Training Manual
for
Semi Commercial Layer Farming

Veterinary Officers' Training Institute
Laxmisagar, Bhubaneswar

Government of Odisha

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Content

Scope of commercial layer farming in Odisha

Poultry sub-sector plays an important role in State economy and provide employment opportunity to unemployed youth in the State. Layer farming have become popular entrepreneurial activity for unemployed youth and the growth rate during last 5 years is nearly 20%. Poultry layer production has assumed an important role as a commercial activity with enormous potential for rapid economic growth.

Poultry egg is a cheap source of animal protein and it confirms to be a total source of nutrition for development of human body. Egg is in great demand for its nutritive value and households prefer for its easy cooking procedure. Layer farming is done to get eggs by raising hybrid layer birds. Layer birds start laying from 18-19 weeks and continue laying upto 72-78 weeks.

Scope of layer farming:

Animal food is considered a good source of quality nutrients viz. Fat, protein, carbohydrates, and minerals. The digestibility of animal-source protein is 90-97% while vegetable origin proteins have 75-99%. However, proteins of animal origin are more completely digested and nutritionally superior to those of plant origin. On the other hand, plant origin proteins are deficient in at least one of more essential amino-acids e.g. Some cereals in lysine and some legumes in methionine but the animal proteins contain all essential amino acids. The egg almost fulfills all the criteria of a perfect balance nutrient diet and one egg provides roughly 80 calories of energy to our body. As per the recommendation of Indian Council of Medical Research, half egg per day is required. In order to reach the per capita availability at par with National average, we require nearly 1 crore eggs per day to meet our domestic requirement, whereas our commercial table egg production is nearly 86 lakhs per day. There is also continuous rise in consumer demand for egg. Since, we are not yet self sufficient in egg production, layer farming has gained momentum during last few years in State.

Poultry development in Odisha has taken a quantum leap during last one decade. The contribution of egg from commercial sector is nearly 90% and from backyard sector it is 10%. It has been estimated that around 143 big commercial layer farms are existing in the State. During last 2 years small-scale commercial layer units with 1000 bird capacity have been set up with government support. The average income per month from these 1000 layer unit is approximately Rs. 20,000/-, which is quite alluring economic activity for entrepreneurs. The layer farming has a huge potential for growth and has been identified as a key sector with the potential to create jobs and help address the short fall in the supply of egg in State.

There are 142 poultry big commercial layer farms in the state with total bird strength of 99.6 lakhs layer birds representing around 2.5 percent of the Country's layer population. Odisha is

the twelth largest producer of poultry egg in the Country (as per Basic Animal Husbandry Statistics 2019-20). Odisha is one of the leading State to have declared Poultry as Agriculture and initiated many promotional efforts such as (1) Reduction of electricity tariff for poultry farming at par with Agriculture tariff (2) Exemption of Entry tax paid on commercial layer chicks and eggs produced inside the state, (3) Supply of egg in mid day meal scheme at primary schools and (4) Capital subsidy for layer farming under Mukhya Mantri Krushi Udyog Yojana. Therefore, a lot of scope is there for Layer-farming in Odisha.

Layer farming has been considered as subsidiary occupations of farmers to supplement their incomes because it assures quick returns, requires minimum space and investment and can be carried out by ordinary farmers. Commercial layer farms play an important role in meeting national protein through the supply of eggs. Eggs and chicken are accepted by all communities and are available at the most reasonable prices. Eggs and chicken are important “food items” today. The poultry sector in India has undergone a significant change in structure and operation. In Recent days, our State has launched many welfare schemes on promotion of egg production.

The sale of eggs generate significant income to farmers. After the chickens' laying capacity decreases, usually after 72 weeks, the birds could be sold as fresh meat. Chicken manure contains essential plant nutrients and can be used or sold to crop farmers and plant nurseries as fertilizer or soil conditioner. The time needed to brood, grow and feed layer birds or to collect eggs in a small commercial layer unit can be managed easily by the farmer. It normally takes one to two hours to feed, clean, and collect eggs daily.

Advantages of layer farming:

- Easy to learn managemental practices for poultry farming.
- Poultry farming is not highly labor intensive.
- Short generation interval of poultry as compared to other' livestock
- Availability of quality hybrid chicks
- Quick, assured and better returns compared to other livestock species
- Availability of trained manpower
- Better understanding and knowledge of the improved and scientific methods of feeding, management and health control
- Poultry's nutritive value and economic feasibility.
- High domestic demand for egg

Importance of egg in human nutrition

A hen's egg, weighing nearly 57 grams, supplies about 50 grams of food material made up of 18 grams yolk and 33 grams of albumen.

Nutrients-wise, the egg primarily contains: proteins, vitamins, minerals & fats. A medium size egg provides roughly 80 calories of energy to our body. To conclude in one sentence, one can say, eggs are: nutritious, cost-effective and delicious.

Why are eggs such an important food?

Eggs have the best quality of protein containing almost all essential amino acids required for our body. Eggs contain almost all vitamins including Vitamin "A" which is essential for good eye sight and vitamin "D" for calcium absorption to give strong and healthy bones. They also contain various minerals including Iodine, required for proper Thyroid's functioning. We get Iron from the eggs which helps to produce haemoglobin in our body. The yolk of eggs prevents age related macular degeneration and deterioration of eye sight. Eggs contain antioxidants like Lutein and Zeaxanthin which help in reducing the risk of cataract.

Research tells that regular intake of eggs by teenage girls prevent breast cancer in later ages. Leucine (Amino acid) content of the eggs helps burn fat faster and thus keep one slim and fit. Last but not the least, the eggs contain choline which helps improve memory.

Content of egg and Food Value

The major contents of egg constitutes 4 components: shell, shell membrane, albumen and yolk.

Shell : It is the hard outermost covering amounting 8-10% of total egg weight. Shell colour usually varies with the breed. The shell that provides protecting covering to the liquid protein has pores for exchange of air during embryo development.

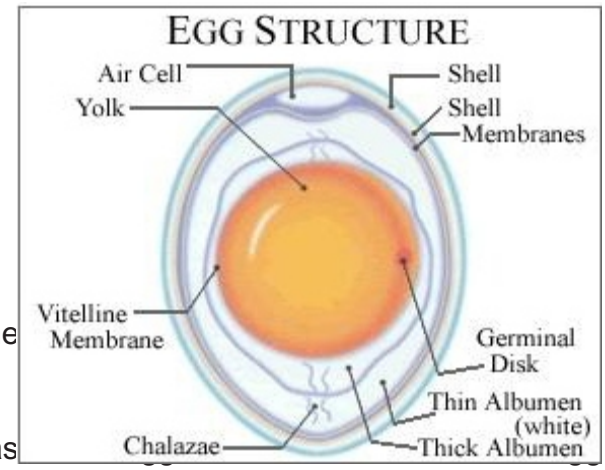
Shell is composed of:

1) Calcium carbonate : 94%

2) Calcium phosphate : 1%

3) Magnesium carbonate : 1%

4) Organic matter (chiefly protein) : 4%



Shell membrane: Next to shell, there are two me constituting 0.6% of egg weight.

Albumen / egg white: It is not a homogenous mas weight composed of 4 layers: Outer thin albumen; outer thick albumen; inner thin albumen & inner thick albumen (chalazaeferous layer).

Yolk: It is a yellowish ball like structure enclosed below the thin vitelline membrane constituting 30-33% of total egg weight.

Myths about consumption of egg

Myth - 1	Eggs are high in cholesterol and can increase the risk of heart disease	Research study confirmed that there is no affect of daily-egg intake on blood cholesterol levels.
Myth - 2	Egg white is better for health rather than Yolk	Egg white and Yolk contains different vitamins and minerals. The egg white is a great source of protein, riboflavin and selenium but most of the egg's nutrients and nearly half of its protein is found in the yolk.
Myth - 3	Eggs are high in fat.	Eggs contain low saturated fat, containing an average of just 1.7g per egg.

Biological value of egg:

Eggs contain wholesome nutrients such as protein, fats, vitamins and minerals. The recommended dietary allowance for average human being and quantity available in egg is given below.

Table 1: Contribution of eggs to daily nutrient requirements in humans

Major Contents	RDA for moderately active man of body wt 65Kg (ICMR 2020)	Quantity in one egg (50g)	% requirement
Energy (Kcal)	2875	72	2.50
Protein (g)	54	6.28	**11.63**
Fat (g)	20	4.76	23.80
Carbohydrate (g)	130	0.36	0.28
Calcium(g)	1	0.028	2.80
Phosphorous (g)	1	0.116	11.60
Iron (mg)	19	0.88	4.63
Vitamin A (I.U)	3330	600	**18.02**
Vitamin D (I.U)	400	50	**12.50**
Vitamin B1 (mg)	1.8	.095	5.28
Riboflavin (mg)	2.5	0.19	7.60
Nicotinic acid (mg)	18	0.04	0.22

*As per the recommendation of ICMR, half an egg per day is required.

Traditional uses of egg in our diet:

Of all the recommended methods of cooking, half boiled egg is the best as there is little or no loss of proteins and vitamins. Raw eggs are never recommended for consumption for several reasons. Raw eggs sometimes may contain a type of pathogenic bacteria called '*Salmonella*' which can cause food poisoning. In fried eggs, the loss of proteins depends on the temperature at which egg contents are fried. If frying is done at low temperature, only about 0.1 g protein (out of 6.5 g) may be lost. At high temperature as much as 15% of proteins and significant amount of vitamins are lost. In omelettes and poached eggs, the loss of protein is about 0.2 and 0.5g, respectively. While in scrambled eggs the loss is about 1g. From the point of view of nutrients, half boiled egg is best preferred, followed by full-boiled,

Establishment of small-scale commercial Layer unit

Commercial layer units should be managed in intensive production system. This type of production system is better than free range production system since it uses inputs like supplemental feed, vaccine, health care etc. It is market oriented and the main objective of production is to get more profit.

Selecting a suitable land area is the first important step in establishing a layer farm. A farmer should have at least one acre of land to set up a 10000 bird layer unit. While establishing a layer farm, the following points should be taken into consideration.

1. Selection of location

- The poultry house should be located in an elevated, well drained ground, safe from flood. High land with loamy soil provide good drainage. The poultry shed should be constructed at least 2 m above the water table and at least 0.5 m above ground level.
- It should be a quiet area with plenty of fresh air and ventilation.
- It should be 500 metres from residential zone in order to avoid nuisance caused due to odour & flies area.
- It should be 100 m from major water course like river, lakes, canals and drinking water source like wells, summer storage tanks, in order to avoid contamination due to leakages/ spillages, if any.
- 100 m from national Highway (NH) and 50m from State High way (SH) in order to avoid nuisance caused due to odour & flies.
- 10-15m from rural roads/ internal roads/ village pagdandis (road)
- The Poultry sheds should not be located within10 m from farm boundary for cross ventilation and odour dispersion
- It is always recommended to establish a farm atleast 500 meter away from another poultry farm.
- The long axis of the farm should run from East to West direction allowing good ventilation. The space between two poultry houses of same age group should be minimum 18 meters.
- Accessibility to all types of transport.
- There should be open space for good ventilation.
- Sufficient extra space for possible future expansion.

2. Availability of basic infrastructure like water, electricity

- Lighting is an essential element of a layer operation. Light control is important throughout the production process as it encourages healthy weight gain since birds need to be awake and able to see in order to eat. Heat is also important, particularly

during the brooding stages. If electricity is not available, solar based lighting options include LED bulbs can be thought.

- A poultry farmer should have access to clean water throughout the year. The quality of the water should be equal to home drinking water. A flock of 1000 chickens requires 7000 litres of water per cycle.

3. **Approval from local authorities/ regulatory bodies:**
   - Poultry farmers are required to obtain relevant approvals from local authorities, specifically the pollution control authority, in order to engage in poultry production.
4. **Readiness of farmer**
   - Anyone interested in layer farming must be comfortable working with birds. The farmer must be able to handle chickens without fear and in a calm and gentle manner. He/she must be comfortable handling waste, specifically bird droppings and be able to keep the farm clean.
   - Layer birds should not be treated badly. It is important to remember that a happy flock is a profitable flock.
   - A farmer must closely observe the conditions of birds and he/she must know how to spot any unusual behaviour.

Layer Production System

There are 2 common types of intensive chicken production systems in State, which include deep litter system & cage system. Now a days intensive system of rearing is adopted by the Entrepreneurs. Intensive system of farming is practised in two ways such as Deep litter system and Cage system of rearing.

1. **Deep litter system**
   - In this system broiler birds are reared in a well-designed housed floored with litter material made up of paddy husk, saw dust, dried leaves etc. with availability of feed & water inside the house.
2. **Cage system**
   - It is the most efficient poultry housing system which involves rearing of birds in small compartments in metallic cages. This is widely practiced system for housing commercial layers birds. The birds are generally housed in cages erected on raised platforms in open sheds. These cages are arranged in rows. Three or four birds are accommodated in each cage with provision of drinking water and feeding. The water is provided through a nipple fitted to a closed pipe running at head height of the bird. Feed is placed in a trough attached to the front of the cage and distributed often manually or by automation. The droppings of birds slip through perforations instantaneously and are collected on the floor.

Strains of commercial Layer Breeds

These birds are meant for egg purpose only. They are genetically superior to produce more egg. These breeds have increased egg production with better feed conversion ratio (FCR). The commercially available layer chicken varieties are BV 300, BV 380, Hyline W-36, Babcock, Bovans white, Lohmann etc.

Name of Breed	Production performance	Source
BV 300 White	330 eggs during 19 – 72 wks period	Venkateshwara Research and Breeding Farm Pvt. Limited, Pune
BV 380 Brown	290 eggs during 19 – 72 wks period	Venkateshwara Research and Breeding Farm Pvt. Limited, Pune
Hyline W-36 brown	300 eggs during 19 – 72 wks period	Ponni Hatcheries Private Limited, Namakkal
Bovans white	330 eggs during 19 – 72 wks period	Pioneer Hatcheries, Pongalur- 641 667. Coimbatore (DT), Tamilnadu.

Ongoing Government Schemes:

1. Support to farmers for Layer farming under Cage system

- Individual farmers are supported. Priority is given to improve the livelihood of migrant workers of the state who have suffered serious economic loss and are in distress along with SC/ST beneficiaries.
- Unit cost of 1000 birds' layer unit in Cage system is Rs.7,59,200.00/-
- 40% subsidy of Rs 3.0368 lakh per layer unit. Share of farmers @ 60% would be Rs.4,55,520.00
- 14 weeks old pullets will be procured directly by the beneficiary

Block Inspection Team

- BVO/AVAS
- Panchayat Extension Officer
- Concerned Livestock Inspector

District Level Committee under the Chairmanship of the District Collector

- CDVO
- ADVO (LP)
- District level representative of Mission Shakti
- PD, DRDA

Process flow

- Collection of application form
- Block Inspection Team after verification of site recommend the application
- DLC approves the beneficiary list
- Issue of Go – ahead Letter

- Construction of poultry shed by beneficiary as per the specified design
- Inspection by BIT after completion of shed and report
- Release of back ended subsidy (40%)
- Inspection of the fully stocked poultry unit and recommend with geo tagged photo
- Release of remaining subsidy (60%)

2. Layer farming in Deep Litter System through WSHG

- The unit cost of 200 capacity poultry bird layer unit is Rs. 2.00 lakh with a subsidy of 50% i.e, Rs. 1.00 lakh per unit.
- The Women Self Help Groups have to arrange 40% of the project cost unit.
- 4 weeks old will be procured directly by the beneficiary from reputed sources or Govt. farms.

