



Livelihood perspective

1.0 INTRODUCTION

Rainfed agriculture has traditionally been the main livelihood activity for poor families in rural India. It is supplemented in varying degrees by small livestock rearing, handicrafts, wages, and hunting and gathering. Improving the productivity of agriculture and other primary rural resources is, therefore, essential to enhance rural livelihoods.

Agriculture has inherent limits as a livelihood option for landless families. For marginal farmers, it offers only fragile livelihoods in agro-climatically

vulnerable regions. Also, declining farm sizes due to population growth further limits the livelihood potential of agriculture.

Thus, besides increasing agricultural productivity, the challenge is to develop livelihood opportunities based on rural enterprises that do not depend on land, supplement agricultural income, offset its uncertainty and exploit the growing demand for new products, especially in urban centres. It is in this context that poultry becomes important since it has the potential to provide a stable non-farm income for the rural poor.

1 India - Home of poultry

Indian Red Jungle Fowl (*Gallus gallus murghi*) is acknowledged as the ancestor of the modern-day hybrid chicken used in poultry production. Poultry includes



Fig. 1: Jungle Fowl

not only the well-known chicken, but turkey, duck, quail, pheasant, peafowl and so on. The term poultry, therefore, refers to all these species of birds, reared for economic benefit. These birds reproduce freely under domesticated conditions. In popular usage, however, poultry farming refers to the rearing of chicken for eggs or meat.

India is known to be the original home of the modern hen, which owes its ancestry to the Indian Red Jungle Fowl, which is found in the jungles of south and southeast Asia. The earliest records of domesticated jungle fowl are found in the Harappa and Mohenjodaro civilisations, going back to 2500 BC. The Indian Red Jungle Fowl is mostly confined to the northern and south eastern parts of the country, and the grey variety to western and southern parts. An endangered species, it has been successfully bred in captivity at the National Zoological Park in New Delhi.

2.0 POULTRY AS LIVELIHOOD FOR THE POOR

- Poultry, or the rearing of birds and fowls for meat and eggs, is a traditional occupation of the poor.
- Till about a couple of decades ago, rearing chicken in India was essentially a backyard activity with families typically rearing 5–10 fowls.
- Scientific advances in genetics presented an opportunity to breed different types of poultry birds for specific commercial exploitation.
- There are two distinct requirements in poultry: producing birds (called broilers) for meat and rearing birds (called layers) for eggs.
- The poultry sector in India employs about 3 million people, of which about 80 per cent are producers. The remaining 20 per cent are involved in feed, pharmaceutical and other services. There are a similar number of people engaged in marketing and allied services.

2 Indigenous vs commercial birds

The local birds, reared in the backyard, forage on naturally available food, be it grains, insects, etc. They are mostly left in the open without any proper housing or specific feeding. They are dual-purpose breeds, used both for meat and eggs. They are more hardy birds, less susceptible to diseases. However, their growth rate is slower and they are less efficient both in meat and egg production. In contrast to this, commercial birds are specifically bred for faster growth and higher production. There are specific breeds used for meat production (broilers) and egg production (layers). They require good housing, regular feeding, care and disease management. They are more sensitive to the rearing environment and are susceptible to diseases. Broilers are highly efficient in converting the feed into meat. Similarly, commercial layer birds are excellent egg producers.

Rearing of indigenous birds for income generation is limited, as scavenging/backyard rearing can be done only if they are small in number. However, rearing birds in hundreds or more requires housing and prepared feed. It is not worthwhile to rear indigenous birds with housing and prepared feed because the birds are inherently poor in feed conversion and meat production efficiency. Thus, for poultry to be an income-generating activity, it is advisable to use commercial birds, which generate more income in shorter time spans.

3.0 EXPANDING OPPORTUNITIES IN POULTRY

Commercial poultry production in India is barely 40 years old, although poultry rearing dates back to prehistoric times. It made its beginning in the early sixties after the government poultry farms demonstrated the efficacy of modern poultry rearing. It gained wide popularity with the extension activities of the then newly set up agricultural universities, which helped popularise modern poultry production in India.

With an annual production of 43,800 million eggs during the year 2005, India ranks fourth in the world. Similarly with the production of 2 million tonnes of meat from 1,350 million broiler birds during the year 2005, India stands eleventh in the world poultry meat production. By the year 2015, broiler production is expected to be 2.5 million tonnes.

Poultry is one of the fastest growing segments of rural enterprise in India today. The production of eggs and broilers has been rising at the rate of 10–15 per cent per annum, compared to the growth rate of 1.5–2.0 per cent in agriculture.

The estimates of income elasticity for meat and eggs strongly suggest that the consumption of these products can be expected to continue to grow steadily. The present availability per capita is 35 eggs and 750 gm poultry meat. Further, the consumption per capita of eggs is 3.0 in rural areas compared to 170 in urban areas. As per the ICMR recommendations, the per capita consumption

3 Commercial birds - broilers and layers

- Broilers are reared for meat purpose while layers are meant for egg production.

- Broilers grow very fast and are highly efficient in converting feed into meat. Layers are good in egg production.

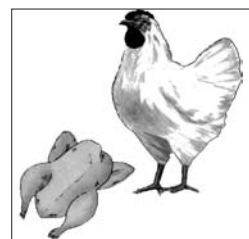


Figure 2: Commercial broiler bird

- Broilers can be used for meat purpose any time commencing from 4 to 8 weeks.

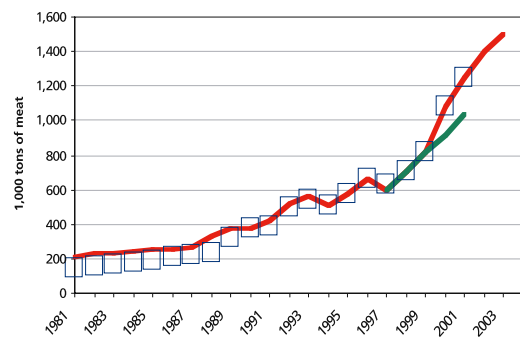


Figure 3: Commercial layer bird

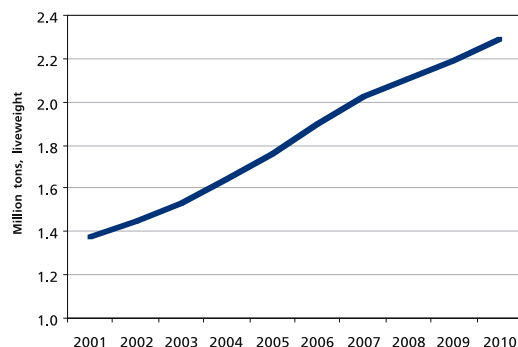
- Layers start egg production in 18 weeks and continue giving eggs for one year.
- The feed requirement and other rearing aspects are different for broilers and layers.
- Broilers are generally reared in a deep litter system on open floors whereas cage rearing is common for layers.
- The investment, including working capital, for broilers is Rs 150 per bird and for layers is Rs 300 per bird.
- The annual return per bird for broilers and layers is in the range of Rs 40–42. Layers give Rs 60 per bird in an 18-month cycle and broilers give Rs 4 per bird in a 35-day cycle.

has to be 180 eggs and 10 kg of poultry meat. Thus, even an increase of 50 gm per capita in meat consumption could generate 26,000 additional livelihoods in the primary sector itself.

