the layer farm. However, one more column, namely the number of hatching eggs produced daily has to be included in the batch wise performance and egg out turn register.

14.3.9 Hatchery records

The hatchery should maintain a register similar to that of egg out turn register but with some modified columns which should include date, opening balance, receipts, settings, discards and sales, chicks produced, chicks sold, chicks discarded, free chicks and remarks.

14.3.10 Batch wise hatchery sheet

This may be maintained, to provide the various information like serial setting number, number of eggs set, type of eggs, strain, source of eggs, number of eggs discarded, number of eggs transferred to hatcher, number of good chicks hatched, number of weak chicks, number of pullet chicks (in case of egg-type only), number of male chicks and mode of disposal, per cent total hatchability and per cent fertility.

14.3.11 Chick out turn and disposal register

This register consists of strain wise chick out turn and disposal particulars, consisting of date, opening balance of chicks, chicks hatched, chicks sold, chicks used for own purpose, chicks discarded, chicks given as free margin, closing balance, price per chick and remarks.

The remarks column should have the Marek's disease vaccination and other particulars.

14.3.12 Feed mill record

The feed mill registers will be similar to the general registers discussed above but with more details about individual feed ingredients. Instead of maintaining few pages for each

Notes

ingredient and feed in the same register, a separate register has to be maintained for each ingredient and feed. An extra column showing the feed ingredient shortage due to storage, grinding and mixing loss has to be indicated at the expiry of each batch or lot received or mixed. Moreover, the remarks column must indicate the source of purchase, bill number, unit price and mode of payment, in case of feeding ingredient. In case of different feeds prepared – to whom sold, quality, rate per unit, invoice number and mode of receipt should be indicated.

INTEXT QUESTIONS 14.2

Fill in the blanks

(a) ..... deals with various farm buildings and other civic works.

(b) ..... includes various farm machineries like feed mill, vehicles, cages, incubators, feeders, waterers etc.

(c) ..... is the major item of expenditure in poultry production.

(d) ..... involves detailing of individual feed ingredients brought to the farm.

14.4 REGISTRATION AND RECORDS OF POULTRY

As an owner / keeper of poultry you are required to notify / register as keepers of poultry and have to keep a record related to your poultry.

These records include:

- The movement of poultry and eggs on to and off premises.
- The transport and marketing of poultry.
- Any medicinal treatment administered and mortalities.
- Measures put in place to control hazards.
- The results of testing for salmonella.

14.4.1 Movement records of poultry

If you own or keep any flock of 250 poultry or greater, consisting of any species on the premises, needs to keep a record of poultry entering or leaving those premises.

Record details required:

- Date and place when poultry or eggs obtained.
- Species and description of poultry.
- Name and address of person from whom poultry obtained.

Notes

- Date when poultry left the premises.
- Name and address of person to whom they were transferred.
- Destination (if known).
- Purpose for which poultry left the premises.

Retention and production of records:

- Records should be kept for 12 months from when dated as being marketed or transported.
- Records should be produced to inspector at all reasonable times.

14.4.2 Hatchery records

When eggs or chicks are moved on to or off the hatchery the occupier must record the following:

- Date of movement.
- The number of eggs or chicks moved.
- Whether the movement is on to or off the hatchery.
- If the movement is off the holding, the holding destination.
- In the case of eggs brought on to the hatchery for incubation, holding of origin.

14.4.3 Records of movements

When birds are moved on to or off the holding you must record:

- The date of the movement.
- Whether movement was on to or off the holding.
- Number of birds moved.
- Age of birds moved.
- In case of the movement of an entire flock, the identification of that flock where there is more than one flock on the holding.
- The identity of the building or group of buildings into or from which the birds were moved.
- The address of the holding that they came from or the slaughter house or holding they were sent to.

14.4.4 Transport records

The following points should be recorded under transport records:

Notes

- Origin and ownership of the poultry.
- Place of departure.
- Date and time of departure.
- Intended place of destination.
- Expected duration of the intended journey.

14.4.5 Medicine records

Record following points under medicinal records:

- Proof of purchase of veterinary medicines
  - name of product and batch number
  - quantity purchased
  - name and address of supplier
- Administration
  - name of product
  - date of administration
  - quantity administered
  - withdrawal period
  - identification of animals treated
- Disposal
  - date of disposal
  - quantity of the product involved
  - how and where it was disposed

INTEXT QUESTIONS 14.3

State True or False

(a) Owners of poultry have to maintain movement record of the poultry/ egg.

(b) Records should be kept for 24 months from when dated as being marketed or transported.

(c) In case of the movement of an entire flock, the identification of that flock should be recorded.