3. Mukhyamantri Krushi Udyog Yojana

This is a State Funded scheme for establishment of more number of Commercially Viable Agri Enterprises (CAEs) in the State in a simple, online, transparent & time bound manner.

Minimum size of Project:

- Layer Unit - 10000 birds – Rs. 80 lakh

Subsidy:

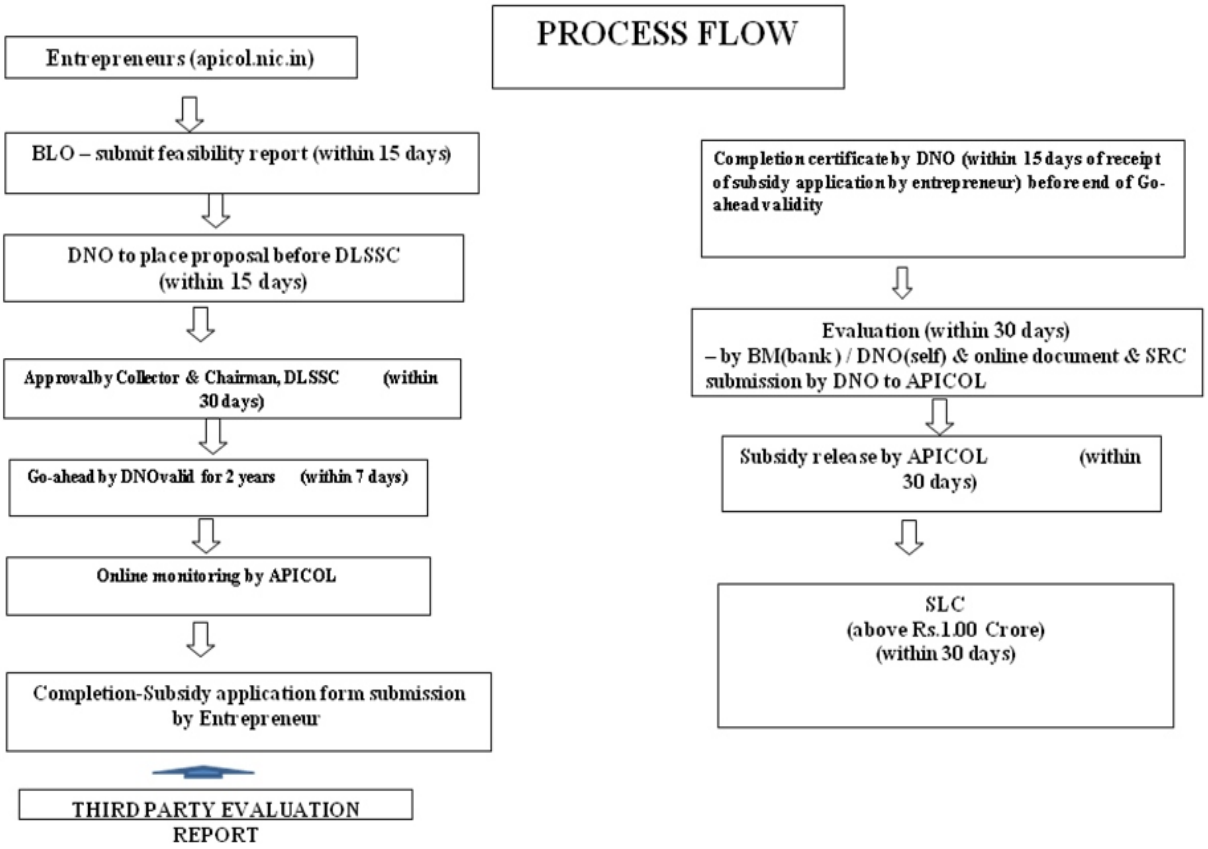
1) General Male: @ 40% of Capital Investment
2) SC/ST/Women / Graduates in Agril and allied discipline @ 50% of Capital Investment excluding cost of land Max. Rs. 50.00 lakhs

How to tag with the scheme?:

The Government scheme is tagged to the beneficiary depending upon the willingness. The major criteria like investment capacity & feasibility study need to be done. The beneficiary has got his/her own choice to select the category of farm. The Government scheme which is befitting for the beneficiary may be tagged. However the category of farming like backyard/ semi-commercial layer/ commercial layer/ layer should be well distinguished during site selection & availability of land with the beneficiary.

A Project report in this regard may be prepared by the concerned BVO in favor of the beneficiary. Accordingly, the application of the farmer may be processed & forwarded to the concerned authority.

When it is a large commercial poultry farming, the beneficiary has to apply directly in the web portal. APICOL is the nodal agency. The flow chart is given below.



Standard Practices for Poultry Layer Farming

A. Layer Hen Selection:

For commercial eggs production, choose highly productive laying hens. The chosen breeds must have good production capability. If your chosen breed contains the desired characteristic and have a reputation for egg production, then that breed will be suitable for your business. Always purchase healthy chicks from a famous and popular hatchery.

B. Basic tenets of Poultry housing:

The Poultry shed shall be located on a fairly raised and properly drained site not liable to flooding. The long axis of the house should face east-west direction, to avoid direct sunlight in areas which experience heat and draught in most part of the year. The length of the shed should be based on number, type of birds and system of rearing. Width should not exceed 9m or 30ft, as a principle, to avoid ammonia accumulation in the shed.

C. Preparation of shed before brooding:

After the old birds have been removed, remove all the non-stationary equipments and residual feed from troughs and bins. Eliminate all rodents and wild birds if any.

Remove all the manure, litter, feathers, cobwebs, dust, and any other organic materials by scrapping with hard brush & using flame gun. Also, remove all weeds and rubbish from the area outside the house. Insecticide should be sprayed all around & inside the shed.

D. Environmental guidelines for poultry farm

The layer farm should comply with the Central/ State Pollution Control Board guideline issued from time to time. The Fencing and green belt development are matters of concern for any farm. The farm should raise green belt all around the farm with minimum of two rows spaced apart of not more than 3m. The poultry farm should be fenced with barbed wire/ linked mesh up to a height of 1.5 m with appropriately secured entrance and outlet.

Efforts should be made to minimize odour/ gaseous pollution problem. Proper ventilation and free flow of air over manure collection points to keep it dry should be ensured. Protect manure from unwanted pests/insects. For proper protection of manure from runoff water, it has to be covered. Design, construct, operate and maintain waste storage facilities to contain all manure, litter and washings. Carcasses are to be collected promptly on regular basis and dispose should be carried out without damaging the environment.

i. Feed mills

The feed mill and godown should be located on a well elevated ground preferably near the entrance to the farm and isolated from other poultry sheds. It should have a separate entrance and exit without crisscrossing the internal poultry farm roads. Provision for vehicle type dip should be made available at the entrance control gate. Floor of the feed mill and godown should be concrete, damp proof, rodent/vermin proof and raised above the ground level by a minimum of 2 feet. One should have adequate fire and other accident safety provisions. All feed ingredients should be stored on pallets or platforms to facilitate easy detection of leakage and to prevent absorption of moisture from the ground. As far as possible, dust collector system should be installed in the feed mill.

- All the workers working in the feed mill should be provided with dust masks.
- Avoid pest infestation of stored feed ingredients by frequent inspection and following prompt interventions. Never store pesticides and other poisonous materials in feed plants or feed making premises. Provide exclusive storage facility within feed plant for feed additives like vitamins, minerals etc.
- Always Store finished feed in covered containers and try to deliver to sheds for distribution to birds in specially made closed delivery trucks avoiding baggage and its reuse. Never store finished feed in sheds for more than the current days requirement.
- Prevent interaction of feeds with wild birds, rodents, pests flies etc. as a measure of food safely and prevention of spread of diseases. Avoid spillages to limit wastage and discourage habitation for pest and rodents. Observe sanitation and cleanliness as a routine to ensure quality and safety of feed grains.\

E. Management of Solid wastes (Solid waste contains Dead Birds, Manure)

General Management:

Our primary focus is to minimize waste generation in regular farm management schedule. Always balance land application of manure to the nutritional requirements of soil and crops. Keep manure dry and avoid wet spots/patches. Store manure properly by following appropriate storage technology like composting. Reduce mortalities on the farm by proper care and disease prevention program. The products from the rendering plant can be used a pet food. No open burning or indiscriminate dumping of any dead birds feathers/ offal's unused materials like litter/ empty gunnies/ containers etc. should be adopted within or outside the farm premises. One should use reliable options for collection, storage, transport and disposal of dead birds.

F. Dead Birds Disposal

1) Burial

The purpose of burial is primarily for safe disposal of the dead birds, where existing infections and pathogens within the host, have to be shielded from healthy surviving lots. For this purpose, the dead birds should be separated from other healthy birds as soon as possible and should be stored in closed containers or disposed off within 24 hours by following any of the appropriate disposal methods.

Preferably, the dead birds burial pit should be of 3 to 4 m in depth and 0.8 to 1.2 m diameter and located above minimum of 3 m from the ground water table. The dead birds burial pit should be provided with vermin/ fly proof cover made up of wooded / metal / concrete having a central openable lid of proper size for day to day dropping of carcasses. The distance between any two burial pits should not be less than 1 meter.

2) Composting

The composting facility should not be located within 300 m from the nearest dwelling and 100 m from any well or water course. The capacity of composting facility must be sufficient to handle the average mortalities on the farm. The roof of the composting facility should be permanent with bottom concreted. The composting facility should be secured with link mesh all around raised to a height of 1.5 m above the ground level to avoid the predation by stray dogs etc. Moisture content of the composting pile should be approximately 60% & if it is more than this, it may result in odour problems and if it is less than this, it will reduce the efficiency of the composting process.

Carbon and nitrogen are vital nutrients for the growth and reproduction of bacteria and fungi. The carbon-to- nitrogen ratio must be in the range of 20:1 and 25:1 for proper composting. This is obtained by carefully balancing the dead birds and carbon sources.

Incineration

- The incinerator should be located in down wind direction to the poultry houses and populated areas.
- The incinerator capacity should be of sufficient size such that no unburnt carcasses are left in a days' operation.
- The guide lines and standards prescribed under Bio-Medical waste (Management and Handling) Rules, 1998 should be followed for erection and operation of the incinerator.

G. Manure Storage and Management Storage

The litter/ manure storage dumps should be minimum 2 m above the water table and of sufficient size based on the type and number of birds handled. It's base should be constructed with stone slabs or concrete or impermeable compacted clay. The litter/ manure storage dumps should have a 25 m buffer strip all around to keep out of wet areas/ drainage discharges. Keep manure dry. Store manure properly by following appropriate storage technologies.

a. Composting Manure:

The composting process of poultry manure consists of proper mixing of the waste with a carbon rich materials (eg. Paddy straw/ husk, wood shavings) in pits. Carbon to nitrogen ratio of 20:1 is usually recommended. Pure manure can also be composed if all factors are carefully monitored.

Addition of air by periodic stirring should be followed. Proper balancing of moisture level (35 to 50 % moisture) should be carried out. Emphasis should be laid on temperature monitoring, which determines if composting conditions have achieved. Efforts should be made to utilize manure for biogas generation, so that the combustible elements from the resources are gainfully separated and used for clean energy.

b. Waste water discharge:

The waste water generated from the cleaning operations (after each batch removal) should be collected in appropriate holding tank and put to use in the green belt. It should be processed for treatment and disposal of effluent is done so that the water can be free of odour & pathogen loads reduced to minimum. Proper drainage/ outlet for collection and discharge should be provided for storm runoff/ discharges from the farm. Efforts should be to improve drainage, reduce standing water and water ditches to control mosquitoes and flies.

Reduce water use and spills from drinking devices by preventing overflow or leakage and using calibrated well maintained self watering devices. Installation of vegetative filters (reed filters) and surface water diversions to direct clean run offs around areas containing wastes will help in decreasing spread of pollutants. Use of pressure pumps, hot water or stream in

cleaning activities instead of cold water and plain water scrubs can tremendously improve sanitation and reduce the quantities of wash water effluents considerably.

No obstruction should be created for any water cause within the farm or outside the farm boundary. Implement buffer zones to surface water bodies, as appropriate to local conditions and requirements and avoid land spreading of manure within these areas.

Good Management practices in poultry farm

The following good management practices should be followed in poultry farms.

a) Control of flies in poultry Farms

An integrated approach that ensures the proper treatment and disposal of manure, correct ventilation of sheds, control of temperature, good sanitization, swift repairs of leaks avoidance of feed spills, prompt removal of broken eggs and dead birds will all help control of flies in the poultry farms.

b) Control of Rodents:

Monitoring should be undertaken on regular basis after recognizing the rodent problem. The methods for the control of rodents may include

1. Exclusion 2. Trapping 3. Glue boards 4. Slow killing toxic baits 5. Rapid killing toxic baits and 6. Tracking powder.

c) Efficient feed management practices

Avoid exposure of feed and feed ingredients to rain, moisture, flies and pests. Ensure proper storage of feed and its transport. One should avoid reuse of used feed bags, as a principle. Keep feeder equipment always clean and tidy. Dispose the waste feed properly with due consideration to bio-security and environment. Balance the feed for meeting the precise nutritional requirements. Never store finished feed in sheds for more than the current days requirement. Match feed formulation to specific nutritional requirements of birds like growth, production, breeding etc. Follow sanitation and cleanliness as a routine to ensure quality and safety of feed grains.

d) Good pest management practices

Design and construct all poultry structures in such a way to keep out pests. Implement integrated pest control and management to control pests and limit pesticides use on farm. Always follow label guidelines for dose application and safety precautions while application of pesticides.

Risk and Challenges in small –scale layer farming

1. Health related issues

a. Infectious diseases: One of the critical factors in running a successful poultry operation is proper health management. The major issue to deal with in the poultry farming is the

presence of infectious diseases that can immediately spread throughout the farm. Now-a-days, Avian Influenza disease is causing serious threat to the farmers. Ranikhet Disease and IBD are other important diseases seen in poultry birds. In order to address the health related issues, the farmers have to adopt the routine health measure practices like routine deworming, periodic vaccination etc.

b. Stocking of birds: The stocks of birds are going to pose a serious threat being the carrier of diseases inside the shed. The rate of transmission and infection is especially higher when there are dead animals involved. These deceased animals can carry highly- infectious pathogens that can easily enter into the shed. Further spread of the infections can be enhanced by movements across the farm.

c. Choice of Feeds: Though feed is essential to the growth of the produce, these can also act as a medium of infection during their transportation. Additionally, pests can infest the feed causing the transfer of disease easier and faster. The farmer has to be cautious while transportation of feed into the farm.