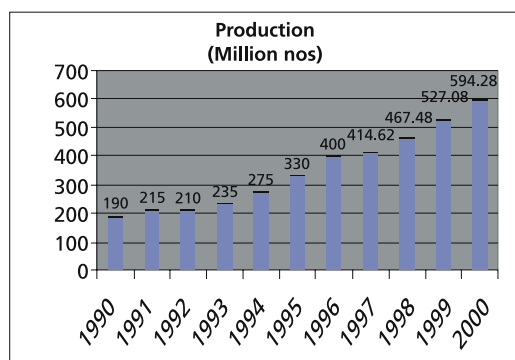
The production trends and growth prospects of the Indian poultry industry are shown in Graphs 1–4.



Graph 1: Industry growth in broiler meat production
Source: USDA/ ERS

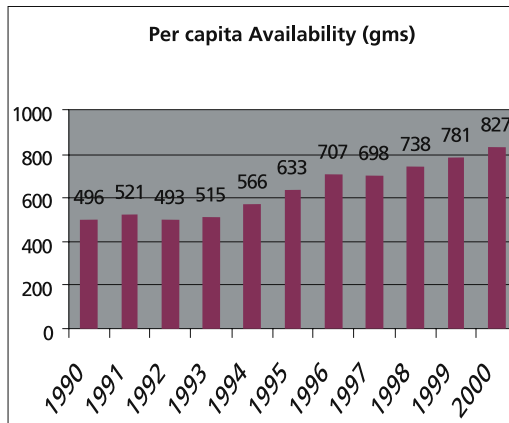


Graph 2: Projected growth of broiler meat production
Source: USDA/ ERS



Graph 3: Trend in production of broilers

Source: Annual report of DAH Govt. of India



Graph 4: Trend in per capita availability of broiler meat

Source: Annual report of DAH Govt. of India

4.0 THE BEST-KNOWN ANIMAL PROTEIN

Broiler is a specially bred poultry bird to meet the increasing requirement of animal protein. The first attempt at broiler production took place in New Jersey, USA in 1880. In India, the first broiler production took place in Hyderabad during 1959 by importing 4,500 White Rock chicks with USAID support and, later, under the technical cooperation programme of Food and Agriculture Organization (FAO).

Broiler meat is the most widely used source of animal protein. It has low fat, low cholesterol, low calories and high protein as compared to other animal meat, as shown in the following table.

Table 1: Comparative chart of the nutrient value of broiler meat with other sources (per 100 gm of edible portion)

Nutrient	Chicken	Mutton	Pork	Fish	Milk	Soya-bean
Energy (calories)	163	194	200	160	117	375
Protein (%)	19	18	18.5	17	4.3	35
Fat (%)	4–6	13.3	15	6–15	8.5	18
Cholesterol (mg)	32–35	71	62	50–60	14	0
Iron (mg)	2.6	2.5	2.2	2	0.2	0.2
Vitamin A (IU)	730	0	500	700	160	0

The comparative picture of broilers vis-à-vis other sources of meat production is given in the following table.

Table 2: Relative production efficiency of broilers

Parameters	Broiler	Sheep	Swine	Turkey	Rabbit	Fish
Generation interval (months)	6.5	18.0	15.0	9.0	7.0	12.0
No. of offspring/dame per year	140.0	1.0	25.0	50.0	36.0	10000*
Marketing age (weeks)	6.0	52.0	26.0	14.0	10.0	52.0
No. of crops per year	7.5	1.0	2.0	3.5	5.0	1.0
Feed conversion efficiency (quantity of feed/body weight)	1.8	5.4	2.5	2.3	3.0	2.5
Protein conversion efficiency (%)	21.0	3.0	12.0	18.0	5.0	4.0
Energy conversion efficiency (%)	14.0	3.0	23.0	12.0	6.0	5.0
Ready-to-cook yield (%)	70.0	45.0	70.0	72.0	48.0	60.0
Meat production kg/m2/year	100.0	5.6	38.4	43.1	8.6	0.5
Carcass protein (%)	29.0	26.0	25.0	31.0	27.0	20.0
Carcass fat (%)	10.0	19.0	28.0	13.0	16.0	11.0

* of these 10,000, less than 1% are viable at market age

5.0 LIVELIHOOD OPPORTUNITIES IN BROILER FARMING

- It provides the advantage of small initial investment coupled with quick and better returns compared to other species.
- Cultural familiarity of the poor to fowl rearing makes it an easily accepted avocation.

6.0 SPACE FOR SMALL FARMERS

Poultry started in India as a tool for poverty alleviation in the mid 1960s. However, production is concentrated now with the rural rich and semi-urban producers. The large producers have cornered the big opportunity in poultry with its fast, double-digit annual growth rate. This has also been aided by the failure of small producers. So much so that no banker is ready to provide credit to small poultry enterprises.

In the recent past, large-scale integrators, such as, Suguna in South India, have started controlling production. Large corporate houses hitherto involved, such as Godrej in feed production or Venkeys in chick production, have jumped into the arena of commercial production also. However, it has not been a good experience for them primarily because consumers prefer live chicken processed right in front of them. Thus, the dependence on 'inefficient wholesaler-trader' continues. This marked preference for 'live' chicken also makes it difficult to take care of seasonal and cyclic demand fluctuations in the market.

It is estimated that only 15 per cent of chick placement is by big corporate houses. Their cost of production is about 10-15 per cent lower than individual farmers. It is widely understood that unless the product characteristics ('live' chicken) change, big organised players will not make much headway.



Rural poor - a continuing search for livelihood opportunities

Among all livestock and particularly poultry, broiler chicken is most suitable to generate livelihoods for the poor, for the following reasons:

- Broiler production has the advantage of a growing and accessible local market.
- Growth in the sector is pegged at 15 percent + compounded annual growth. At the existing industry size of 1,350 million broilers consumed per annum, it is estimated that over 50,000 smallholder livelihoods can be generated every year in the primary activity itself.
- It requires an easily adaptable skill requirement as compared to rearing other livestock species. The critical production variable is husbandry, which provides advantages to the self-employed poor and women.
- Available technology is adaptable to the context of the rural poor.

4 Why have the rural poor stayed away?

The tremendous success of poultry development has bypassed rural poor for the following reasons.

- **High entry barriers**

Poultry industry is highly organised, complex, competitive and intensely market-oriented. The poor with their socio-economic disadvantages and low skill base cannot enter the sector without outside support or intervention.

- **Input supply, extension and marketing**

In contrast to the existing situation in which multiple agencies provide these services of input supply, extension and marketing, poor producers would require all these services under one roof.

- **Access to technology**

Sophisticated technology, when not scaled down, will remain with the more well-to-do farmers. Appropriate technology, which is scalable, improves access in favour of the poor.

- **Policy support**

A more facilitating policy to provide a level playing field for the poor in remote areas is necessary.

According to a recent assessment, the threat of big players to small individual farmers is still in the distant future in less developed areas such as Madhya Pradesh, Uttar Pradesh, Bihar, Chhattisgarh, Jharkhand, Orissa and Rajasthan. With efficient operations, it is possible for larger conglomerates of small producers to take on this challenge. Home-based broiler farming that PRADAN promotes, integrates the natural advantages that small producers enjoy on production efficiency and creates systems to help small producers network and attain economies of scale. Thus, improving production efficiency and cutting costs are the most critical elements in the future for the success of small holders' poultry.

7.0 THE SMALLHOLDER POULTRY MODEL

PRADAN took up a pilot project in Kesla in Madhya Pradesh to promote livelihoods based on micro-enterprises that used modern technologies to produce goods for urban markets. Broiler farming was one of the chosen activities. Although broiler

rearing uses fairly complex technology, it is essentially a rural enterprise. It was beyond the reach of the poor due to the complexities of production, available technology and marketing avenues.