(d) Records of medicines purchased and given to poultry should be recorded.

Notes

WHAT YOU HAVE LEARNT

Let us recapitulate and enlist salient points we have learnt through this lesson:

- Farm records keeping provides the farmer with a tool to help in farm planning, farm management decision making, and projection of future profitability of the enterprise, with an aim of maximizing farm profit.
- Record keeping involves keeping, filing, maintaining, and categorizing inventory, financial and production information for the flock. This can be done by hand recording or by using computer software.
- In general, farm records can be broadly classified under two categories: Production/ Technical records and Financial records.
- The nature of the records varies, based on the type and volume of the enterprise.
- Owners / keepers of poultry are required to notify / register as keepers of poultry
- Record relating to movement of poultry, transport and medicinal records.

TERMINAL EXERCISE

1. Indicate True (T) or False (F) to the following statements:
   (a) Record keeping will serve as important source for monitoring and evaluation.
   (b) Accountancy records are feed record, Grower flock record and Layer flock record.
   (c) Recordkeeping involves keeping, filing, maintaining, and categorizing inventory, financial and production information for your flock.
   (d) Feed is the major item of expenditure in poultry production.
   (e) Equipment register includes various farm equipment machineries like feed mill, vehicles, cages, incubators, feeders, waterers etc.
2. Explain the types of poultry farm records.
3. Why record keeping is important?
4. Enlist the poultry farm records to be monitored daily.
5. Write the methods of record keeping.
6. Describe the basic records to be maintained at a poultry farm.
7. Enlist the records to be maintained as a registered poultry keeper.
8. What are the records required for the movement of poultry?

ANSWERS TO INTEXT QUESTIONS

Notes

14.1

(a) Records

(b) flock

(c) hand recording systems

(d) computers and computer software

14.2

(a) Building register

(b) Equipment register

(c) Feed

(d) Feed mill record

14.3

(a) T (b) F (c) T (d) T

TERMS TO KNOW

Ad libitum – As desired or as required or without restriction.

***Ad libitum* feeding** – It is a labour saving system under which poultry birds eat as much as they wish.

Age at sexual maturity – Age at which 50% of the birds are producing eggs or average of the age at which each of the birds produces her first egg is called age at sexual maturity.

Artificial insemination – Artificial transfer of cock's semen into hen's reproductive tract.

Assets – Property or possessions, value of things owned.

Balance sheet – Statement of assets and liabilities as on a point of time

Beak trimming – Trimming (cutting) the part of upper and lower beaks by use of electrical trimmer.

Bell drinkers – Drinkers which are bell-shaped or circular.

Breeders – Birds which produce hatching eggs.

Broiler – Chicken grown for meat purpose generally marketed at or before completion of 6 weeks of age.

Brooder – Metallic or wodden equipment used in artificial rearing of chicks from one day up to 5 weeks, for providing artificial warmth at controlled temperature.

Brooder guard – Chain-linked GI or cardboard pieces (each of 30 cm in height and 60 cm in length) arranged all round and 30 to 45 cm away from the brooding area.

Broodiness – A natural instincted desire in female birds to hatch young ones out of eggs.

Brooding – Procedure in which heat is provided artificially to the chicks till 4 weeks of age.

Broody – Tendency to sit on eggs to hatch.

Candling – Method to see contents of an egg without breaking it through a beam of light.

Canopy – An umbrella-like structure made of GI or bamboo or other suitable material.

Capital – Money with which starts a business, wealth.

Chick – A young chicken, pheasant or other game bird from one day to about seven to eight weeks of age, either male or female.

Chicken – The domestic bird most widely distributed and commonly used for meat and egg purpose.

Choking – Difficulty to respire due to blockage at the throat.

Circular feeders – Feeders which are hung from the roof which are circular in shape.

Crate – A container usually made of wood or plastic for carrying live poultry birds

Culling – The elimination of unproductive or otherwise undesirable birds which judged from their physical characteristics are found to lack the qualities for which they were reared, whether it be for egg production, meat purpose or for show.

Debeaking – It is the process of cutting the part of beak.

Deep litter – A 6 to 8 cm deep bedding of paddy husk or groundnut shells or paddy straw or any other material spread on the floor to give comfort to the birds.

***Desi* –** Local birds.

Deteriorate – To become inferior in character, quality, value etc.

Deworming – The process of removing worms from the gastro intestinal tract.

Diary – Daily record of events.

Dipping – The brief immersion of animals or birds/eggs in an insecticidal or antibiotic liquid to rid them of insects, mites, ticks, bacteria etc.

Discarded – To throw away; reject.

Disinfectant – A product which at certain concentrations, will kill on contact a wide range of disease causing organism.