2. Waste Management Procedures & Composting:

An efficient waste disposal system should be placed for dealing with dead birds. The owners must also adopt regular disinfection procedures. One of the least paid attention aspects of poultry farming is the disposal of compost in the premises. These neglected part of any poultry farm put the birds at a greater risk of infection. Composts attract a host of intruders since these areas are sources of food among animals such as foxes, rats. The farmer should follow the strict waste management protocols. The flies in and around the layer farm are the potent threat of infections which should be minimised by adaptation of strict prescribed sanitary measures.

3. Vehicles and through fare

Movement of the vehicle inside the farm premises should be restricted. Restrict the entry of visitors to the farm premises. The farmer and the labour should follow the strict sanitation and hygiene procedures.

4. The biosecurity measures like construction of boundary wall or fencing should be ensured to get away with the entry of infection into the farm. The entrance and exit are to be clearly demarcated with footbath at proper place.

5. Water supply and medications: Clean and fresh water should be provided to the birds without compromising the quality. Poultry farm owners faced with several challenges in procuring the right medicines for their farm. The famers may be asked to keep routine medicines.

6. Financial Capacity: The financial component is the major challenge encountered by the farmer. This can be addressed by availing loan with the rate of interest as low as possible

from banks. Moreover, the farmer may be assisted with subsidy linked scheme of the Government.

7. High input costs: Higher feed cost is probably one of the most serious challenges for the industry as it accounts for 60-70% of the cost of rearing of the bird. Maize is the integral part of the poultry ration. The State Government has come up with the policy decision of the exemption of VAT in the procurement of Maize and Broken rice. Maize and Soyabean cultivation are to be promoted throughout the State. In addition to this, the Govt. intervention on regulating the high costs of chicks and equipments is solicited.

8. Climate: The State of Odisha is very much vulnerable to natural calamities in the form of floods, cyclone etc. which hinder the sustenance of the poultry sector for which the poultry birds are to provided with insurance coverage for recovery in case of unprecedented eventuality.

9. Marketing: The poultry products are required to be lifted from the production site which will minimise the expenditure on account of marketing. The farmers' producer organization (FPO) should be formed for eliminating the middlemen in the trading. The contract farming should be promoted. The marketing infrastructure in form outlet should be created.

10. Labour: The poultry farmers while going for intensive system of rearing encountered with both shortage and high cost of labour. The farmers should engage the local labourers as it will minimise time loss due to commuting from distant places. The local labourers should be encouraged to undergo skill development training.

Features of layer birds

- Within the first 20 weeks of age, about 5% of hens start laying eggs.
- Egg laying rate and size of eggs increases gradually.
- Usually it increases every week and reach more than 90% after 26 weeks and maintain well beyond 36 weeks depending upon the strain.
- After laying a maximum number of eggs, they usually stop laying for a few days and after this period, their egg production might reduces slowly.

Construction of Poultry shed

Poultry birds are housed for comfort, protection, efficient production and convenience of the poultry farmer. The best egg production can be achieved by layers, if the birds are comfortable and safe.

Construction of poultry house:-

i. Foundation: It should be strong and solid to prevent the damage caused by rodents.

ii. Floor: It should be pucca, smooth, cemented, impervious to moisture with gradient towards door.

iii. Walls: The walls of the poultry house should be water proof, wind breaker and smooth facilitating easy cleaning and disinfection. The wall should be solid at the bottom and wire netting at top should be attached strongly to the roof.

iv. Roof: The roof of the poultry house are of different types such as a) shed type b)'A' type c) Monitor type d) Semi-monitor type e) Gable type f) Combination type. The roof of the poultry house may be made up of asbestos sheet or zinc sheet or cement asbestos sheet or tiles.

v. Doors: Usually the doors are located at the end of the side walls opposite to each other and preferably made up of iron frame with wire netting. The preferable size of the door is 6X2.5 ft.

vi. Windows: A good number of wire netted windows of 1.5 sq. feet should be provided which would open inwardly. The windows should be location has to be done for proper ventilation keeping.

vii. Prevent dampness: Rain water should not enter into poultry house. Leaky roof, walls, waterer, dampness should be checked. Adequate ventilation and lighting will prevent dampness.

Types of sheds

Shed types are the simplest of poultry house which are most useful and practically used for different climatic conditions & systems. In case of layer farming, the birds have been categorized as per the age into three types namely chicks (0-8weeks), grower (9-20weeks) and layer (21 – 72weeks). Accordingly, the birds are reared in different sheds i.e. Brooder shed (0-8weeks), Grower shed (9-20weeks) and layer shed (21 – 72weeks).

Initially, after hatching, the chicks are reared in brooder shed. On attaining the age of 8 weeks, the birds are shifted to grower shed. At the end of 20 weeks, the birds are transferred to layer shed where they continue to stay till culling i.e. at attaining the age of 72 weeks.

The number of sheds for rearing of layers as per the interval of arrival of each batch of chicks is as follows.

1	1+2 pattern	One brooder-cum-grower house+ two layer house (chicks induction at an interval of 28 weeks)
2	1+3 pattern	One brooder-cum-grower house+ three layer house (chicks induction at an interval of 20 weeks)
3	1+1+5 pattern	One brooder+ one grower house+ five layer house (chicks induction at an interval of 12 weeks)

1. Deep litter

In this system, birds are kept in large pens, where upto 250 birds can be reared. The litter can be made from locally available materials such as dry husk or saw dust and spread up to depth of 3-6 inches. The litter should be dried on regular basis generally at 3 days interval otherwise it can cause different diseases. In addition to comfort for the chicken, the litter absorbs waste material excreted from the chicken and make the house dry. The existing litter should be removed totally when the existing stock is culled. Before introduction of new stock, the house should be cleaned carefully and left free for two weeks at least. Make sure that the litter should be dry and thickness of the litter should not be less than 2 inches at any time.

The advantages of the system includes proper accommodation, proper control of diseases if litter is kept dry, valuable manure and high egg production. Minimum land requirement, economical management, automation and less incidences of broken eggs are the possible advantages. Deep litter can act as a good insulator. It protects chickens from cold weather, and during hot seasons they can nestle into it and reach the cool floor below. Studies show that when all other factors are equal, layers produce more eggs on deep litter than in cage systems. Chickens can be brooded and kept through their productive lives in the same house. Deep litter allows the bird to dust itself against lice and other parasites.

The disadvantages of this intensive system of chicken production include high floor space requirement, problem of cannibalism, more feed wastage and diseases outbreak. If the management is bad, there will be accumulation of ammonia due to wet litter. Also, this results in dirty eggs production & disease problems. There is a greater chance of worm infection, ticks infestation and coccidiosis (internal protozoan parasites).

Shed Construction in Deep Litter System

The longitudinal axis of the poultry shed is required to be oriented in east west direction & the north & south sides of the shed has to be wire netted to facilitate free ventilation. The width of the shed may be restricted to 30 feet or 9 m. The standard plinth height of a deep litter shed is 1 feet. The plinth height of the shed may be raised depending upon to the humidity & swampy condition of the area. The floor must be permeable to excess water that is present in the litter material. The roof material must be economic with good insulation capacity & fire resistant property (insulated fibre material/insulated tin sheets). Inter shed space should be minimum 30 feet. Provisions of electricity & water have to be ascertained in the shed. Disposal of used litter material should be away from the shed in open sunlight which can be further used as good compost.

Effective space management to minimise labour in Deep Litter System

- In deep litter system, the feeder, drinker & egg nests should be so placed that it should not restrict the movement of the person inside the shed for routine work.
- The birds should be minimally disturbed during the time of providing water & feed.
- Both the feeder & water pots can be hanged in order to best utilize the underneath space.
- The placing of water pots & feeders should be in alternate row.
- Similarly, the laying nests can be placed at a height of around 2 feet to provide maximum floor space the birds.
- Partition between two pens of the shed should be directly fixed with wire net.

Cage system

This type of intensive production system involves rearing of chicken in one house on the prepared cages or nests and it is more appropriate for layers. The egg produced is used only for food since there is no cock. The chicken has no access for free ranging. Therefore, the chicken should get the required nutrients through supplementation. It is usually adopted where land is limited & expensive in semi-urban or urban areas.

The advantages of the system include cages can be placed under existing roofs; thus, a special building may not be required. With cages, more birds can be kept in a building than on deep litter. Better flock supervision is possible and poor layers can be identified immediately and culled, thus saving feed costs. Problems of tick infestation are reduced. Clean & uniform egg production is possible. When properly constructed, cages can last for many years. Very

fewer disease problems are caused by transmission through faecal matter. Cages are a cheaper investment in the long run due to ease in caring and feeding of the birds.

The disadvantages of the system include higher cost of installation, cage layer fatigue or paralysis. Cages involve very high initial investment per bird. There are more broken eggs than with deep litter. Distribution of light will not be uniform.

Construction of Shed in Cage System:

Here the shed orientation is same as that of deep litter system. The design of the shed is entirely on column & beam structure. Here instead of plinth, a working platform is required to be constructed with 6 feet ground clearance in order to dispose the waste materials. The space between two adjacent columns should be approximately 10-12 feet. Height of the column should be 9.6 feet from the working platform. The roofing material and truss are to be placed over the column. Here the width of the shed provided for 3 rows cages is 37 feet & the length of a shed is restricted to 400 feet for proper water distribution to the cages. As a principle: the more the shed length, the construction cost will be cheaper, but it must not exceed 400 feet lengthwise.

Design of a cage system layer house:

Working platform should be 10 feet length & 37 feet width. Walking platform in between two rows of cages has to be maintained at 2.5 feet. To set the cages, free space of 8.5 feet width has to be kept. Walking platform near the wire net/pillar should be minimum 2 feet width. At the end of the shed, 3 feet width of walking space need to be provided.

Dimension of the layer cages:-

Type of cage	Length(Inch)	Width (Inch)
Layer cage (three birds/cage)	15	15
Layer cage (four birds/cage)	18	15
Layer cage (five birds/cage)	18	18

The requirement of floor space per bird in cage system of housing :-

Type of house	Floor space (Sq. Ft) per bird
Chicks (0-8 weeks)	0.3
Growers (9 – 20 Weeks)	0.5
Layers (21 – 72 weeks)	0.6

Brooder Cage:

As per the prevalence practice of rearing poultry birds under cage system, the requirement of brooder cages for a poultry farm is assessed on the basis of housing 9 chicks per cage i.e. for a poultry farm of 1,000 capacity , the no. of cages would be 10,000 /9=111 cages approximately

or say 112 cages. The chicks are kept in half number of cages i.e. 1112/2=556 cages upto 3 weeeks of age. After that, they are spread in all the cages and continue to stay in brooder cages till completion of 8 weeks.

Dimension of the brooder cage:

Dimension	Dimension(Inch)
Length	18
Width	15
Height	15

Grower Cage:

Further, the requirement of grower cages will be made on the basis of keeping 6 birds per cage. The birds are usually kept upto end of 20 weeks.

Dimension of the grower cage:

Dimension	Dimension(Inch)
Length	18
Width	15
Height	18

Layer Cage:

On completion of 16 weeks, the birds are to be shifted to the layer cage. There is option of rearing three birds/cage or four birds/cage or five birds/cage during the entire laying period of 52 weeks i.e. upto end of 72 weeks.

The height of the cage at the back side is 18 inch and that at the front side is 21 inch. Keeping in view the availability of land, capital and location of the farm, the layers can be reared either under deep litter or cage system.

The requirement of floor space per bird in three types of house:-

Type of house	Floor space (Sq. Ft)
Brooder house	0.5
Grower house	0.75
Layer house	2.0

EQUIPMENTS :

- Brooder : To provide artificial temperature for chicks.
- Brooder guard : To prevent the chicks moving out of temperature area.
- Feeder

Age of the bird	Measurement of feeder		
	Length (inches)	Breadth (inches)	Depth (inches)
One day to one week	1	2	1
One week to 6 weeks	2	3	1.6
7 weeks to 18 weeks	4	5	3
Adult birds	5	6	4

- Waterer: There are 3 types of waterer viz. fountain , trough and permanent channel. In normal weather condition, water requirement is two times that of the feed.
- Nest boxes: Metal nests of dimension 14 square inch, 6 inches deep and 15 inches head room. Kerosene tins is a good choice. One nest is required for every 5-6 birds. Kerosene tins are a good choice. One nest is required for every 5-6 birds.
- Other equipments:
    1. Weighing balance
    2. Egg tray & basket
    3. De-beaker, Sprayer, Brush, Lamp

In a large commercial farm, to get regular egg production, the batches should be so maintained that farm can produce uniform quantity of eggs throughout the year. To achieve this, batch rotation at a constant interval is necessary.

- Normally in a commercial farm it is attained by introducing batch at each 3 months of interval & culling of birds is worked out in the same manner.
- This process provides a constant number of birds in laying stage, thus going for a uniform production status.
- This provides an efficient & effective marketing condition for the eggs produced.

A three month (12 weeks) batch rotation plan: (1+1+5 pattern:- One brooder+ one grower house+ five layer house (chicks induction at an interval of 12 weeks) can be followed.

Care and management of Chicks and Brooding

Layer farming is generally categorized into five major stages. These stages signify the age of the birds in relation to their 1) growth, 2) space requirement, and 3) recommended type of feed. The lists the five stages of poultry production with corresponding bird ages are depicted below.

Stage	Age
Brooding	1 to 6 weeks
Growing	6 to 12 weeks
Pullet	12 to 20 weeks
Laying	20 to 120 weeks
Replacement Process	72-80th week

Selection of Chicks:

Selection of an ideal breed suitable to the field situation is important to consider for rearing of poultry birds for egg production. The female chicks are raised into pullets for commercial egg production. This stage is called 'rearing', and there are several common rearing systems. Some farms raise layer chicks on a litter floor in a shed. Other pullets are either finished off or reared entirely in wire-floored cages.

Steps to be taken for cleaning of Shed after disposal of all layer birds:

Rest period – After disposal of all the birds, the poultry house should remain empty for 3-4 weeks (cleanout period- 14 days) to break the life cycle of disease causing organisms. All the birds should be removed from the house.

All removable equipment and fittings should be dismantled and removed from the building. Dry cleaning (i.e. brushing, scraping, etc.) should be performed inside and outside the buildings as detailed below.

- Removing dry matter: Remove all dry matter from the shed. All the used litter materials should be removed out and be buried out in order to minimize contamination of the farm.
- Cleaning out the Inside of the Shed: Scrape out all remaining organic matter. Clean the roof of the shed, break all cobwebs, clean the dust, etc. Clean all pillars using the same cobweb brush. Clean the mesh using a hand brush. Sweep the entire shed using a coconut broom (Khadika jhadu).

At the end of dry cleaning the whole house should be washed with a steady stream of water as detailed below.