The challenge was to understand and improvise to make the activity amenable for participation by the poor. Since its inception in 1987–88, the project has been able to organise the activity in a robust manner to withstand challenges from big farms, and leverage the opportunities offered by the industry. This essentially requires reducing the disadvantages and accentuating the advantages of small and decentralised units on three fronts: production organisation, interaction with input-output markets and financial systems.

The intervention provides a woman with skills, infrastructure, inputs and marketing assurance for home-based broiler poultry rearing. All she requires is one cent of land (435 sq ft), either owned by her or taken on lease. She earns between Rs 9,000 and Rs 16,000 a year, which works out to Rs 45–80 a day for her 200 days of engagement.

This cash income, available to her on a regular and continuous basis, helps her meet expenses and also facilitates capital formation in the family. The woman is better able to negotiate a good deal for herself within her family and the larger society. An income equivalent to 200 wage days stops outward migration and helps a family to invest in existing resources, most notably cultivated land; thereby, further augmenting food sufficiency in poor households.

The essential elements of this model/prototype are:

- Ensuring that production efficiency is better than industry standards with a rigorous training of producers, intensive production support and quality orientation, and on-call referral veterinary services.
- Ensuring cost effectiveness with the collective procurement of inputs and sale of birds to achieve economies of scale, and integrating backward and forward linkages.
- Creating a system to address the volatile nature of the market.

5 Women as poultry rearers

Women play a critical role in a family's agriculture and livestock activities. This key role, particularly in poultry rearing, has been traditionally acknowledged. The income from poultry remains with her and is considered as 'Stree Dhan'. Their natural instinct for taking care, saving and avoiding wastage help women to be efficient in husbandry. Women find it convenient to take up home-based poultry rearing and easily fit the poultry activities in their daily work routine.

- The focus here is on self-employment with reasonable returns as against higher profit motive or enterprise returns in larger farms.
- The smallholder model depends on owner labour or own family labour in contrast to employed labour in large-sized farms.

The most essential requirement for the success of the smallholder poultry model is the need for the integration of input supply and effective market access, possible through collectivisation. The smallholder poultry could be at stake if the technology is not scale neutral and if the cost of inputs is not competitive. Further, a high cost of collectivisation can also adversely affect its workability. The salient features of the smallholder model are given in Flow chart 1.

The relative competitiveness of the smallholder model is shown in the table 3.

7.1 COMPETITIVENESS OF THE SMALLHOLDER POULTRY MODEL

- In situations where the opportunity cost of labour is low, the smallholder poultry model is feasible because it becomes scale neutral.

Flow chart 1 The smallholder broiler farming model

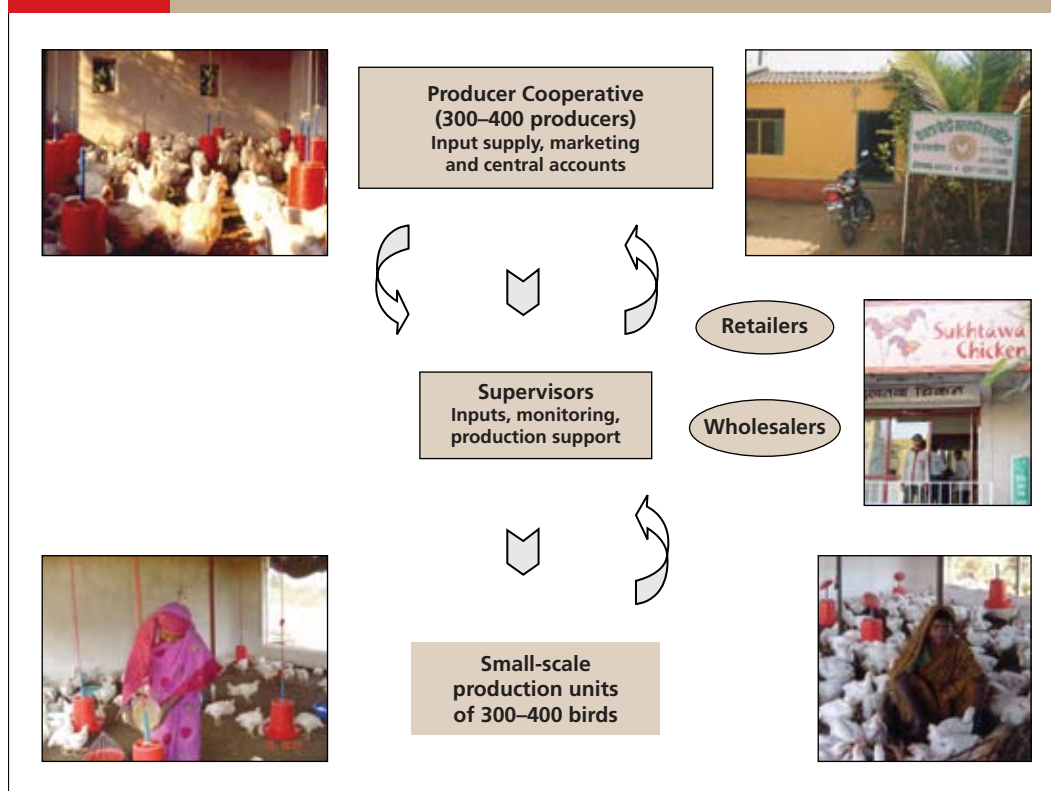


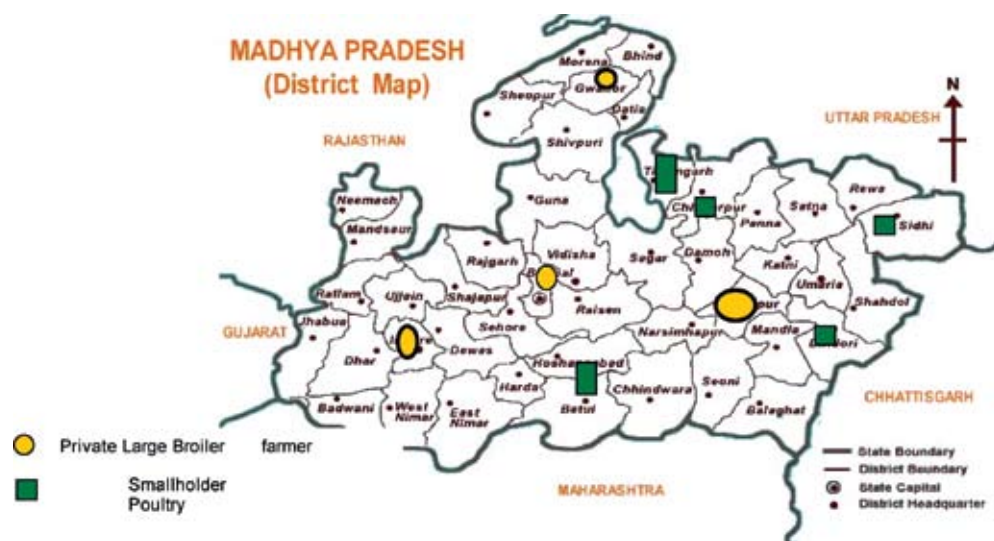
Table 3: Cost comparison for producing a kilo of live chicken

Components	Integrator	Big private farmer	Smallholder model
Chick (Rs/chick)	4.00	6.00	6.00
Feed (Rs/bird)	18.0	18.0	18.50
Litter material	0.5	0.5	0.5
Grower/labour payment (Rs/bird)	3.00	1.75	3.00
Vet and medicine (Rs/bird)	1.00	1.50	1.25
Grower administration (Rs/bird)	0.50	0.30	0.75
Electricity and water	0.00	0.75	0
Total production cost (Rs/bird)	27.00	28.80	30.00
Live bird transportation (Rs/bird)	1.25	1.00	1.25
Live bird cost in market (Rs/bird)	28.25	29.80	31.25
Cost of capital (Rs/bird)	1.40	1.50	0.00
Entrepreneurship margin (Rs/bird)	1.40	1.40	0.00
Overall cost (Rs/bird)	31.05	32.70	31.25

Note: Prices indicated are only illustrative.