Down feathers – Hair like feathers on the newly hatched chicks.

Dressing percentage – Ratio of total edible portion to total weight of bird multiplied by 100.

Extensive system – Birds reared freely without any specific building.

Feed Conversion Ratio (FCR) – kg Feed consumed per kg weight gain.

Fertile egg – Egg containing living germplasm or developed embryo to produce chick.

Fertility – The ability to produce offspring.

Foraging – The act of looking or searching for feed.

Fumigation – is a process in which an area is disinfected or purified with the fumes of certain chemicals; in poultry operations, formaldehyde is commonly used.

Grower mash – Specially prepared meal mixture for young stock during the growing stages.

Growers – Chicken aged between 8 and 16 weeks; or which are more than 8 weeks old and not sexually mature to produce eggs.

Growers – Those chicks which are reared from nine week onwards till they start the laying or egg production start (9-20 weeks).

Hanging feeders – Feeders which are circular in shape and are hung from the roof.

Hardy – Able to survive under unfavourable weather conditions or able to with stand difficult conditions.

Hatchability – The ability of fertile egg to hatch into chick.

Hatcher – Part of incubator where fertile eggs are transferred for the last 3 days of incubation.

Hen day egg production (HDEP) – This is arrived at by dividing total eggs laid in the season by the average number of birds in the house. Due allowance is made for mortality and culling. This figure is higher than the hen-housed average.

Hen Day EGG Production – Number of eggs produced per 100 live layers.

Hen Housed Egg Production (HEEP) – Number of eggs produced per 100 layers housed at the beginning.

Homeotherm – Animals which can maintain body temperature within a narrow range regardless of the outside temperature.

Homoeothermic – Animals which can maintain body temperature within a narrow range regardless of the outside temperature.

Income tax return – Tax levied on income. Income tax return is the acknowledgement of income tax deposited.

Incubation period – Time required for a fertile egg to hatch into a healthy chick.

Incubation – A process of hatching the chicks from fertile eggs.

Incubator – Machine where eggs are incubated to hatch out chicks artificially.

Indigenous – Local.

Infertile egg – Eggs without embryo.

Infrared bulbs – Bulbs which emit infrared rays; available in red and white colors; 150 or 250 W.

Intensive system – Rearing many birds within a building.

Layer – A hen kept for laying eggs.

Layers – Mature chicken producing eggs; usually over 18 weeks of age.

Laying – Act of giving egg is known as laying.

Linear feeders – Feeders which are long or straight.

Litter – A bedding material used for the rearing of poultry birds.

Livability – Ratio of total number of birds sold to total number of chicks purchased multiplied by 100.

Manure – Poultry excreta.

Mash Feed – Type of feed which is powdery in nature.

Mash – A mixture of feed ingredients crushed and mixed so that birds cannot easily separate out ingredients. All mash indicates a complete ration mixture to be fed without grain supplement.

Mortality – The ratio of deaths in an area to the population of that area.

Nasal – Nose.

Ocular – Eyes.

Odourless – Having no smell.

Pedigree – Having recorded line of descent.

Pellet – Type of feed which has uniform sized granules.

Perishable – Subject to decay, spoilage, or destruction

Photoperiod – Duration of light including sunlight; or total illuminated period.

Plinth – Height to which the building / floor is raised from the ground.

Poikelotherm – Animals which change their body temperature depending on outside temperature.

Poultry – Those species of birds which are reared for economic benefit. It mainly includes Chicken, ducks, turkeys, guinea fowl, Japanese quail, pheasant, geese, emu, ostrich etc.

Predators – An animal that lives by capturing and eating other animals.

Pullets – Pullet is a female chicken under 1 year of age and has not yet started laying eggs.

Radiation – mode of transfer of heat in which the medium is not heated and only those which come into contact or obstruct will get heated.

Receipts – Receiving payments.

Relative Humidity – The ratio of the amount of water vapour in the air at a specific temperature to the maximum amount that the air could hold at that temperature, expressed as a percentage.

Run space – Space provided outside the brooder area contained by the brooder guard.

Sanitizer – A chemical that reduces the numbers of disease causing organisms to safe levels.

Scavenging – Eating outside in an open area.

Setter – Part of incubator for setting of eggs during 18 days of incubation

Shelf life – The length of time a product or packaged food may be stored without becoming unsuitable for use or consumption

Stacking – Arranging one over the above

Starter – Chick of either sex in the age group of 0 to 8 weeks of age.

Surplus – An amount or a quantity in excess of what is needed.

Thermoregulation – Regulation of temperature, in general, and body temperature, in particular.

Worming (Deworming) – Getting rid of internal parasites.