- Cleaning of feeders and Drinkers: Dismantle the feeders and soak in water for one hour before scrubbing with detergent soap. Rinse well and leave to dry in the shade. Scrub the drinkers in the same manner and leave to dry in the shade. Soak the feeder/ drinker suspender strings for one hour, wash clean and shade dry.
- Repairs and maintenance: Check the house and equipment and take up repair works.
- Floor treatment: Hot water with detergent should be used while cleaning. Cracks and crevices should be cleaned properly. Sprinkle some lime powder which acts as a good disinfectant.
- When the building is completely dried, the floor should be properly cleaned with 2-3 % caustic soda or 3-5 % Cresol or lime water. The inside of the building should be white washed.
- Cleaning external areas: Weed and clean the immediate surroundings of the house. Spray the outer short wall with an insecticide followed by a disinfectant.
- Disinfection: Disinfection should not take place until the whole house and its surroundings are thoroughly cleaned and all repairs are complete. After wet cleaning is done and the house is dry, spray a disinfectant at a rate of 3ml per litre of water (as recommended by manufacturer) on the inner and outside of the shed, including the mesh and short wall.

The house thus prepared should be locked till 48hr prior to arrival of chicks. No other person except the worker of that shed should be allowed to enter the poultry house.

Preparation before arrival of Chicks

The following preparations should be completed well in advance before arrival of chicks in the farm.

Steps to be taken before arrival of Chicks:

Step 1	• Select an area in center of the poultry shed, so that one can go round the brooding space for observation.
Step 2	• Place gunny bag/ plastic sheet covering the wire mesh above the short wall surrounding the brooder area. This is done to prevent air flow.
Step 4	• Cover the brooding area with litter consisting of wood shavings or paddy husks. The litter should be 2 inches in depth.
Step 5	• Cover the litter with newspaper. Newspaper is used to deter the birds from eating litter and to train them to eat only the feed.

Step 6	• Insert brooder guards in the brooder area. A brooder guard consists of galvanized metal sheets/ Card board are put together to create a space for brooding area.
Step 7	• Fix electric bulbs under a large metal shade over the middle of the brooder to serve as a heat source. The bulbs should be placed one foot above the ground. The heat supply required by the chicks is calculated at approximately one watt per bird. • The heat source is turned on at least three to four hours before the chicks arrive in order to provide a comfortable environment for the chicks to be brooded.
Step 8	• Set a brighter bulb (11 watt CFL) 4 feet over the floor to encourage chicks to feed and drink water over the first five days.
Step 9	• Place chick feeders filled with feed and water drinkers filled with water in the brooder before the chicks arrive. • Feeders and drinkers should be spread out around the brooder area.
Step 10	• Carry out an equipment check. This equipment should be functional and ready when the chicks arrive. • The brooder house should be preheated to 35°C by switching on all the lights including the brooders 12 hours before the arrival of chicks.

Steps to be taken after arrival of Chicks:-

Step 1	• Chicks received after transportation, involving a long duration must be encouraged to drink water first and later the feed. • Electrolytes/antibiotics supplementation in drinking water will reduce transportation and environmental stress and also reduce initial chick mortality.
Step 2	• Release the chicks gently into the brooder guard close to drinking water and grinded maize / suji/ broken rice. • While placing chicks in the brooders, count the number of chicks placed to ensure proper stocking density. • The chicks should be active, move freely, scratch, take feed and water and make chirping noise.
Step 3	• Dip the beak of the chicks in the drinking water and place near the heat source • Once the chicks start drinking water sprinkle the starter mash on news paper as well as feeder tray.
Step 3	• Provide adequate light continuously during the first two days.

	• If the chick distribution is not uniform adjust the heating source
Step 4	• Initially the feed may be sprinkled over the paper and later placed in feeders. Spread Starter/Pre-starter Feed/suji / grinded maize on the paper few hours before arrival of day old chicks. • Provide the feed in mash or crumble form. Crumble/pellet feed will ensure more uniform growth. • Remove the chick guard after 10-15 days and spread out the chicks into the entire brooding pens. Add some more litter material before spreading of chicks. • Provide Chick Feed or Starter Feed ad libitum.
Step 5	• Replace new papers every day till 5th day after which they are removed.
Step 6	• Provide 3 feeders and 2 drinkers for every 100 chicks. Feeders and waterers are arranged in cart wheel manner, so that chick need not have to walk long distance to access feed and water. • Fill waterers with clean water or operate water system. During the first six weeks, operate feeders to provide feed more than twice daily. • Above all an optimum temperature has to be maintained keeping in mind that the chicks remain comfortable and are scattered under the area of hover. • The height of the heating source at day old should be 15-30 cm above the litter.
Step 7	• Check brooder temperatures and observe the movement of chicks. One 100-watt light bulb hanged approximately 1.5 feet from the floor for every 50 chicks can provide required temperature of 95 degree F. • If the chicks gather at the source of heat and hurdle, it indicates requirement of more light. So increase number of bulbs. • There should be free moving space around the feeder and drinkers. • Dead birds should be removed right away and disposed off properly.

Care and Management of Chicks

a. Brooding

Brooding is the art and science of rearing baby chicks in large number in the absence of a broody hen. New born chicks cannot maintain their body temperature due to lack of well developed body feathers to conserve body heat. During the first few weeks of age, the thermo-regulatory system located in the hypothalamus of brain is not properly developed, so

as to maintain a constant body temperature, therefore, brooding is done. The brooding period is the most critical period for chicks and can affect future growth and production. The brooding period starting from 1 – 10 days is the most important time in a birds' life. Several factors, primarily, temperature, light, water and food must be given special consideration when chicks are in their brooding stage. During this period a farmer must establish a suitable feeding and drinking routine that will allow birds to develop a good growth pattern.

The recently hatched chick has not yet developed their own mechanism to regulate its own body temperature. Hence, it cannot maintain its body temperature properly for the first few weeks and it is subject to chilling in the winter season when extra heat is not provided from externally. Therefore the chicks will not take required feeds and water and this will decrease the growth and improper development of internal organs, responsible for digestion. Good brooding management will always result in better flock uniformity.

The management and care of baby chicks is known as brooding. Artificial brooding mainly aims at providing the right temperature to the chicks. In addition to temperature, adequate floor space, feeder and water space, ventilation and light should be provided for optimum comfort and growth of chicks. Brooder space of 0.6 square feet is recommended per chick. Thus, 500 Square feet area in brooder (24 feet diameter chick guard) can accommodate 1000 chicks.

Brooding Management in Layers

Body temperature of chicks is 103-104 °F. Feathers as well as thermoregulatory system are not developed in initial stage of life of chicks. Therefore to maintain body temperature of chicks, artificially heat is to be provided to chicks which is known as “Brooding” and the equipment used for that is known as “Brooder”. In case of layer chicks, brooding is practiced till 6-8 wks of age.

The brooder area should be provided with 30 cm (1 foot) height brooder guard in circular fashion to maintain uniform chick distribution thereby reducing hurdling / piling of chicks at corners resulting in high mortality (Found in rectangular brooder space) and to prevent floor drafts. The guards should be placed 1.05 – 1.5 meter (4.5 to 5 feet) away from the edge of the hover.

The brooder guards is made up of hard card board / aluminium plate help in controlling early chick movement. It allows the chicks to remain nearer to heat source, thereby helping in maintaining their body temperature.

Arrangement in brooding area: -

The brooding period is the most critical period for chicks and can affect future growth and production. When a large number of chicks are to be raised, some artificial means of heat is necessary. It should be arranged in the center of the house, so that one can go round the brooding space for observation. The brooding area should be covered with gunny bags, over which news paper will be spread. This is done to prevent the chicks from eating the litter material. The brooder area is surrounded by circular chick guard of 1ft height, made up of card board or, aluminium sheet which will be placed 0.6-0.9 m from the edge of canopy. The circular area provided uniform distribution of chicks around the heat source, thus avoiding piling up. Each standard canopy of 5 feet diameter can accommodate 250 no. of chicks.

As artificial brooding is practiced, electric bulb/ infra red bulb or, battery brooders are used. A hover is primarily used for reflecting the heat of bulbs towards the ground, so that the newly hatched chicks can be kept warm which will be as close to the incubator temperature conditions.

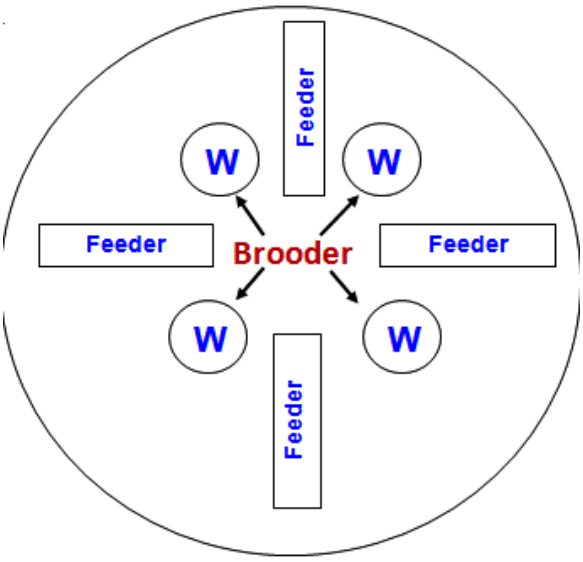
I. Incandescent bulbs brooding: For the incandescent bulbs (40 to 100 watts), Canopy is required.

ii. Infra-red bulb brooding: Infra-red and White bulbs of 150 or 250 Watts are enough for 75 to 90 chicks and 125 to 150 chicks respectively.

iii. Battery (Cage) Brooding : In this system, chicks are being reared in galvanized cage brooder (18” length x 18” depth x 15” height) with one or two or three tiers. Initially, 20 chicks can be reared in one cage brooder which should be reduced to 8 chicks during 7-8 weeks of age. The corner of the brooding area / house should be made round up by using card boards. The wire mess of the side wall should be covered with gunny bags / plastic sheets so that, the required temperature in the brooding house can be maintained.

Ventilation: - There should be provision of good ventilation for bringing fresh air and sufficient oxygen (O_2) in brooding area along with removal of carbon di-oxide, ammonia fumes and other harmful gases from brooder house to control the moisture level in the house, to regulate temperature.

Provision of waterers in the brooding areas: -



Few hours before the arrival of chicks, the waterers should be filled with fresh clean drinking water so that the water attains the room temperature. There should be provision of drinking water for 24 hrs. As a thumb rule, per each gram of feed intake, twice the amount of water is required. Before introducing the chicks into the house, try to dip the beak into the electrolyte solutions so that they can learn the way of drinking & then left them free.

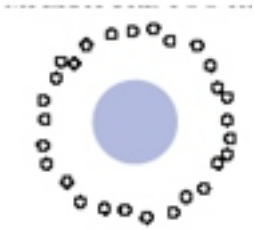
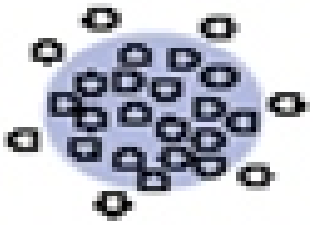
Feeding practices during early brooding:

During the 1st wk of brooding, the space should be covered with news papers in layer. Suji / maize grits is sprinkled on it. Remove the top layer of newspaper daily. The litter should be turned upside down after 3-4 days and removed after 7 days. Provide adequate water in the brooder house, and you have to train them for drinking water. Mix 5% glucose with water, so that they can easily get energy. Provide them any types of high quality multivitamins. Multivitamin and electrolyte water become very effective when you transport chicks from a long distance. It reduces tiredness and help to make them in normal state.

Brooding Temperature:- Artificial source of heat is used to provide extra heat to chicks to maintain their body temperature as chicks lack well developed body feathers to conserve body heat & also the thermoregulatory centre is not so developed. Temperature at brooder required during first week of brooding period is 35^{0}C (95° F) which has to be reduced by 3^0 C or 5^0 F each week till room temperature is attained.

Age in days/weeks	Brooding temperature
0-7 days/1st week	95 ° F(35.0 ^{0} C)
8-14 days/2nd week	90 ° F(32.2 ^{0}C)
15-21 days/3rd week	85 ° F(29.4 ^{0} C)
22-28 days/4th week	80 ° F(25.6 ^{0}C)
29-35 days/5th week	75 ° F(23.9 ^{0}C)

Observing Chicks to adjust temperature during Brooding

Correct Temperature		Uniform distribution around the hoover. Noise level signifies contentment.
High Temperature:		Chicks make noise , pant, dehydration, head and wings drop and away from the heat source, nearer to brooder guard, .
Low Temperature:		Chicks make noise , distress calling and will gather near the heat source

Beak trimming:- The main objective of beak trimming is to prevent vices like cannibalism, vent pecking, feather picking. It also improves feed efficiency.

- It is trimmed at 7 to 10 days of age & then re-trimmed at 8-10 weeks with a de-beaker machine.
- One third of the upper beak is removed followed by cauterization. Cauterization helps in arresting and destroying the tissue responsible for generating beak growth.

Grower Birds (6 to 12 weeks):

After six weeks of age, birds must be removed from the brooders and transferred into slightly larger confinements. While feed, water and certain vaccines/medications are essential during the growing stage, the need for ample space to accommodate the body expansion of birds is very essential.

Once chicks can control their body temperature they still need to be protected from extreme climatic conditions. At this stage they receive pullet grower feed which is less expensive and contains only 15% to 17 CP% & 2500 kcal/kg ME (CPCSEA, 2021).

The main objective of growing period is to achieve targeted body weight suitable for laying eggs and uniform laying period by following restricted feeding. The birds are shifted to rearing house during this period.

Pullets (12 to 20 weeks):

During this growing period, the demand for feed, water, and floor space increases as the birds mature. The type and amount of feed as well as the adequacy of water during this period will determine the ultimate egg-laying productivity of hens. The birds should attain and maintain the right body weight for better egg production.

Adult Layer Birds (20 to 72 weeks):

Adult hens are the real producers in a Layer farm. The egg laying stage generally begins at approximately 20 weeks of age. The use of "layer" feed begins at this age. However, birds should be transferred to their laying cages when they are 18 weeks of age. Good quality pullets should only be shifted to layer house (Deep litter / cage system) for egg production at 16-17 weeks of age when 5% egg production has been achieved. The selected pullets should be of uniform weight and size. Pullets with morphological defects such as lameness, blindness, emaciated should be culled before transferring them to layer house.

Characteristics of good quality layer:-

Body part	Laying hen	Non-laying hen
Eyes	Bright and alert	Dull and sleepy
Vent	Full, Large, Moist	Small, dry and puckered
Comb	Large, smooth, bright red, glossy & soft	Shriveled, dry, dull and scaly
Abdomen	Large, spread 3 – 5 fingers, soft and less fat	Small, usually less than 2 fingers, hard and more fat
Pelvic bones	Usually spreads apart 2 fingers, thin and pliable	Practically close together, thick and stiff
Ear lobes / wattles	Full, waxy and velvet like	Shrunken, wrinkled and coarse
Beak	Stocky, well curved, worn-out, less yellow	Dry, hard, cold, coarse and shrunken with white scabs.

Body structure of a good layer:

- A flat broad back that carries well towards the pubic bone.
- A wide girth
- Good depth of body that increases towards the abdomen in a bird in laying condition.
- Good span between the pubic bones and keel bones.
- Good quality soft and pliable skin
- Thin , straight pubic bones set well apart

- Body, wedge-shaped from back to keel bone
- Legs set well apart
- Appropriate fleshing in all parts of the body
- Reasonably long keel bone

Body weight and other sexual developments:

- Body weight and body condition of the bird around the time of maturity are the most important criteria influencing laying of eggs.
- Egg size and number of pullet eggs production is controlled by body weight of the birds.
- The initiation of egg production is dependent upon the age of the bird and its body weight.
- A good layer produces its first egg at around 17-18 weeks with an average body weight of 1200-1250 grams.
- Any deviation with the body weight influences the peak production, persistency and total eggs production of the layer.