6 Emergence of poultry in Kesla

PRADAN started, in 1988, the work of enhancing the income of the tribal poor in Kesla Block of Hoshangabad district, Madhya Pradesh, by promoting broiler poultry enterprises among poor households. The operational area consisted of a small stretch of 60 km from Itarsi to Shahpur, on National Highway 67. The monthly placement of broiler chicks initially was only 2,500. By the year 2004, the Itarsi-Shahpur stretch emerged as the third largest broiler production cluster in Madhya Pradesh after Indore and Jabalpur, placing over 1.5 lakh chicks every month.



The demonstration of broiler farming as a livelihood for tribal poor has had a multiplier effect. Today, many unemployed youth in this area if they have access to capital, think of starting broiler farming as an avocation. Moreover, with new poultry feed stores, the availability of vaccines and the delivery of chicks at the farm - all largely because of PRADAN's intervention - the job of rearing broiler birds has become much easier. Other large farmers have also found it profitable to set up broiler farms as more traders are operating in the area.

7.2 ELEMENTS OF THE SMALLHOLDER POULTRY MODEL

Making poor tribal women pick up skills required for broiler farming

- Rigorous training of new producers.

- Round-the-clock support through trained village-level *Para-vets* at their doorstep.
- Quality referral service through on-call veterinary doctor.

Making producers perform better

- Payment of growing charges to producers with built-in incentive system for efficient production.
- Para-vet charges linked to producer output.
- Comparison with local industry and pegging for higher efficiency.

Enhancing small unit advantage

- Adopting all-in-all out system, which helps better management.
- Emphasis on isolated sheds that breaks the horizontal spread of diseases.
- Self-employed labour in small units is more efficient than the hired labour in bigger farms.
- Small farms being owner operated there is always better husbandry.

Cost efficiency

- Single window collective procurement of inputs and marketing of produce.
- Backward integration in feed and chicks.
- Forward integration in warehousing and retailing.
- The 'collective' becoming a significant market player by cornering substantial market share and getting into a position to determine prices.
- Adopting a staggered production scheduling to spread out working capital requirement.

7 Kesla Poultry Cooperative Society (KPS)



The Kesla Poultry Cooperative in Madhya Pradesh is a predominantly women's society comprising 375 tribal and Dalit members from 16 villages. Each member has a

production unit in her backyard, capable of rearing 300–400 birds. A member produces 5–6 batches in a year; each batch taking 30–45 days to mature. Average earnings are between Rs 1,300 and Rs 2,500 per batch (Rs 8,000–14,000 a year).

A member gets chicks, feed, medicines and litter material from the cooperative. Each member is provided with a producers' book that records all transactions with the cooperative. It also records performance variables such as mortality, weight gain, feed conversion, etc.

In a village of 25–30 producers, a trained paravet (usually from a member's family) provides round-the-clock production support. The paravet (called a supervisor) is also responsible for distributing inputs, which members pick up according to individual requirements. The supervisor also checks whether the production sheds are properly disinfected, chicks vaccinated and the market-ready birds are picked up for sale. The supervisor weighs the birds and records mortality every week. These production records are analysed by the cooperatives' veterinary doctor. Corrective measures are taken immediately for any variances.

In the weekly meetings of supervisors, the cooperative schedules production and lifting

of birds. It ensures the lifting of ready birds at a pre-determined rate. The producer visits the cooperative office after a batch is sold, where her accounts are reconciled and payments made. She is also helped to analyse the reasons for high or low returns. The cooperative sells the birds through local traders or strategically located warehouses in nearby cities and state-of-the-art retail outlets in Bhopal.

The cooperative currently produces 45,000 birds every month, making it one of the largest production houses in Madhya Pradesh. In 2005–06, the cooperative placed 5.4 lakh chicks and sold 5.1 lakh birds with a live weight of 980 tonnes, worth Rs.3.25 crores. The accounts of the cooperative are maintained by customised software that also generates MIS (Management Information System) reports.

The governing board of the cooperative meets every month to discuss issues related to performance, input procurement, marketing and profits earned by members. The representatives of the producers on the board and the supervisors then hold village-level meetings to discuss decisions taken in the monthly meetings.

A Chief Executive Officer (CEO), assisted by village-level supervisors and a veterinary doctor, manages the day-to-day operations of the cooperative. The cooperative employs 37 people drawn mostly from local village youth. It meets the costs of its staff and other establishment expenses. The market interface is handled by the cooperative. It procures all the inputs and ensures the sale of birds. This provides the producers with the means to even-out the market fluctuations and to delink production and marketing risks.

Creating systems of regular information flow

- Weekly monitoring of production variables of all producers.
- Performance outputs monitored through customised software.
- Sample farm visits by veterinarian for expert guidance.

Financial system

- Customised financial software to help track movements of stock across decentralised stock centres, batches and producers.
- Capital assets created through individual member financing.
- Working capital managed collectively and raised by the collective from banks/other financial institutions.

Accountable professional management

- Deployment of trained professional management for managing the cooperative.
- Installation of a strong governance system (monthly board meetings with extensive reporting).
- Organising weekly meetings of village-level supervisors.
- Providing information on the latest world poultry industry developments.

Mitigating risks due to price volatility

- De-linking prices of inputs and outputs at grower units from market fluctuations.
- Collectively interacting with markets for price advantages.
- Providing producer's margin based on production efficiency.

Initiating the activity

1.0 INTRODUCTION

Given the livelihood perspective in general and the scope of poultry as livelihood for the poor, one can now design the activity. This requires an assessment of the local context, quantifying livelihood potential, assessing market size, identifying critical parameters, working out linkages, mobilising resources and finally launching new producers.

2.0 GROUNDWORK FOR INITIATION

Before introducing broiler farming in an area, it helps to address the following tasks:

- Assessing whether income from small-scale broiler farming would be relevant to the poor in the selected area.
- Assessing the market to find out the viable size of intervention and to know how many households could be involved in the programme.
- Assessing the local context for adapting the smallholder poultry model.
- Working out the unit size and finances for individual producers.



PRADAN workers and volunteers deeply engrossed in planning and designing

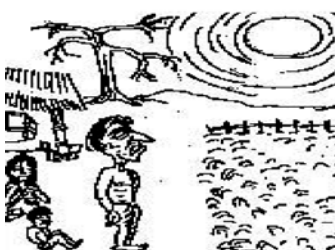
ing systems, remuneration, etc.).

- Finding resources and establishing linkages.
- Selecting villages, producers and service providers.
- Training and capacity building of producers and supervisors.
- Helping members form a collective and installing systems and processes.

3.0 ASSESSING LIVELIHOOD POTENTIAL

While assessing the livelihood potential of poultry farming in an area, it helps to remember that this activity is aimed at self-employment for the poor. It is important to find out whether the returns from the activity are better than local opportunities. A good reference is how the Return Per Day (RPD) from poultry farming compares with the prevailing local wage rates.

Once the development practitioner roughly assesses the daily and annual returns from the activity, s/he needs to compare them with the existing livelihoods of the family, discuss the returns with the targeted families and make an assessment of how they feel about it.



Agriculture, dependent on the vagaries of the weather, may not yield as much revenue as broiler farming.

- Identifying the nature of the collective (pric-

8 Calculating the margin per bird

Asking 4–5 local poultry farmers the average margin per bird or weight sold suffices for the purpose of initial assessment. A more accurate figure is arrived at by collecting the market prices of inputs and using standard production variables of feed conversion ratio and mortality figures.

As per the field experience of the smallholder poultry model, private farmers in areas where poultry farming is not very developed, currently operate at a margin Rs 4–5 per kg of live weight. In areas where poultry farming is fairly well developed, the margin drops to Rs 2 per kg of live weight.

If a producer rears 300 birds for 30 days (for the birds to reach a minimum saleable weight of 1 kg), the gross margin would be Rs 1,200 (assuming a margin of Rs 4 per kg). This translates into an income of Rs 40 per day. She could then earn between Rs 8,000 and Rs 12,000 a year, assuming she is able to rear 7–10 batches.

It has been experienced that given the current level of technology, a woman can manage to rear up to 700 birds in a batch. She requires hired help beyond this number. However, initially she is more comfortable with managing about 300–400 birds.

(supplies not met from farmers within the area). The market study includes the profile of consumers; preferred size of bird; margins at different points (wholesalers, retailers, etc.) and terms of payment. The study must identify comparative advantages. This study can be easily conducted with sufficient reliability if some key informants, such as big traders, chick suppliers, are identified and the informa-

10 Pointers for assessing the market size

- Identify important market centres within a radius of 250 km.
- Identify the different categories of consumers, for example, business people, salaried class, wage earners, etc.
- Know the consumer preferences - frequency of purchase, purchase quantity, size of bird, etc.
- Know the market players - wholesalers, retailers, etc.
- Interact with big traders, chick suppliers and input agencies.
- Find out how many birds are sold per day, per week, etc.
- Understand seasonality factors, if any, in market offtake.
- Find out the overall demand, local supply and deficit.
- Assess the year-to-year increase to know the growth rate.

9 Checklist for the assessment of livelihood potential

	Yes	No
■ Is there sufficient market for broilers within a radius of 250 km?		
■ Has a small survey among private farmers been conducted to know the current margins?		
■ Is the return per day (RPD) better than the prevailing local wage rates?		
■ Are a minimum of 200 producers available in selected villages within a radius of 25 km?		
■ Is there round-the-year road connectivity in these potential villages?		
■ Is there quality drinking water and power supply available in these villages?		

Note: An ideal project location will have a 'yes' on all the above criteria

The practitioner has to conduct a survey for the assessment of the livelihood potential of poultry in terms of returns per day, acceptance and attractiveness of the proposition and discuss the same with the intending producers. It makes sense to move ahead only if the proposition is attractive to them.

4.0 ASSESSING THE MARKET SIZE

As live birds can be easily transported within a radius of 250 km without much transit losses, it is important to assess markets within this area to determine the volume, annual growth and deficits



Women of Kesla Poultry Society holding ready chickens
Source: India Today April, 2006

11 Exploring latent markets

It is also useful to assess latent markets. In Hoshangabad district, Madhya Pradesh, for instance, an entirely new market emerged in a small town that consumed little poultry meat. It consumed large quantities of goat meat. Consumers shifted easily to chicken due to availability and lower prices. This market has remained the mainstay for the Kesla project for the past 10 years. It is, therefore, important to look at the entire animal protein market and pricing trends and then purposefully shift consumption towards poultry meat. Urbanisation, high disposable incomes and non-vegetarian communities need to be identified, as they indicate future growth.

tion provided by them is cross-checked at the local level.

Once the market size, gaps in supply and annual growth are known, the practitioner can translate these figures into the number of small producers who can be promoted as participants under the programme.

5.0 DECIDING CRITICAL PARAMETERS

Once it is certain that poultry farming presents a

worthwhile livelihood opportunity for the poor in the area, the practitioner needs to detail out the intervention at both individual and collective levels. S/he needs to remember that in a networked small producer environment, the viability of both individual and collective enterprises is important.

At the individual level, the single most important factor is the unit size. This is determined by both looking at absolute annual returns and also returns per day. Since the smallholder poultry model is defined for self-employment, hired labour in managing a unit is not considered. Thus, the outer limit for the unit size is a capacity to rear 700 birds.

For the activity to be attractive to the poor, an income between Rs 7,000 to Rs 10,000 is expected. Therefore, at current prices, the unit size for subsidised sheds is a capacity of 300 birds, for partly subsidised sheds, 400 birds and for full loan interventions, 500 birds.

At the collective level, the projections of turnover, etc. can be made based on the number of growers to be promoted. Once the size of operations is known, the critical things to be decided are:

- Given the local market situation, there has to be an appropriate pricing of inputs and outputs in a manner in which the cooperative

12 Assessing the size of intervention

In the World Bank-aided DPRP project in Dharamtari district, Chattisgarh, the project wanted to initiate broiler farming as a livelihood activity. The project team assessed the size of intervention as follows:

- Assessing what kind of returns would excite the poor communities. A RPD of Rs 40–50 for home-based activity by the women of the family was stated by the community to be good.
- The following calculations were made by the project team to decide on the unit size.

• Expected returns per day	❖ Rs 40–50
• Expected monthly income	❖ Rs 1350–1575
• Prevailing margin for broiler birds	❖ Rs 4–5/kg
• Production period	❖ 30–35 days
• Expected live weight	❖ 1.0–1.25 kg
• Expected margin per bird	❖ Rs 5.00
• Batch size to match expected monthly income	❖ 300

- The Dharamtari, project team decided on a unit size of 350 birds. The market survey done in the district headquarters and smaller towns within a radius of 100 km showed that about 1,000 birds are consumed daily. The local farmers in Dharamtari are able to supply only 400 birds and the remaining 600 birds are procured by the traders from outside. The traders also indicated that for the last 3–4 years the market size has been increasing at 20 per cent per annum.
- The project team computed that the completion of one batch with lay-off would take 45 days and so on an average taking a daily mortality of 3 per cent, one farm of 350 birds can supply 7.5 birds $\{350 \times (1-3\%)/45\text{days}\}$. This showed that the deficit in the local market itself could easily absorb 80 producers of 350 birds each $(600/7.5)$. The annual increase of 20 per cent could further absorb about 26 producers $[1000 \text{ birds} \times (20\%/7.5 \text{ bird})]$.
- Based on the above analysis the Dharamtari Project made plans to add 100 producers in the first year itself.

does not end up with losses.

- The remuneration of the service provider has to be attractive, so that all the functions are adequately addressed. A low remuneration makes the service provider less active. Assessing the expected remuneration and accordingly organising the producers is helpful.
- Systems required for accommodating the risks on the production and marketing front.

6.0 WORKING OUT THE LINKAGES AND RESOURCES

After the working model is in place, one needs to work on raising resources for the individual units as well as the cooperative. The specific points that a practitioner needs to keep in mind are:



6.1 TRAINING OF PRODUCERS

Providing training to producers involves expenditure on various items. A sample budget for a seven-day training programme for 20 producers is given in the following box.