For best performance, adult birds need to be fed carefully containing 18% CP & 2600 Kcal/kg ME (CPCSEA,2021) and kept in a house at 21-28^0 C. This means that hen houses are to be designed in such a way to keep this temperature all year round. The hens are checked regularly to monitor their health and medicines may be administered as needed. The quality of feed provided to hens may be varied according to level of production. Layers are fed during laying stage at 2 phases- a) Phase 1(21-45 weeks) b) Phase 2 (46 weeks and above).

Layers need at least 14 hours of daylight during the laying cycle. Depending on the season of the year, an additional 2-4 hours of artificial light must be supplemented to ensure 14 hours of daylight. The use of 50-watt light bulbs, one per 100 birds, may be provided.

Collect eggs at least twice a day, once in the morning and again in the afternoon. Eggs should be stored in a cool place if not sold (or used) the next day after collection. Manure and blood stains on the egg shells can be washed with water. It is recommended that cleaned eggs be refrigerated immediately to protect from any bacterial contamination.

Managemental Tips :-

- Never disturb birds during laying times (7 – 11 AM).
- Use LED lights that stimulates sun rise and sun set phenomenon (Gradual change in intensity).
- Sero-surveillance for Salmonella, Mycoplasma, ND (H1) and IB.
- Achieve standard body weight of 1.2 Kg at laying stage.
- Do not allow 24 hrs of photoperiod .

- Darkness is very important for better health (Melatonin secretion).
- Higher stress level during ovulation - High incidence of double yolk eggs – oviduct prolapsed.
- Birds have nutritional wisdom. Avoid drastic changes in feed.

Clean egg production:

- Nests to be constructed 15-20 cm deep inside.
- 10-12 cm of fine and absorbent nesting material such as shaving, Oat is to be provided.
- The litter is to be dried regularly.
- Avoid overcrowding.
- Gathering of eggs at least 3 times daily in winter and as frequently as possible in summer.
- The containers where eggs are gathered should be firm enough on sides and bottoms. Eg- Wire baskets, well ventilated wooden boxes make the best containers.
- Eggs should be cooled quickly after being layed.

Heat Stress:-

Layer birds are very sensitive to environmental temperature. Their growth, egg production and health are severely affected during extreme weather. Therefore, within the economically feasible limits, ideal temperature has to be provided to the birds, in order to obtain optimal growth rate and returns from the birds. Intensive rearing of poultry requires immediate and special attention and care during heat stress in summer months. Heat stress can infect heavy losses in poultry by causing almost a total reduction in egg production and meat production. Consider drinking water medication rather than feed. Feed itself causes metabolic stress during summer time. So, try giving feed at early morning hours or at late evening. Provide electrolyte in drinking water in order to reduce stress.

Time	Activity
3.00 AM – 5.00 AM	Feeding with light on
7.00 AM	Complete Feeding
Till 3.00 PM	Chilled water with supplements Lemon :- 1/ 3 litre of drinking water Sodium bicarbonate – 1 g / litre of water Calcium supplementation (As prescribed dose) Ascorbic Acid – 1 g / litre of water Aspirin (Acetyl Salicylic Acid – 0.25 – 0.50 g / litre of water
5.00 PM – 7.00 PM	Evening feeding with light on
Mortality	In the event of mortality, consider going for feed dilution with fresh grounded maize or wheat for 24 – 48 hrs at least.
Respiratory stimulus	Thermocare, respiron, essential oils etc.

Layer Medication:-

Age	Medicines / probiotics / Growth Promoters
Day 1 – 3	Water Sanitizer in lukewarm water (Tylosine)
	Electrolytes and Glucose
	Antibiotics (Tetracycline)
	Acetic Acid
Day 4 – 7	Probiotic course (curd) Its continuous use will improve health under stress conditions.
Day 8 – 14	Vitamin – A , C, D, E
	Vitamin B complex
Day 15 – 21	Growth promoters
	Immunostimulants
	Coccidiostat
Day 22 – 28	Calcium Supplement
Day 29 – 42	Liver Tonics
Growers and adults	Vitamins and Growth promoters

Layer Medication:-

Piperazine	Nematodes , Tape worms 50 mg/ bird (< 6 wks), 100 mg / bird (> 6 wk)
Albendazole	5 mg/ Kg BW for Tape worms
Levamisole	Broad Spectrum and Immuno-stimulant 1 gm / lit of water
Dipping Age	14 – 15 weeks for 3 consecutive days with Cypermethrin solution Prior to cage shifting Early morning in mild warm water, dip upto neck for 5 seconds

AUTOMATION IN LAYER FARM

The recent advanced technologies are highly progressive for daily activities that will reduce labour, work for 24/7, report remotely, work efficiently and complete work in short time period. Some of the examples are given below-

1) **Gohbot**- A robot with the help of machine learning and imaging sensors able to pick up eggs from the floor and sense environmental temp, gases and light levels.

2) **Chicken Boy**- An automated ceiling suspended robots capable of removal of dead birds, assessing ambient conditions and analysis of litter moisture.

3) **Clear Labs Next Generation Sequencing**- It uses advanced data analytics for serotype identification of Salmonella species from carcass rinses.

4) **Anti- microbial Probiotics**- Modified microbes used in Poultry feed that can detect pathogens and secrete anti-microbials and anti-microbial lysins.

5) **TyraTech Phytogenic** Blends for coccidiosis Control- A chemical receptor specific to parasites and physically disrupts the parasite cuticle.

6) **Transport Genie**- Records micro-climatic conditions of live poultry during transport including real time communications with the driver and the key stakeholders.

7) **Egg XYT CRISPR Gene editing technology**- Biomarker is inserted in the DNA of male chicks at parent stock level so that when they are matured and breed, the incoming eggs are scanned and those with male embryos are diverted to food production.

8) **Automatic trolley/chain feeding system-** The feed will be directly be delivered from the feed mill to the layer sheds by pneumatic system**.**

9) **Automatic centralized egg collection, grading, labelling, handling, candling, packaging system.**

10) **Acoustic Sensors-** Using vocalization frequency, it can be able to detect feed deprivation and adequacy of thermal environment.

Feeding of Layer Birds

Management of layer bird is one of the most challenging task because the birds have to lay to their maximum potential with economic viability. The major considerations for laying hens which affect the quality of eggs, fertility and health are:

i. Feeding at different laying stages as per nutritional requirements.

ii. Types of supplementary feed and replacement of main feed with supplementary feed.

iii. Growing of supplementary feed protein, vitamins and minerals.

The layer birds have to be provided with required:

- Metabolizable energy
- Crude protein /Amino acid
- Calcium
- Non-phytate phosphorus

The layer birds have to be reared with the following precautions:

- Provide 2% of calcium for two weeks before laying
- If you notice that they are not gaining expected weight, then you have to serve starter feed for eight weeks because it contains higher crude protein.
- Serve feed for two to three times in a day till they are of 18 weeks of age.
- Demand of feed increases very fast when the birds start laying
- Don't decrease the amount of feed while laying (even if their weight increases)

Feeding of birds at different stages of laying

Feeding of birds is a vital feature as feed cost alone accounts for 75-80 of % of the total cost of production in layers. Poultry feeds are basically categorized as below:

- Starting poultry feed (Chick Starter): A ration to be fed to chicks up to 8 weeks of age.
- Growing poultry feed (Grower Feed) : A ration after 8 weeks until laying commences, (8-16 weeks)
- Pre laying feed : A ration during pullet stage (17-20 weeks)
- Laying poultry feed : A ration to laying birds after 20 weeks (when laying commences)
    - ❖ First phase of laying 21-45 weeks

- ❖ Second phase of laying 46-60 weeks of age
- ❖ Third phase of laying 61 weeks to culling

Nutrient Requirements of Layer birds

Nutrients requirement depend on type, age as well as purpose of rearing of poultry birds. There are several feeding standards which our farmers are following starting from BIS, NRC to ICAR. There is no single standard that can be claimed to be the best. Based on economy & suitability, a farmer goes for certain standard.

Nutrient requirement of Layers (BIS, 2007)

Nutrients	**Chick**	**Grower**	**Layer P-I**	**Layer phase 2**
Moisture (max)	11.0	11.0	11.0	**11.0**
CP (Min)	20	16	18	**16**
ME (Kcal/Kg)	2800	2500	2600	**2400**
EE (Min)	2.0	2.0	2.0	**2.0**
CF (Max)	7.0	9.0	9.0	**10.0**
AIA (Max)	4.0	4.0	4.0	**4.5**
Salt (Max)	0.5	0.5	0.5	**0.5**
Ca (Min)	1.0	1.0	3.0	**3.5**
P (Min)	0.7	0.65	0.65	**0.65**
Pav (Min)	0.45	0.40	0.40	**0.40**
Lysine (Min)	1.0	0.7	0.7	**0.65**
Meth (Min)	0.40	0.35	0.35	**0.30**

Nutrient requirement of layer birds in different stages ((NRC-1994))

Nutrient	**Starter**	**Grower**	**Pre-layer**	**Layer**
(% or kcal/kg)	(0-6 wk)	(6-12 wk)	(12-18 wk)	(>18wk)
ME (Kcal/ Kg)	2850	2850	2900	2900
Crude protein	18	16	15	15
Lysine	0.93	0.72	0.70	0.69
Methionine	0.45	0.34	0.40	0.30
Linoleic acid	1	1	1	1
Calcium	0.9	0.8	0.8	3.25
NPP	0.40	0.35	0.30	0.25
Sodium	0.15	0.15	0.15	0.15
Chloride	0.15	0.15	0.15	0.15
Vit A, IU	1500	1500	1500	1500
Vit D3, ICU	200	200	200	300
Vit E,IU	10	5	5	5
Vit K, mg	0.50	0.50	0.50	0.50

Steps in Feed Formulation

Based on nutritive values, costs, presence of toxins & maximum inclusion levels, the ingredients are to be selected & then added to the formula to provide the nutrients per 100 Kg by adopting the following steps-

1) Reserving 5% of the ration for additives and supplements.
2) Including the energy sources to meet the desired level of ME.
3) Manipulating the level of inclusion of various protein sources to meet the protein requirements
4) Reserve 5-7 % of the ration for fibre sources (DORB).
5) Calcium content of diet is verified & then a calcium source is added.
6) Similarly, phosphorus source is added in such a way.
7) Supplement limiting amino acids (Lysine & Methionine).

Finally, the total for ME, CP, Fibre, Ca, P, Lysine & Methionine in feedstuffs is checked & if required, modification is done. Keep in mind that, for economical purpose, a farmer can go for unconventional feed sources keeping in mind the ME & CP requirement of poultry birds.

Crude Protein (CP) % and eenergy requirement in Layer feed:-

Feed in layer birds are divided into 4 types such as pre-starter (1-6 weeks), starter (6-12 weeks), Grower (12-20 weeks) and layer (21-72 weeks). The protein content is chick starter diet is higher compared to the other three types of diet due to higher need for body tissue growth. In case of poultry, it is called as Metabolic Energy (ME) and expressed in K Calories / Kg of feed.

ME = Gross Energy (GE) present in feed - GE present in faeces - GE present in urine

Metabolic Energy (ME) requirement in broiler chickens: In general, the ME content of the diet increases as the bird moves from pre starter to starter and then finisher phase.

Age	Type of feed	ME (kcal/kg feed)	Crude Protein (%)
0-8 weeks	Starter	**2850**	**18**
9 to 16 weeks	Grower	**2850**	**16**
17 to 18 weeks	Pre-layer	**2900**	**15**
19 to 72 weeks	Layer	**2900**	**15**

Water :-

Poultry birds can survive, 98 % body fat loss , 50% of body protein loss, but cannot withstand 20% loss of body water. So, water is very important factor as nutrition is concerned.

Birds can tolerate high levels of certain minerals like Calcium and Sodium in water but they are very sensitive to other minerals like Iron and Manganese, which give a bitter taste. This sensitivity could decrease water consumption. Filtration systems could be used to resolve this issue. Water filters should be cleaned weekly.

(Thumb rule: water consumption is twice that of feed consumed)

Ingredient and Nutrient Composition of Layer diet

	Diets	
Ingredients	**Basal**	**Low nutrient density**
Maize	60.0	49.1
Soybean meal	12.5	9.4
Sunflower cake	13.5	12.4
De-oiled rice bran	3.35	19.8
Shell grit	8.96	7.57
Di-calcium phosphate	0.96	0.96
Common salt	0.40	0.40
Lysine	0.00	0.04
Methionine	0.05	0.05
Trace mineral & vit. premix	0.18	0.18
Choline	0.05	0.05
Antibiotics	0.05	0.05
Nutrient composition (%)		
ME, kcal/kg	2603	2393
CP, %	15.42	14.28
Lysine, %	0.65	0.58
Methionine, %	0.32	0.29
Ca, %	3.60	3.15
NPP, %	0.29	0.27

Supplementation of Calcium and Phosphorus in laying ration

- The imbalance between dietary calcium (Ca) and phosphorus (P) damages growth performance and bone development in poultry.
- A laying hen showing 90% egg prodn. requires 16-18 g of protein and 285 to 290 kcal ME per day.
- A laying hens producing 90% eggs require daily about 3.4 to 3.6 g of calcium. Laying hen need large amounts of Ca because egg shells composed of CaCo3

- Egg shell = 10- 12 % of egg weight (54 gram) i.e., egg shell weighs 5.4 gram which contains 3.6 grams of Calcium. Therefore, 3.3% Calcium in layer ration to be provided if the bird consumes 110 gms feed daily.
- Usually, the Ca to P ratio is used to evaluate the balance between dietary Ca and P. Ratio of Ca to Non-phytate Phosphorus (NPP) – 1:11 to 13

Environmental temperature and feed intake in layers:

The feed intake of laying hens will be reduced with increase environmental temperature because the hens feed only to satisfy their energy requirement. But if concentration of proteins and other essential nutrients is raised enough to compensate for the lower rate of consumption, egg production will usually continue at very satisfaction rate. Environmental temperature and energy intake (feed intake) are inversely related. Energy requirement is less at higher environmental temperature. We can go for amino acid balanced diet without increasing the crude protein level in diet as because heat increment of protein is higher. Egg output usually is not affected until the environment temperature reaches 30^0C or more.

Supplementary feeding with home grown materials for economic egg production:-

In commercial production, there should not be any compromise for proper nutritional supplementation to the layers. Some of the alternate source of feed are described below.