13 A sample budget for a seven-day broiler rearing training programme with 20 producers					
Sl. No	Particulars	No. of persons	Amount (Rs)	No. of days	Total (Rs)
1	Food and lodging	20	70	7	9,800
2	Trainers fees	1	400	7	2,800
3	Travelling cost for trainees	20	40	1	800
4	Assistant trainer fee	1	100	7	700
5	Audio visuals	-	500	1	500
6	Stationary (xeroxing, pen, markers, paper, etc.)	20	20	1	400
7	Reading materials for trainees	20	10	1	200
	Total				15,200

6.2 INVESTMENTS REQUIRED

The major investments are for the shed construction and the purchase of broiler equipments. One can fit programme investments in many mainstream poverty-alleviation programmes.

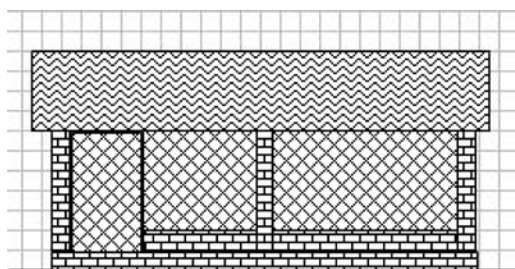


Fig. 4: Layout plan of a model poultry shed

- In the past, PRADAN has sourced funds under various government programmes such as IRDP (Integrated Rural Development Program), SGSY (Swarna Jayanti Swa-Rojgar Yojna), SGSY infrastructure, RSVY (Rastriya Shram Vikash Yojna), Tribal Welfare and DPIP (District Poverty Initiative program).
- Bank finance through self-help groups (SHGs) has also been availed.
- Family-focused programmes of KVIB and NABARD's Scheme of Tribal Finance Corporation are available to individual Scheduled Caste and Scheduled Tribe families and is similar to the SGSY financing of 50 per cent subsidy of up to Rs 13,500.

6.3 START-UP COSTS

The cooperative starts getting revenue right from the beginning. To meet all its costs it requires at least 100 producers. Some soft funds are required to help the cooperative during the scaling-up period. In the past, funds have been raised by PRADAN from WFP, DPIP, Tribal Welfare and other programmes.

6.4 INPUT SUPPLY LINKAGE

Apart from the resources, the development practitioner needs to identify good and reliable suppliers of inputs and traders to sell the birds. These people can be identified while conducting market studies.

7.0 LAUNCHING NEW PRODUCERS

After the practitioner has laid out the operating model in detail and tied up all the resource linkages, s/he can start launching new producers. The following are the necessary steps:

14 Financing individual units

It is possible to raise money for producer-level investments from poverty-alleviation programmes as grants. A practitioner needs to address three key issues: how to build ownership of the fund, how to determine the amount of grant and how to justify that amount. PRADAN used the following methods while using grants:

- The grant was available to a participant only after selection, which included the residential training, the cost of which was borne by the participant. This helped screen out the participants interested only in the grant.
- The grants were only used to create infrastructure, which was done after obtaining a written assurance that the asset created in the name of the women would be used only for the stated purpose. The landowning male member signed this document.

The participant family contributed 15 per cent of the cost of creating the infrastructure as wages or construction material. The women were also asked to save a portion of their income from poultry farming in their own account in the co-operative so that they could use it for the future maintenance of the sheds.

A mix of loan and grant is now widely available under SGSY, NABARD's scheme of Tribal Finance Corporation, Family Oriented Scheme of KVIB and KVIC. These should preferably be routed through self help groups. Systems need to be installed to track the proper utilisation of funds and ensure prompt repayment.

15 Points in concept seeding

The following points are important to make the concept seeding effective:

- Clear articulation of what the family would need to do in terms of time and resource allocation, to take up poultry farming as a livelihood.
- Clarity on how current time-resource management would change on taking up poultry rearing.
- Expected returns from the activity and the associated benefits.
- Fall-back options, if the activity fails.
- Clear understanding of debt service, loan conditions - interest rate, tenure, penal clause, etc. - in case of loan-based units.

16 Selecting poultry farmers

There are some simple observable indicators to assess the suitability of producers. These are both objective and subjective. The subjective indicators include eye for details, sense of organisation, sense of hygiene, work ethics and family harmony. The objective indicators include the number of working adults in the family to support the producer. This would be relevant especially in cases of exigencies when the single woman would find it difficult to cope without support. The age of the producer is also important, as older producers have usually not done well. The cases of rearers who have not done well include those who are very poor and those who are better off. Thus, the economic criteria cannot be a guide in the selection process.

The practitioner assesses the subjective indicators by visiting the prospective producer's home. Housekeeping - ways in which the prospective producer manages her house and children is one good way of judging the behavioural aspects. However, the most effective indicator is the farmer's performance during the in-house training. This also provides for self-selection and some trainees drop out on their own accord in almost all the training batches. One of the reasons for dropouts is the 'selection error' where the activity does not fit into the family resources and time availability. It could be also due to returns not matching the expectation; consequently the family shifts to other activities.

It is important to note here that these criteria are not to be used in a way that excludes interested farmers. This checklist is provided because these indicators have often (but not always) proved critical. Experience has thrown up interesting results. Sometimes, producers who scored high on these parameters turned out to be poor producers later on. The motivation to do well and a firm resolve often overrides everything else. Experience also shows that a good exposure visit to both best- and poor-case scenarios and the explicit understanding of what a farmer can realistically earn in the business has been very useful in selecting good farmers.

7.1 IDENTIFYING THE VILLAGES

The practitioner needs to look at round-the-year road connectivity and access to drinking water, and a potential of at least 20 producers in the village.



Producers engaged in routine chores inside a shed

7.2 CONCEPT SEEDING

The risks and possibilities of the activity are examined in the focus group meeting of potential farmers. This task becomes easier if there are functioning SHGs in the village.

7.3 EXPOSURE VISIT

The practitioner takes groups of interested women to successful units. The practitioner must also take the potential farmers to units that are not doing well and help the visitors understand the critical issues. This venture requires rigorous adherence to work schedules. Even small mistakes in brooding, feeding, watering, medication and vaccination can have serious consequences. The high capital intensity of the activity implies a risk of huge losses unlike normal farming activity.

8.0 SELECTING THE SERVICE PROVIDER

The following points need to be kept in mind while selecting local service providers:

- The person should be young and sufficiently

17 Paying the service provider

The service providers get paid based on the birds sold by the producers with whom they work. They are paid at 0.50–0.55 paise per bird. To make the supervisor more responsible one can add a clause that in case of loss in any batch no payment is made. However, care needs to be taken that each service provider works with an adequate number of producers to make an average of Rs 1,500 per month when fully active. Each producer is levied Rs 1 per chick to generate revenue to take care of the expenses of the service provider as well as the establishment expenses of the cooperative. Producers know that they pay the service provider. This ensures that the service provider is accountable to them.

18 Junon Hembrom, a supervisor

Junon Hembrom used to sell vegetables in the local *haat* (market), grown either in his *bari* (homestead land) or bought in wholesale at Ranchi. Junon is about 38 years, has a wife and four children, the eldest being 18 years. Junon is 10th pass and can read English. His wife and children manage agriculture and he is relatively free.

He is now a supervisor of the Torpa Grameen Poultry Co-operative Society (TGPCS) Ltd. His wife rears broiler chicken and is a member of TGPCS. Junon supervises broiler production in 20 poultry sheds in the villages. He also manages an input stocks centre.