- Alternative cereals, to replace maize- Sorghum, Bajra, Ragi, Korra, etc.
- Alternative protein to Soybean meal - decorticated cottonseed meal, mustard or rapeseed meal, sunflower oil meal, Guar meal, etc.
- Cereal by-products - Rice polish, Rice bran, Wheat bran maize gluten meal, DDGS etc.
- Protein meals of animal origin are meat meal, meat cum bone meal, Poultry byproduct meal etc.
- Agro-industrial byproducts – Sal seed meal, cassava root meal, karanja seed cake

Feed Additives

Feed additives are non nutritive substances that are added in small quantities (< 0.05%) to a basic feed mix for the purpose to improve feed utilization efficiency, feed acceptance, maintain health status, uniformity or production efficiency in intensive system of poultry production. Feed additives gained major attention in poultry feeding due ban on use of in-feed antibiotics and increase use of feed enzymes to improve the utilization of nutrients in raw materials and to reduce feed cost. Common feed additives used in poultry diets include probiotics, prebiotics, phytobiotics, antioxidants, emulsifiers, binders, enzymes, feed acidifiers, etc

Feed additives usage in different groups of chicken

Age (wks)	1-12	13-18	19-32	33-60	61-72	Stress
Pre & Probiotics	√	√	√			√
Enzymes	√	√	√	√	√	
Acidifiers	√	√	√			√
Antioxidants	√	√	√	√	√	√
Electrolytes	√					√
Toxin binders	√	√	√	√	√	√
Liver tonic	√	√	√	√	√	√
Lyso-phospholipids	√	√	√			√
Vitamin C	√	√				√
Ammonia binder	Whenever required					

When the bird is kept under backyard condition or in a small flock with medium level of egg producing (LIT) birds, a provision of home grown materials such as greens, vegetable wastes, kitchen wastes etc can be utilized for economic egg production.

Types of supplementary poultry feeds:

- Greens: The best examples of greens are Subabool leaves, Spinach, Berseem, Cowpea, Bilati Poi and Azolla.
- Vegetable Wastes: The fresh vegetable wastes can be minced to feed the birds.
- Broken rice/grams/pulses can be provided as supplementary feed to the birds.
- The minced offal of poultry/fish/oyster/ snail/ feather in clean & hygienic condition can be provided as supplementary protein source.

Replacement of main feed with supplementary feed:

Normally the chick feed is not advised to replace with supplementary feed. But, in growing condition the supplementary feed can replace up-to 25 % of the poultry concentrate. Similarly during egg production upto 15 % poultry concentrate feed can be replaced with the supplementary feed without hampering the production potentiality of the bird. Azolla is a floating fern that provides unique opportunity for small holder farmers to become a protein rich/ nutrient rich fodder for the different livestock species.

- The technology used to produce Azolla is very simple and the materials used are socheaper that it can be done by all categories of farmers of Odisha. Farmers use it as protein supplement in the daily ration of their poultry birds.
- It is a “Farmers friendly technology “. Azolla contains 90 – 92% moisture and 8 – 10 % dry matter. Out of total dry matter, it contains about 50 – 60 % protein, 10 – 15% minerals and 10 – 15 % bio-active substances along with amino acids. Carbohydrate and fat contents of Azolla is very low.

Method of preparing Azolla units:

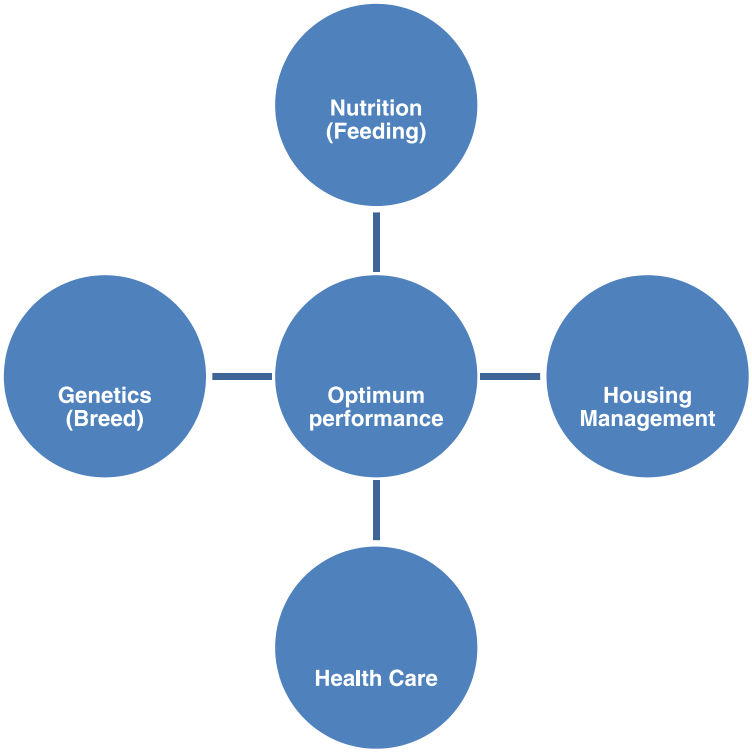
In field condition, the Azolla works out as a wonder food from backyard system, which can be grown very profusely in economical means. The Azolla can be grown in artificial water bodies made preferably under shed.

A pit size of 2m wide x 2m length x 0.2m depth is dug as a first step for growing Azolla. The bottom of the pit is covered with plastic gunnies or tarpaulins. About 10-15 kg of sieved fertile soil is uniformly spread over this plastic sheet. Then a Slurry (made of 2kg cow dung and 30 gm super phosphate in 10 lit. of water) is poured on this sheet . The water is poured to make the level reach to about 10cm height. Next about 500g-1kg of fresh and pure culture of Azolla is introduced in the pit. Once introduced, the Azolla will rapidly grow and fill the pit within 10-15 days. As regards to harvest, about 500-600 g of Azolla can be harvested daily thereafter.

Farmers can avail the financial assistance of Rs 2000/- per unit under state plan scheme for growing Azolla in their backyard.

Ideal Management Practices in Layer Farm

The layer birds are very sensitive and they need adequate attention for getting optimal egg production. The factors responsible for optimum egg production are:



The following managemental practices are to be followed by the farmers.

1. Feeding & Watering Practices:

- The layers are to be fed 5-8 times at chick stage & gradually reduce to twice in a day when they attain an age of 8 weeks.
- The layer birds are fed 60-65% of the total feed as the first intake in early morning hours & the rest part of feed will be given in the afternoon.
- Grill on linear feeder should be there to avoid spoilage.
- Non conventional feed resources will be a boom for poultry sector.
- There should be free access to clean water round the clock. Water guards on waterers will prevent spoilage.
- Feeder & waterer are to be arranged alternatively at equal distance keeping their height at bird's shoulder level filling only to 2/3 level of feeder.
- The feeders and drinkers should be placed in such a manner that all birds should get equal opportunity for feed and water.
- Clean drinking water must be provided in adequate quantity throughout the year.
- However cool water during summer & lukewarm water in winter is advisable.
- The average water requirement is double the feed intake.
- In summer the feed consumption reduces drastically. Hence, the supplementary nutrition like different minerals, vitamins, should be increased in the feed to compensate the body requirement. However, energy balance in feed can be possible by decreasing the energy & protein source.
- Similarly in cold weather the energy level should be increased to maintain the additional body requirement by increasing fat source.
- In order to increase/decrease the energy level of feed an adjustment in cereals is advisable with addition/deletion of fat or oil in the feed.

2. Ventilation & temperature management:

Poor ventilation results in accumulation of carbon dioxide, Ammoia and then the birds will suffer from respiratory illness, irritation of mucous & various diseases like coccidiosis.

- Air movement is best determined by observing bird's comfort, litter condition, and odour build up.
- Exhaust fans, propelling fans, negative pressure ventilation & tunnel ventilation system may be followed. Alumunium-steel-zinc alloy roof material will be better option in tropical areas.

- On the 1st week of age, 35^0 C is quite comfortable for chicks. Thereafter, room temp. is reduced by 3^0C every week till it achieve around 23^0 C.
- When environmental temp. is higher, we can go for roof sprinklers & foggers & when it is lower, we can go for checking the wind flow from side wall using gunny bag or curtain.
- It is important to observe the bird's behaviours at different temperatures & humidity conditions due to seasonal changes. Necessary steps should be taken promptly to provide appropriate temperature & ventilation.

3. Lighting :

An intensity of 1 foot candle at bird's eye level is recommended for egg production. 40 watt bulb will be enough for 100 sq ft. floor area or usually for 100 no. of chicks one 100 watt bulb is sufficient depending upon outside environment. Growing chicks are completely reared under natural light . In laying period a provision of 16 hours of photoperiod is necessary for stimulation of egg laying hormones. In no way, the lighting hours should go beyond 16 hrs. 40 watt bulb will be enough for 120 sq ft. floor area. The bulb of 45 watt is to be attached 7 ft above floor.

Artificial light must be provided to encourage feed consumption, optimum growth and prevent birds from piling or stampeding when scared. 23 hours of continuous light (natural light+ artificial light) should be provided to chicks on arrival except 1 hour at night during brooding period. One hour of darkness will favour better growth and give the bird an experience of darkness to avoid panic during power failure. This one hour of darkness is given generally after the sunset. During this period, all the lights of inside and outside the sheds must be put off. The lights are turned on one hour after total darkness and kept until dawn. At floor level, the light intensity should be 0.5 foot candle, which can be supplied by one 150-watt bulb for each 1000 sq ft of floor space. In growing period (9 -20 weeks), the light period should not exceed 10 – 12 hours in a day. No artificial light to be given during grower stage.

During laying period (after 20 weeks), there should be a gradual increase of lighting period from 12 hours to 16 hours by increasing 30 minutes every week & remain at that level thereafter. Beyond 16 hours, layers will show photo refractoriness.

Seasonal operations for better production

The ideal temperature for better egg production is 20-25 ℃ with RH 60%. Any deviation due to seasonal impact can affect the productivity.

Summer season management:- During summer, the feed intake decreases, which affects the overall body weight gain. The birds should be fed during the cooler part of the day. The amino acid balanced diet with increased nutrients to be given. The birds should be provided with more floor space to reduce the stock density. Birds should be provided with more no. of drinkers along with sufficient clean water. The roof should be covered to provide additional cooling effect. Provision of sprinkler above the roof and wet gunny begs on the net may be

provided. Fan, Fogger, Sprinkler, Humidifier are used for controlling temperature in poultry shed.

Winter season management:- Gunny bags should be hanged on the wall to protect birds from chilled air. These gunny bags should be hanged during evening hours till the sun light appears. There should be provision of exhaust fan to facilitate ventilation. The litter should be kept clean to provide utmost warm and comfort to birds. Additionally, electric bulbs or heater can serve as secondary warmth source for birds. Care should be taken to hang these heating devices well above the reach of layers. During winter, the feed consumption increases to maintain their body temperature. Therefore, the feed should be formulated in such a way that the energy requirement (e.g. increasing in maize part) is fulfilled by feeding lesser amount. This only happens if fat is added in feed that will increase energy density. As water consumption decreases due to cold, it is advisable to provide lukewarm water. To protect from fall in temperature during night time, curtains may be used.

Rainy Season Management:- The area around the poultry house should be made clean and free from water logging. The roof should be repaired to prevent water leakage. The gunny bags on the windows should be removed to allow fresh air and light. The litter should be kept dried with proper ventilation. Additionally, electric bulbs or heater can be used for providing warmth to the birds. As intensity of day light decreases, there should be provision of florescent light to mimic day light. Poultry farmers should be well prepared during the rainy season to protect birds from splash water & rodents. Adequate hygienic measures should be taken to prevent diseases outbreak. Use of toxin binder in feed (activated charcoal/organic acids) and keeping the litter dry by using lime should be practiced.

Use of Poultry manure in agriculture crop:

- Poultry manure is a rich source of nitrogen, phosphorous, potash & a good number of micro minerals like calcium.
- The nitrogen content of poultry manure is around 9 % which is 3 times higher than cow dung.
- The poultry litter contain uric acid & NH_3 which is not advisable to use directly in agriculture. Therefore a decomposition period of 6 months is necessary for using the manure in the field or we can go for dilution in water only after drying.
- During decomposition & drying, excess moisture, offensive odour, moulds, bacteria are removed & can form good manure. So, the manure can be used in a judicious way for agriculture field & aqua culture pond.

Use of Poultry manure in agriculture crop:

- The poultry manure after proper decomposition can be used along with farm yard manure in agriculture field.
- As the carbon content of poultry manure is less, a mixture of farm yard manure & poultry

manure at a ratio of 3:1 gives an optimum result. The mixture can be applied @ 10 tons per hectare for good yield of crops.

- When the poultry manure is used alone it should be restricted to a quantity of 5 to 7 tons per hectare for agricultural purposes.
- The manure can also be used as aqua feed to a limited quantity (approximately 2 tons per hectare of water area at 3 months of interval).
- While using in aqua culture, precautionary measures may be taken keeping in view of use of insecticide for fly control in the poultry litter.
- A minimum withdrawal period upto 2 months after use of insecticides is necessary before utilizing in aqua culture.

Health Management of poultry birds

From the perspective of an entrepreneur, there is need to have some basic knowledge regarding the poultry diseases that are common in our environment. These can be prevented by proper planning to ensure that no additional losses to the layer birds happen during diseases & also ensure proper health managemental practices. Few important diseases of chicken relevant from entrepreneurs' point of view are elaborated below.

A) Viral diseases:

1) Ranikhet / New Castle Disease Symptoms:

- Affects all birds.
- Difficulty in breathing.
- Nasal discharge.
- Anorexia.
- Greenish diarrhoea.
- 90-100% mortality.

Prevention: Early vaccination with F1 or Lasota followed by R2B vaccines.

Vaccine Availability:

- Government Dispensaries (OBPI) : (F1 and R2B)
- Venky's (VH group): (B1,lasota,R2B)
- Biovencer healthcare Pvt. Ltd.(F1, Lasota)

Hoester bioscience: (F1, Lasota, R2B)

A typical Symptom

Typical Symptom

2. Marek's disease

Symptoms

- Affects all the birds.
- Droopy wings
- lameness, paralysis.
- Enlarged feather follicle

Prevention: The option is only for ensuring early vaccination, at hatchery level on day one.

Vaccines available in market:

- Venky's (VH group): MD vaccine
- Hester bioscience: MD bivalent

3. Fowl Pox

Symptoms

- Lesions on the skin (dry fowl pox)
- Lesions inside the mouth and throat (wet fowl pox)
- Lesions/nodules on the comb, wattle, eyelids, other non feathered areas
- nodules on mucosal membranes of pharynx, trachea, oesophagus

Typical ante-mortem look in Pox cases:-

Prevention: The option is only for ensuring early vaccination, at hatchery level on day one.

Vaccine availability:

- Government Dispensaries (OBPI) : fowl pox vaccine
- Biovencer healthcare pvt. Ltd: fowl pox

Hester bioscience: fowl pox

4. IBD (Gumboro diseases)

Symptoms

- Rapid onset of the disease with a sudden drop in feed and water consumption
- Watery droppings leading to soiling of feathers around the vent, and vent pecking.
- Chicks are listless and sit in a hunched position.