Junon distributes inputs that include chicks, feed, medicine and vaccines. He is also responsible for filling the necessary financial vouchers. He maintains stock registers at the stock centre for all input items. In addition, he helps members in administering medicine and vaccines and follows-up the schedule of poultry rearing. Junon is also trained in identifying common poultry diseases so that he can alert the cooperative's veterinary doctor well in time.

Junon earns approximately Rs 2,000 per month by supervising. Although he was associated with TGPCS since its inception, he did not get this opportunity by chance. He had to pass a rigorous test on numerical ability, writing skills and ability to communicate through a group discussion. He has the motivation to support others. He is also skilled to communicate with women and is observant and analytical. He does not shy away from confronting the members if they do not follow the proper schedule of poultry rearing.

educated (preferably above 8th standard) to maintain accounts and pick up relevant skills for a paravet job.

- He/She should be from the same village as the producers or in the vicinity of the village.
- The potential income should be attractive enough for him/her to devote sufficient time and interest.

Experience shows that the service providers closely related to producers, with good production performance, generally do well in their job.



Launching producers

Training and shed construction

1.0 INTRODUCTION

The first step in launching new producers is to identify women who are willing to take up broiler farming as a livelihood option. Considering the nature and demands of the avocation, the promoter has to take into account the suitability aspect of the participants also. Further, their willingness to undergo training is also of vital importance.

A good production performance is seeded during training. The aim is to help producers learn the basic minimums very rigorously. Training, besides helping women to learn skills, provides an opportunity to the trainees to assess for themselves whether they can cope with the rigours of the enterprise. It gives



A woman utilising her training in broiler production

It gives the practitioner an opportunity to assess each trainee and ensure that each one of them becomes a good producer. It is here that the training process has its dual role of imparting skills in addition to validating the selection of producers.

The methodology that PRADAN has adopted is the 'experiential' method, which combines hands-on experience with a clear explanation of the logic of the various tasks. The premise of an experiential

residential training of this kind is that the participants learn better by experiencing rather than just listening or seeing.

2.0 TRAINING THE PRODUCERS

The two training modules, which PRADAN has been using, are a 7-day intensive programme and a 35-day comprehensive programme. The training curriculum of these modules is given under Table 5 and Table 6 annexed to this chapter. The most popular and well-adopted is the 35-day residential training with a full practical coverage of one production cycle.

2.1 Residential training for one complete production cycle

In the 35-day training, each trainee is provided with 50–100 chicks to rear for the entire rearing period till the birds are sold. The trainees arrive 3 days before the arrival of chicks. They start by disinfecting the shed and making preparations for the placement of chicks.

The trainees are provided with accommodation and they bear the cost of food. The rationale is that the cost of food would any way be the same, whether the women are at home or attending a training programme, and is hence not an additional burden. However, the issue is one of the opportunity cost of being away from home. This is compensated, to some extent, from the income from the flock reared during the training. Further, the willingness to wait for this compensation and to forego the immediate opportunity cost are indications of the keen interest of the participant in taking up the activity.

From the practitioner's point of view, the training

is seen as providing poor women an opportunity for a self-selection process. As there is no stipend during the training, it helps to weed out those with only a casual interest.

During the training, women are taught to read numbers, write their names and learn about basic hygiene and sanitation. Human health components are also added. This training methodology has been received well. However, infrastructure and time remains a deterrent to wider applicability.

2.2 One-week training on managing the starters

In broiler farming, the first week, to a large extent, determines the performance of birds. PRADAN has, therefore, designed a one-week on the job residential training for the producers. In this programme ten sheds are earmarked for 20 trainees and chicks are ordered. In this programme there are a few producers who provide their shed as host trainees and the others are guest trainees. The guest trainees arrive two days before the arrival of the chicks to learn hands on about disinfecting the shed and preparing the brooding unit.

After the chicks arrive, two farmers are allocated to each shed along with the shed owner. Together they take care of brooding, under the supervision of a veterinarian. Two classroom sessions are held everyday for theoretical understanding. After the first vaccination, the guest trainees return home and prepare their own sheds to place chicks. The host trainees continue to be trained under the supervision of the veterinarian. This model also helps the trainees to observe the other household engagements of the host farmers and learn how they allocate their time for broiler rearing.

3.0 TRAINING CURRICULUM

In the 35-day training programme there is a comprehensive coverage of topics, both theory and practical, with hands-on rearing experience of one batch of birds from the brooding stage to sales. The course content is as follows:

- **Introduction:** This session is on the mapping of expectations, introduction to organised poultry, emphasising on broilers and layers and how they differ from native fowls, motivation games and basic economics of the activity.
- **Housing and husbandry:** Poultry house specifications including size, ventilation, direction, spot selection and method of selection are included in this session. In addition, informa-

tion on poultry equipment (feeder, drinker, brooder, chick guard, etc.), nutritional requirements especially with respect to balanced feed and growth, timing of feeding and watering, health care, hygiene and sanitation is provided.

- **Early chick management:** The session deals with chick counting and the use of chick guard/ring for placing chicks, the importance of the why and how of medication, brooding and yolk infection, problems and chick disease prevention, diagnosis and curative measures.
- **Grower management:** The placement of feeders and waterers, litter management, vaccination, problems and disease prevention, diagnosis and curative measures is introduced in this session.



Women taking part in an exhibition of the Small-holder Broiler Farming model

- **Grown-up bird management:** This session, apart from dealing with standards for Feed Conversion Ratio (FCR), weight gain, mortality aspects and management in various seasons, deals with similar aspects as in grower management.
- **Management, troubleshooting and economics:** The different aspects that are dealt in this session include troubleshooting tips, economics of poultry farming, efficient production, organisation and preparing an action plan to take up rearing in own shed, market assessment and successful marketing.

4.0 TRAINING OUTCOME

During the training, the practitioner has to assess whether a trainee is able to:

- Adjust her daily chores with feeding and various other aspects of the care of chicks.
- Take interest in learning and practice sanita-

tion, avoid feed wastage, and take up regular vaccination and medication.

- Put in flexible hours of work, including taking care of chicks at night during the brooding stage.
- Analyse the reasons for profit, compare it with others and take corrective action.



A broiler training centre at Kesla

5.0 ENRICHMENT AND VALUE ADDITION

The challenge before a development practitioner is to add more value during the training period. Some useful suggestions include:

- Helping women learn basic numeric and functional literacy skills.
- Organising health and sanitation orientation through link-up with the local primary health centres.
- Providing basic tips to improve farming methods through link-up with local Krishi Vigyan Kendras.
- Organising a session on gender sensitisation.
- Using audio-visual media for training effectiveness.

6.0 SELECTION OF SITE FOR POULTRY SHED

The site selection for building the broiler shed shall take into account the size, dimensions and orientation of the plot. The following specific points are to be noted.

- It is better to select a site where there was no poultry activity earlier.
- The land should be even, elevated and preferably a square plot. If rectangular, the length (longer axis) should be from east to west.
- The site should not be low lying and must be free from water logging. There should be quick drainage of rain/storm water.
- The site should provide scope for plenty of

light and good aeration.

- The site should be near the road for easy reach of the procurement of essential commodities, veterinary services and for the transport of broilers to the market.
- Adequate drinking water of acceptable quality should be available near the shed. The requirement of drinking water at the rate of at least half litre per bird per day is to be ensured.
- Sheds should neither be located too near the residential house nor too far from the residence. If it is far, theft and attack by wild animals could be a problem. If it is too near, then disease spread and poultry smell will be a problem.
- Power supply should be available to the shed for brooding and lighting.