Typical Symptom

Prevention: Vaccination with Live attenuated (Mild, Intermediate, Intermediate plus vaccines or Hot vaccines)

Vaccine availability:

- Biovencer healthcare pvt. Ltd: Gumboro disease vaccine (live/inactivated)
- Hester bioscience: Gumboro intermediate
- Bio-Med: IBD intermediate plusTypical Symptom

5. Bird flu/avian influenza

Typical Symptom

Symptoms

- Swollen head and cyanotic wattle and comb.
- Sero-mucous nasal discharges and hyper-salivation.
- Subcutaneous feet petechiael haemorrhages.
- Birds may die without showing any clinical sign.
- Involvement of nervous system is reflected with tremors of head and neck
- Sudden death

Prevention: Sanitary measures and biosecurity measures to be followed. Avoid contact between poultry and wild birds.

No vaccine is available.Typical Symptom

Bacterial Diseases:

Bacterial diseases include any type of illness caused by bacteria. Bacteria are a type of microorganism, which are tiny forms of life that can only be seen with a microscope.

1. Salmonellosis or Pullorum Disease

Typical Symptom

Symptoms

- Chalky white diarrhoea.
- Sudden death.
- Pasted vent.
- Depression and loss of weight.

Prevention: Sanitary measures and biosecurity measures to be followed. Recovered birds act as a source of disease and thus better to cull.

2. Colibacillosis

Symptoms

- Diarrhoea.
- Dizziness.
- Swelling of joints.
- Oedematous comb and wattle.
- Depression and loss of weight.

Prevention:

- Maintain adequate hygiene and bio security to minimize transmission through faecal contamination of eggs.
- Infected excreta and litter should be disposed properly to avoid contamination of natural water sources and spread in the farm.
- Avoid stress and overcrowding in the flocks Typical Symptom

Typical Symptom

C) Fungal:

Fungal diseases are often caused by fungi that are common in the environment. Most fungi are not dangerous, but some types can be harmful to health.

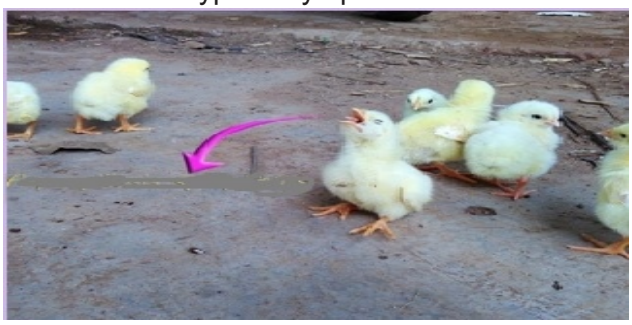
1. Aspergillosis or Brooder pneumonia

Symptoms

- Affects chicks.
- Respiratory problem.
- Swollen eye and head.

Prevention: Sanitary measures and bio-security measures to be followed. Typical Symptom

Typical Symptom



D) Protozoan Diseases:

It is a parasitic single-celled organism that can divide only within a host organism.

1. Coccidiosis

Symptoms

- Chicks huddle together, having ruffled feathers and dropped wings and eyes may remain closed.
- Decrease in egg production.
- Bloody/ chocolate coloured diarrhoea.
- Comb and wattles become pale.

Prevention: Sanitary measures and bio-security measures to be followed. Outbreaks are common between 3- 6 weeks of age. Keep the litter dry by frequent turning of litter.

Typical Symptom

E) Helminthic Diseases

Several endoparasites like tape worm, round worm, and flat worm affect poultry birds and subsequently the birds get anaemic and emaciated. Some of the typical symptoms are inappetence, poor body growth, ruffled feather and diarrhoea. Parasitic diseases can be prevented by using anthelmintic every two months.

F) Vitamin/nutritional deficiency diseases:

Deficiency of vitamins like A, D, E, thiamine, niacin, folic acid, B12 & may cause diseases like : poor hatchability, thin egg shell, rubber beak, torticollis , abnormal twisting of head & neck, polyneuritis that causes star-gazing, leg disorders, dermatitis, feather depigmentation.

Managemental diseases:

Egg eating and cannibalism are major managemental lapse diseases. In cannibalism, one bird pecks or pulls the feathers/ vent/ toe or head of another bird resulting in skin injury that serves to be a portal for entry of deadly pathogens.

Causes of pecking/cannibalism:

a. Overcrowding

b. Overheating

c. Inadequate nutrition

d. Injured/dead birds left in the stock

e. Laying nests are too lighted.

f. Abrupt changes in management practices

Vaccination and its importance for Layer Farming:

Why vaccination in layers?

A vaccine (or immunization) is a biological preparation providing acquired immunity to a particular infectious disease. Most vaccines consist of weakened / attenuated live form of the germ which is injected into the body. The body then detects the invading germs (antigens) and produces antibodies against them. Those antibodies then stay in the body for a long time. In many cases, they stay for the rest of life. If the body is exposed to the disease again, it will fight it off based on previous memory without affecting from the disease. Some vaccines need booster and repeat doses/shots.

Timely vaccination makes disease resistance power in the body of chick. Vaccination helps to keep the hen free from infectious diseases. Diseases occurrence will be less in post vaccination period. Accordingly, the mortality rate will reduce, and the low mortality rate will translate into more production capacity and more profit to the entrepreneur.

Before Vaccination, some protocols have to be followed. The chickens are to be properly handled. Care should be taken to wash the vaccination equipment with hot boiled water. The organizer should always prefer vaccination programs in cold weather condition. So, early morning hours will be best. The vaccination should be accomplished without giving stress to the birds.

Vaccination schedule for layers

Vaccine with brand names	Age of bird	Vaccine dose	Mode of administration
MD vaccine(HVT)	Day old	0.2 ml	Under the skin fold of neck
RD (Lasota)	7th day	One drop	Occular/nasal route
IBD (intermediate strain)	14th day	One drop	Occular/nasal route
IBD (intermediate strain) – Booster	24th Day	-	Drinking water
RD (Lasota) – Booster	30th day	-	Drinking water
Fowl Pox	6th week	0.5 ml	Wingweb method
RD (R2B/Mukteswar strain)	10th week	0.5 ml	S/C or I/M
Infectious coryza	12th week	0.5 ml	S/C or I/M
RD + IB killed	16th week	0.5 ml	S/C or I/M
RD (lasota) + IB	35th week		D/W

Bio-security measures in a layer farm

Bio-security is a programme designed to prevent the exposure of birds to disease causing organisms by reducing introduction & spread of pathogens into & between the farms. It is a team effort, a shared responsibility, and an on-going process to be followed at all times. The

major components of bio-security as practiced by the poultry industry include isolation, traffic control, sanitation, rodent and insect control. Some of the important bio-security measures are as follows

Bio-security Measures :

- Fencing.
- Keep visitors to the minimum.
- Limit visits to other poultry farms.
- Keep all animals and wild birds out of poultry houses.
- Practice sound rodent and pest control program.
- Inspect flocks daily and recognize disease symptoms.
- Good ventilation and relatively dry litter.
- Keep areas around houses and feed bins clean.
- Disinfection and sanitization of poultry house & equipment.

Routine bio-security measures :

- Cleaning of the farm premises
- Cleanliness of workers
- Cleaning & sanitation of brooding shed
- Application of lime after batch replacement
- Fumigation of chick shed (20 g of $KMnO_4$ + 40 ml of commercial formalin used for 100 cubic feet area)
- Cleaning of litter material
- Cleanliness of feeders & drinkers
- Routine vaccination
- Removal of dead birds & proper disposal (preferably incineration)

Business planning for small-scale layer farming

Introduction:

The business refers to the economic activity of producing or selling of goods or services for profit in ethical manner. Farmers must adopt a business approach and understand the cost of inputs in line with the potential profits from a well-managed operation.

Gross costs and projected returns of a broiler business:

Cost of production		Returns
Fixed	**Variable**	
• Housing • Tools and equipment • Land use • Depreciation	• Feed • Day-old chicks • Medicines and vaccinations • Electricity /fuel • Litter • Transportation	• Live chicken sales • Litter as fertilizer • Gunny bags

A profitable, sustainable broiler business operator must have the ability to:

- Manage logistics (delivery of inputs, transport of harvest)
- Identify and build good, effective relationships with suppliers and buyers
- Manage operations and finances by acquiring required knowledge and skill
- Ascertain availability of production resources e.g. land, labour and capital.
- Build marketing skill to deliver the product to the customers.

Any business is measured by its financial performance and the banks will always make their decision to finance based upon the financial statements of the business. This makes it imperative for the entrepreneur to be financially literate. The financial literacy, so to say, will go a long way in boosting the confidence of the entrepreneur and take strong decisions based on careful and fundamentally strong analysis of financial implications of such decisions on the future of the business. Treating broiler farming as a business helps farmers to get the best out of their farms and their resources. Applying business methods, such as record keeping and cost-benefit analysis, to farming can greatly improve its efficiency.

- Profit (P) occurs when the Income (I) generated is greater than expenses (E) incurred (P=I > E)

- No profit occurs when incomes equals expenses (P ≠ I=E).
- Loss (L) occurs when income is less than expenses (L= I< E). When this state persists, it is advisable that you close down the business as soon as possible.

As an entrepreneur the farmer needs to:

- Show creativity and innovation in business and lead from the front
- Analyse the business opportunities in the environment and exploit successfully
- Analyse how to meet the unsatisfied market need.
- Take calculated risks and assume responsibility for both profits and losses.
- Looks for efficient and innovative ways to make business with due diligence, persistence and commitment
- Mobilises the necessary resources (money, materials, machinery, labour management, technology etc.) to implement the business.
- Find ways to make the business grow through innovations.
- Try new, better broiler breeds, and appropriate technologies to increase productivity, diversify production, and reduce risk - and to increase profits.

Business Plan:

A business plan is a written summary of entrepreneur's proposed business, its operations and financial details, its marketing opportunities and strategy of business. The written document explains goals, investment and future cash flow. It also describes plan to attract and keep customers. A business plan is a changing, dynamic document. There are no guarantees that your business will succeed but a well-written and well-thought business plan plays an important role to determine the success of the Project.

Purpose of Business Plan:

- It forces an entrepreneur to think and plan the business.
- It helps to determine direction of own business - Goal
- It serves as a road map for setting up of an enterprise.
- It provides details of resources required.

It indicates feasibility and viability of the business in terms of its profits and market.

Business Plan template:

1. General Introduction - Name and address of business and entrepreneurs, nature of business, Past Experience, Entrepreneur profile are mentioned.
2. Description of Business - An entrepreneur always makes concerted efforts towards the successful completion of a goal. An entrepreneur perseveres and is undeterred by

uncertainties, risks, obstacles, or difficulties which could challenge the achievement of the ultimate goal. Products and

services to be offered, scale of business operations, type of technology to be used are described.

3. Organisational Plan - Form of ownership (sole proprietorship, partnership or Farmer Groups), identification of business partners, roles and responsibilities of members of the organisation are stated. The entrepreneur behind any business should have the following traits.

    a. Character (Integrity)

    b. Capacity (to repay the loan; willful defaulters)

    c. Collateral (security - Agricultural land)

    d. Credit worthiness (Financial discipline)

    e. Competence (Willing to take risk/ makes something out of nothing)

    f. Dream/ Vision (Intent)

4. Production Plan - The detailed process like Feed Conversion Ratio(FCR), Feeding chart, and the weight gain are changed depending on the breed of broiler birds and management practices.

5. Marketing Plan - Successful entrepreneurs do not rely on guesswork and do not rely on others for information. Instead, they spend time collecting information about their customers, competitors, suppliers, relevant technology and markets. Gathering relevant information is important to ensure that the entrepreneur makes well-informed decisions about marketing products. Table eggs produced, pricing policies, distribution channels, promotional strategies are to be planned. Some small farmers already know exactly what it is they want to do, how they are going to do it, and why they want to do it. However, many farmers never take the time to consider what the customer wants, why the customer wants it or how the customer wants it. Many of these same farmers never consider why their products or services would be sought after more than their competitors. Marketing products and services is essential to farm profitability and viability, yet many farms lack a specific, organized plan. A producer should have a detailed plan describing how he/she will market products. The four areas where consumers derive value are the product, the price, the placement, and the promotion.

6. Financial Plan- fixed and working capital requirements, sources of capital, cash flow projections, break even analysis.

The business plan contains all details of the product, production plan, target market, delivery process, form of ownership, role distribution, marketing plan and financial analysis. These are

subjective and their impact assessment needs numbers or quantification which is found in the financial section of this plan.

Detailed Project Report:

Based on the business plan, the detailed project report (DPR) is submitted to the investors or lenders for appraising the financial feasibility of the project. The finance part of the business plan holds key significance as it forms the key fundamentals for an investor to decide upon investing in the business. Many entrepreneurs might not be too proficient in making or understanding these statements as they need understanding of basic accounting procedures. The entrepreneur should have basic understanding of the key elements of the financial performance.

Some Key terms for financial management of Farm

Sl. No.	Terms	Description
1.	Capital	Capital is the amount (regarding money value), an entrepreneur or the owner has initially invested into the business. It is also known as owner's equity or net worth or Shareholder's wealth or Owner's wealth or Proprietor's claim on the entity.
2.	Asset	The asset is what enables the firm to get the money or a benefit in future. In other words, the asset is any resources used in the business to generate future income. Ex. Building, Machine
3.	Liability	Liability is the amount a firm owes to outsiders (the firm is liable to pay), excepting to the proprietor or owner. These are the economic obligations that a firm legally binds to settle a debt. Thus, for business, capital is a liability towards the owner.
4.	Balance Sheet	Summary of all the assets and liabilities (along with capital) available with the farm at a specific time (in a prescribed form). Usually, it is presented in a tabular form.
5.	Revenue	Revenue means the sale value of goods and services that have been supplied/ sold to customers during the period.
6.	Expenditure	Expenditure is a payment for a benefit received. Expenditure may be of capital or revenue nature.
7.	Goods	Goods are those things which are purchased for resale or for producing the finished products which are also meant to be sold.
8.	Inventory	It includes goods lying unsold on a particular date.
9.	Depreciation	Consumption of fixed assets
10.	Profit	Profit is the excess of revenues over expenses during the period (being measured). Profit = Sales Revenue – Expenses.

11.	Current Asset	An asset which can be converted into cash within one year period is called a current asset.
12.	Fixed Asset	An asset which is purchased for the purpose of operating the business (but not for resale). It is kept in the business usually for a longer period for more than one year period.
13.	Variable Cost	A variable cost is a defined as a cost which varies with the volume of production. Ex. feed, Electricity, labour, Health care, interest and principal payment on Loan
14.	Fixed Cost	A fixed cost is a cost which remains constant (same) even if the volume of production changes. Ex. land, equipment, poultry shed, Birds,
15.	Total Cost	Total Cost = Variable Cost + Fixed Cost
16.	Break Even Point	The point at which a firm incurs no loss or no profit is called a Break-Even Point. At this point, total revenue equals the totals cost incurred by the firm. At BEP, Total Revenue =Total Cost.
17.	Contribution Income	Contribution income is the revenue over variable cost. Contribution Income = Sales Revenue – Variable cost
18.	Contribution margin	Contribution margin is defined as the ratio between contribution income and sales revenue.
19.	Break Even in Amount (In Rs.)	Fixed Cost/ Contribution Margin
20.	BEP (in units)	Fixed cost/ Contribution income
21.	Money	Money is any thing that is accepted as payment of (discharge of) debt.
22.	Cash	Cash comprises coins and banknotes
23.	Cash Flow	Cash flow is the continuous movement of cash in theorganization as a result of receipts and payments occurring due to transactions of the business. Receipts are cash inflows whereas payments are cash outflows.
24.	Liquidity	The term liquidity refers to the liquid cash available for immediate usage. It is important for an organization to have sufficient liquidity so as to meet its debts as they fall due.

The following aspects are to be considered for any business operation.

1. Break even point:

There are two types of costs involved in Small scale Layer Farming

i. Capital costs: This is the cost invested for a long time. It includes land, equipment, poultry shed, Birds, etc. The capital cost should be limited otherwise the entrepreneur will be exposed to higher risk.

ii. Operating costs: This is the recurring expenses which are a regular part of the production cycle. Examples include feed, Electricity, labour, Health care, interest and principal payment on Loan. Higher recurring cost will put entrepreneurs at a competitive disadvantage position.

Every business organization works to maximize its profits. With the help of Break-even point analysis, the management studies the co-relation of profit and the level of production. BEP is concerned with the level of activity where total sales equals the total cost and it is called as the break-even point.

When the total cost of executing business equals to the total sales, it is called break-even point. Contribution equals to the fixed cost at this point.

Here is a formula to calculate break- even point:

B.E.P (in units) = Total Fixed Expenses/ Selling Price per Unit − Variable Cost per Unit = Total Fixed Cost/ Contribution per Unit

Break-even point based on total sales in terms of Rs. = Fixed Cost/ Contribution MarginMargin of Safety

Margin of Safety is the amount of sales, which generates profit. In other words, sales beyond Break Even Point are known as Margin of Safety. It is calculated as the difference between total sales and the break even sales.

Margin of safety = Actual Sales − Sales at BEP

2. Cash-Flow:

One of the most critical items for a small-scale layer farming is having enough cash to meet needs throughout the year. The entrepreneur needs to know how much cash will be required to meet day- to-day operations (operating costs and loan payment) and how much sales revenue will be generated (Sale of egg, poultry manure, culled birds). Estimating future Cash flow in business helps in analyzing the financial viability. Positive cash flow occurs when the cash moving into a business from sales is more than the amount of the cash leaving a business through accounts, monthly expenses, salaries, etc. Negative cash flow occurs when the outflow of cash is greater than the incoming cash.

Preparation of Cash Flow Statement

The Cash flow statement must show the flows of cash- Cash receipts and cash payments for the period under the following three headings:

a. Operating activities – Cash flows from operating activities are those related to the normal course of business.

Examples: Cash inflows include cash receipts from sales of bird

Cash outflow include cash paid to employees, suppliers

In simple words, operating activities are the cash effects of transactions and other events relating to operating activities. The net cash flow from operating activities represents the net increase or decrease in cash resulting from the operations shown in the profit and loss account in arriving at operating profit.

b. Investing Activities – Most items in the investing activities section come from changes in long-term asset accounts. Investing cash outflows result from the purchase of fixed assets (Poultry shed and equipment) and investments, whereas inflows occur from the sale of fixed assets.

c. Financing activities – Most items in the financing activities come from changes in long-term liability or equity accounts. Financing cash inflows come from the sale of the entity's equity securities or issuance of debt such as bonds. Cash outflows consist of payments to stock holders for dividends and payments to reacquire capital stock or redeem a firm's outstanding debt.

3. Capital Budgeting:

In order to take Capital Budgeting decision, Net Present Value (NPV) and Internal rate of Return (IRR) is calculated.

a. Net Present Value:

The Discounted Cash Flow (DCF) concept is based on the premise of the `time value of money'. The flow of income is spread over a few years. The real value of a rupee in your hand today is much more than that of a rupee which you will earn after a year. This is called time value of money. The future income, therefore, has to be discounted in order to compare with the current outflow of funds in the investment.

Net present value describes as the summation of the present value of cash inflow and present value of cash outflow. Net present value is the difference between the total present values of future cash inflows and the total present value of future cash outflows.

NPV = Total Present value of cash inflows – Net Investment.

The Project can be acceptable if the aggregate PV of cash inflow is more than the current outflow.

b. Internal Rate of Return:

The Internal Rate of Return is another method under the Discounted Cash Flow technique which is used for appraising the investment proposals. It is based entirely on the estimated cash flows and is independent of interest rates.

The internal rate of return is defined as the interest rate that equates the present value of expected future receipts to the cost of the investment outlay. Under this method, we derive the discounting rate at which the aggregate of the PVs of all future cash inflows equals the present cash outflows for the proposal. IRR is the return that makes the NPV = 0.

Accept the project if the IRR is greater than the required return. This is the most important alternative to NPV and is often used in practice.

4. Profitability analysis:

Profit earning is the main aim of every economic activity. A business being an economic institution must earn profit to cover its costs and provide funds for growth. No business can survive without earning profit. Profit is a measure of efficiency of a business enterprise.

Profitability Index = Present Value of Cash Inflows/ Present Value of Cash Outflows

Marketing Skill

The success of any business depends on proper analysis of market to find what are the opportunities existing, who are the competitors and what are the need of customers. Therefore, an entrepreneurs should study the market dynamics in his/ her area and accordingly determine the marketing strategy to sell their eggs and get better price for their eggs.

Market scenario:

In our local condition the eggs are marketed in raw & whole form. Previously, there was demand for egg in urban areas but now there is demand of egg in rural areas also. Currently, the demand for egg is 90 lakh eggs per day in our State, whereas the domestic production is only 65 lakh per day. This envisages an additional production of 25-30 lakhs to meet the present demand. This additional requirement can be met by rearing around 40 lakh layer birds.

As per the initiatives taken by Department, small farmers with a capacity of 1000 layers and 200 capacity layer farms through Women SHGs will be developed throughout the state to provide rural self employment. These kind of farmers will have ample scope to go for direct marketing of eggs in the local market.

The entrepreneur should have the skill to analyse the market. Some of the important market scenario which needs to be studied are:

- Geographical description of the business location
- Is there local demand for the product and if not, how can it be created?
- Who are the big competitors, how can you counteract them and their influence?
- How many competitors does the business have? If they are many, your market share is low, which means that aggressive promotion is necessary to ensure visibility.
- Does your product need publicity and if so, what expenses would that incur?
- What is the trend in the selling price? Is there any seasonality?

Marketing of eggs

Egg is a highly nutritious with high biological value & un adulterated food item for human consumption. Consumers depend upon this nutritious food for healthy growth & good source of protein. Taking into consideration of its nutritional value ICMR has recommended half egg per head per day for a balanced diet, there is scope for marketing egg directly.

Direct Marketing:

Direct marketing includes the following methods of selling i.e., sales from the farm (farm gate), door-to-door sales, producers' markets and sales to local retail shops.

Egg producers who are situated a short distance from consumers may be able to practise direct marketing. Before choosing to sell their products directly to consumers, however, they must evaluate two main factors:

- Time: Producers who choose direct marketing have less time for production activities.
- Cost: The costs involved in direct marketing.

There are four main ways to carry out direct marketing.

Sales from the farm

- Producers may be able to sell eggs directly from the farm (farm gate).
- This, however, will depend on whether consumers are able and willing to go to the producer's facilities.
- The main advantage of farm-gate selling is that the producer may be able to obtain a market price for eggs without incurring marketing costs.
- The main advantage for the consumers is that eggs will be fresh with little or no quality loss.

Door-to-door sales/street hawking

- Some consumers prefer that eggs be brought directly to their door.
- This means that the producer must spend time on marketing; however, consumers may appreciate the service and be willing to pay a good price.
- Furthermore, the producer can take orders directly from consumers and carry only what he/she is assured will be bought.
- Eggs may also be sold on the street.

Producers' markets

Usually the producer simply occupies a stall in a public marketplace and offers his/her produce for sale. Eggs are commonly displayed in baskets and often differentiated by weight/size and colour . Sales in producers' markets permit a farmer to make direct contact with consumers who are not able to go to the production facilities.

The main disadvantage of using such markets is that, towards the end of the day, the producer may have to either reduce his prices sharply to dispose of remaining stock or carry it back to the farm.

Sales to local retail shops

- Producers can also sell directly to local retail shops. This requires some sort of agreement between the two parties regarding constant supply, quality and payment methods.

- In some cases it may be possible for producers to sell directly to institutional consumers such as hotels, restaurants, schools and hospitals.
- This type of direct marketing, however, requires negotiation, which may result in a written contract of the duties and obligations of both parties.
- It also requires continual interaction over time between producer and buyer, a standard egg quality agreement and a constant supply.
- The producer must carefully evaluate the issues involved including the regular production and transport of large quantities of eggs.

Group marketing:

Since the production level is less, it becomes difficult to carry the egg directly to market for selling. Small farmers can unite to aggregate their eggs for marketing through the dealers to save time & effort. Here the farmers can aggregate the product to get a big volume to enter into the dealer oriented market linkage for assured marketing. Also a number of producers can also unite to market the eggs in nearest market for better getting benefits.

Use of Social Media for promoting marketing of eggs

- Farmers can access their product and can sell directly.
- Farmers can make a whatsapp group among the local consumers and start networking with people who has demand of eggs.
- Door delivery can be done at the customer with a minimal delivery charge included.
- Facebook messenger can also be utilised for this. In social media marketing farmers can approach the customers.
- The customers can also get the products very quickly without any difficulty.
- During the present COVID-19 situation, social media marketing will make the community safe as people will get nutritious food items by maintaining social distancing.

The greater the distance between producer and consumer, the more complex is the marketing strategy required to ensure that eggs reach consumers in the form, place and time desired. Producers may decide to market their produce directly to consumers - direct marketing - or may choose from a variety of marketing strategy that make up a marketing channel.

Marketing Channel

A typical marketing channel is made up of collectors, assembly merchants, wholesalers and retailers. A marketing channel is composed of a set of separate but interdependent organizations involved in the process of making a product available to consumers. The use of

a marketing channel is convenient particularly when the producer does not have the time or financial means to carry out direct marketing. Intermediaries are usually able to make the product widely available and accessible because they are specialized and have experience and contacts. They also have a better understanding of the egg market. Intermediaries take the risks involved in marketing and also pay for the produce immediately.

Market Intermediaries:

Collectors:

Collectors usually collect eggs from various small producers. Where the quantity of eggs collected at each stop is small and frequent, this system is often the most economic. Collectors may be unemployed youths, producers themselves, agents of wholesalers, or retailers.

Farmer Groups:

They form a cooperative association of producers. The main advantage is that the business is run by and for those who use it, rather than by those who own it. They aggregate the produces from individual farmers and market it at nearest market.

Wholesaler

Wholesalers usually obtain eggs from collectors and local traders. Eggs may be purchased directly or accepted for sale on a commission basis. Many wholesalers have their own storage facilities. Wholesale distributors may engage specialized transport arrangement to transport eggs.

Retailer

Eggs are sold in the market through retailers. The retailers usually sell eggs either in an exclusive shop or they sell along with other items in general shops and supermarkets.

Value addition of Egg:

A. Sorting & Cleaning of Eggs

Eggs are sold largely on their appearance. Dirty eggs are not to be marketed at all. But, when the eggs are slightly dirty, dirt patches are removed using fine sandpaper & then wiping them with clean damp cloth using lukewarm antiseptic water. Avoid washing the eggs directly because it will remove the protective " bloom" on egg shell leading to evaporation of their moisture content.

B. Grading of Eggs

This is a system of classifying eggs into different categories based on their weight & quality. Egg grading involves inspection of the shell for soundness, cleanliness, checking the internal quality by candling etc. Two world class methods for grading of chicken eggs are as follows.

a) Agmark grading

b) USDA method

In India, eggs are being graded as per egg grading and marketing rules, 1968. Following grading, eggs rs are marked by the grade designation "Agmark". Recently, the Bureau of Indian Standard (BIS) has also come up with standard for grading eggs, taking into consideration both exterior and interior quality of eggs.

Indian Standards for Table Eggs

Grade	Weight of Individual Egg (g)	Weight per dozen (g)	Weight per unit of ten (g)	Shell	Air cell	White	Yolk
A. Extra Large	60 and above	715 and above	596 and above	Clean, unbroken and sound Shape	Upto 4 mm in depth, practically regular or better	Clear reasonably firm	**Fairly well centered, practically free from defect, outline in distinct**
A. Large	53-59	631-714	526-595				
A. Medium	45-52	535-630	446-525				
A. Small	38-44	456-534	380-445				
B. Extra large	60 and above	715 and above	596 and above	Clean upto moderately stained, Sound and slightly abnormal	8 mm in depth. May be free and slight bubbly.	Clear, may be slightly weak.	**May be slightly off centered. Outline slightly visible.**
B. Large	53-59	631 - 714	526-595				
B. Medium	45-52	535-630	446-525				
B. Small	38-44	456-534	380-445				
Eggs which do not qualify under the above two grades, may be debarred for entering Trade Channels as fresh eggs.							

Storing and Preservation of Egg

A) STORAGE

- Eggs are to be stored in a cool humid storage area having temp 55^{0}F & RH- 75%. Eggs should be positioned with small end pointed downward. Hatchability holds reasonably well upto 7 days, but declines rapidly afterward.

B) PRESERVATION

- Thermostabilisation - eggs in hot water at temp of 135-145 degree F for 15 min.

- Cooling eggs - Temp below 68 degree F & 80% RH will help prolong the freshness of eggs. Cool room, Underground Cellar, Earthern pot, Home made Cooler will be of great help.
- Frozen eggs- Freezing is one of the best ways.
- Dried Eggs - Can be stored for many months even at high temp.
- Oil protected eggs - Warm oil such as coconut oil is used to coat the shell which will seal the pores of shell, preventing evaporation & loss of CO_2.
- Lime water method - 1lt boiled water with 1 Kg of quick lime are mixed & cooled to room temp. After 225g of NaCl salt is added, the mix. get settled down. Immersing the egg overnight will be developing Calcium layer over the shell.
- Home methods- Indigenous materials such as *neem* leaves, *shisham* leaves, rice husk, dry salt, moist sand, slaked lime or dry charcoal powder are used for storing of eggs. These materials are placed with eggs in boxes.

Packing of eggs:

Packing of eggs is important requisites for good marketing & better income. Transport damage is usually accounts for 2-5%, but with proper packing it can be reduced to 1%.

Different Containers used for packaging of eggs are:

1) Firm-walled baskets and boxes.
   (a) Wooden boxes- Top protected and securely sealed.
   (b) Plastic coated wire baskets.
2) Barrels.
3) Flat boxes.
4) Paper-board case with fillers and cup flats.
5) Wooden case with tray & paper board fitting
6) Trays (Aluminium frame)

Inner packing materials

We can go for saw dust, rice husk, straw, wood saving etc., but eggs cannot be transported in refrigerated vans using this. In the modern system, fabricated materials called 'filler & flats' & 'egg cartoons' are used. Grade & size are to be indicated on each package over wrappings. Eggs are to be carried in a refrigerated van so that qualities of eggs don't deteriorate.