7.0 ORGANISING SHED CONSTRUCTION

Broilers need shelter to protect them from the extremities of climatic conditions, predators and theft. Housing helps in better management and to provide ideal conditions for the optimal performance of the broilers. A shed is, therefore, the most important component in poultry farming.

- This investment constitutes over 50 per cent of the total unit cost and almost 85 per cent of the capital investment required for setting up a broiler production unit.



Beginning the construction of a broiler shed

- As shed is a long-term investment, any mistake will adversely affect the production efficiency and viability of the unit.
- This is an investment where there is scope for

significant contribution from the owner by way of family labour and the use of locally available construction material.

- Appropriate decisions regarding location, design and cost are absolutely critical for the success of broiler farming.

19 A broiler shed should be...

- comfortable and relaxing to the birds
- able to provide sufficient space
- cool in summer and warm in winter
- protective against rain, sunlight and wind
- dry always without any dampness
- able to facilitate good light and air circulation
- such that the floor of shed is at least 1.5 ft above the ground level

8.0 SHED DESIGN AND SPECIFICATIONS

In the broiler sheds there should be sufficient space for the birds. The space requirement for each bird depends mainly on bird's age, size, environment, shed size and ventilation. Normally in the deep litter system an area of one sq ft/bird is necessary for broilers. Insufficient space will result in slower growth, incidence of diseases, mortality and finally low quality of marketable birds.

8.1 Shed direction

Orient the shed in the east-west direction so that direct sunlight does not fall on the sidewalls during the hottest part of the day.

8.2 Distance between sheds

If more than one poultry shed is to be constructed in a given location, a minimum distance of 15 m (50') should be maintained between the sheds to allow proper ventilation and prevent the shed-to-shed spreading of infection.

As a thumb rule, the minimum distance between poultry sheds should be three times the height of the shed at the ridge level.

8.3 Airflow/ventilation

- If the shed is to be located near the house, care must be taken to construct the shed in a manner in which airflow is not obstructed by the house.
- Open sides on the northern and the southern side help in better ventilation of the shed.
- A high roof pitch (between 30–40 degree) assists natural ventilation by increasing the movement of air by convection and reduces radiant heat from the underside of the roof at bird level.

20 Optimal ambient conditions for broilers

The broiler shed design should take into account the following aspects to provide conducive conditions for birds

- | | | | | | | | | | | | | | | | | | |
|---------------------|---|--|----------|---|-----|------------------|---|----------------|-----------|---|------------------|---------------------|---|------------------|-----------|---|--------------|
| ■ Temperature | - | Broilers require optimum temperature maintenance of 55°–75°F; Higher temperatures hamper the growth of broilers. Shed temperatures below 40–45°F are also not desirable. | | | | | | | | | | | | | | | |
| ■ Relative humidity | - | High humidity and high temperature in the shed are not desirable. Wet litter or cake formation of litter is an indication of high humidity in the poultry shed. The litter moisture should not exceed 20–25 per cent. High humidity in the shed favours the growth of disease-causing microorganisms. Normally 60–70 per cent relative humidity is to be maintained in the sheds. | | | | | | | | | | | | | | | |
| ■ Ventilation | - | <p>In the poultry sheds sufficient provision should be made for the entry of clean air and the exit of stale air, especially in the summer season. Good air circulation in summer will also reduce the temperature inside the shed. Ventilation determines the required level of oxygen and also minimises the obnoxious gases in the ambience of the shed. The desirable levels or the prescribed limits are as follows:</p> <table border="0"> <tbody> <tr> <td>□ Oxygen</td> <td>-</td> <td>20%</td> </tr> <tr> <td>□ Carbon dioxide</td> <td>-</td> <td>less than 0.5%</td> </tr> <tr> <td>□ Ammonia</td> <td>-</td> <td>less than 25 ppm</td> </tr> <tr> <td>□ Hydrogen sulphide</td> <td>-</td> <td>less than 40 ppm</td> </tr> <tr> <td>□ Methane</td> <td>-</td> <td>less than 1%</td> </tr> </tbody> </table> | □ Oxygen | - | 20% | □ Carbon dioxide | - | less than 0.5% | □ Ammonia | - | less than 25 ppm | □ Hydrogen sulphide | - | less than 40 ppm | □ Methane | - | less than 1% |
| □ Oxygen | - | 20% | | | | | | | | | | | | | | | |
| □ Carbon dioxide | - | less than 0.5% | | | | | | | | | | | | | | | |
| □ Ammonia | - | less than 25 ppm | | | | | | | | | | | | | | | |
| □ Hydrogen sulphide | - | less than 40 ppm | | | | | | | | | | | | | | | |
| □ Methane | - | less than 1% | | | | | | | | | | | | | | | |

8.4 Insulation/reflected heat

- The tiled or asbestos roof requires thatching in summer for insulation.
- The open sides of the sheds are to be covered with plastic sheets (in rainy and winter season) or gunny curtain (in summer) to assist in temperature control during brooding, cold or hot weather and during night times.

able to adopt rat proofing by embedding with the wall a horizontal slab at 1.5' height all around the shed.

9.0 MODEL POULTRY SHED

A model shed with 20'x15' dimension to accommodate 300 birds is shown in Fig. 4. The layout plan shows the dimensions, elevation, side view

21 Checklist for shed specifications

	Yes	No
■ Is there sufficient market for broilers within a radius of 250 km?		
■ Is the area away from human habitation?		
■ Is the place dry and free from drains and water bodies?		
■ Does the place allow for natural air movement?		
■ Is the place easily accessible to a road?		
■ Is the long axis of the shed in the east-west direction?		
■ Do the open-sided ends face the north-south direction?		
■ Is the floor of the shed at least 1.0 to 1.5 ft above the ground level?		
■ Is the floor laid with concrete?		
■ Is the side height of the shed at least 6.5–7.5 ft?		
■ Is the centre height of the shed 10–12 ft?		
■ Are the east and west sides closed with walls?		
■ Are the sidewalls incorporated with an adjustable plastic and gunny curtain?		
■ Is the shed secure from entry by rodents, vermin, wild birds and animals?		

Note: An ideal shed will have a Yes on all criteria

- Vegetation around the shed will reduce the amount of reflected heat entering the shed. However, care should be taken not to inhibit air circulation.

and sectional details. The specifications related to length, width and height along with details on foundation, wall thickness, openings, columns and roof projection are given in the legend.

8.5 Roof and flooring

- The roof should ideally be made of tiles or asbestos.
- The roof should have a projection of 2 ft in the northern and southern sides to prevent the splashing of rainwater into the shed.
- Concrete flooring facilitates better cleaning and helps to avoid water seepage.

The typical estimate for the shed given in Table 4 gives the breakup of construction cost in terms of earth work, brick work, plastering, side cover, roofing, flooring and whitewashing works. The total cost of construction estimated at Rs 27,000 works out to a unit cost of Rs 90 per sq ft.

8.6 Side cover/ door/entrance

- The northern and southern sides will have plastered walls of only 8–10 inches. The rest is closed with a wire mesh (preferably 1x1 inch).
- The door should be of 6 ft length and 2.5 ft. width with a provision at the entrance for a footbath filled with disinfectant.

8.7 Rat proofing

To prevent the entry of rats and snakes it is desir-



The exterior of a model poultry shed

Fig.4: Layout plan of a model poultry shed

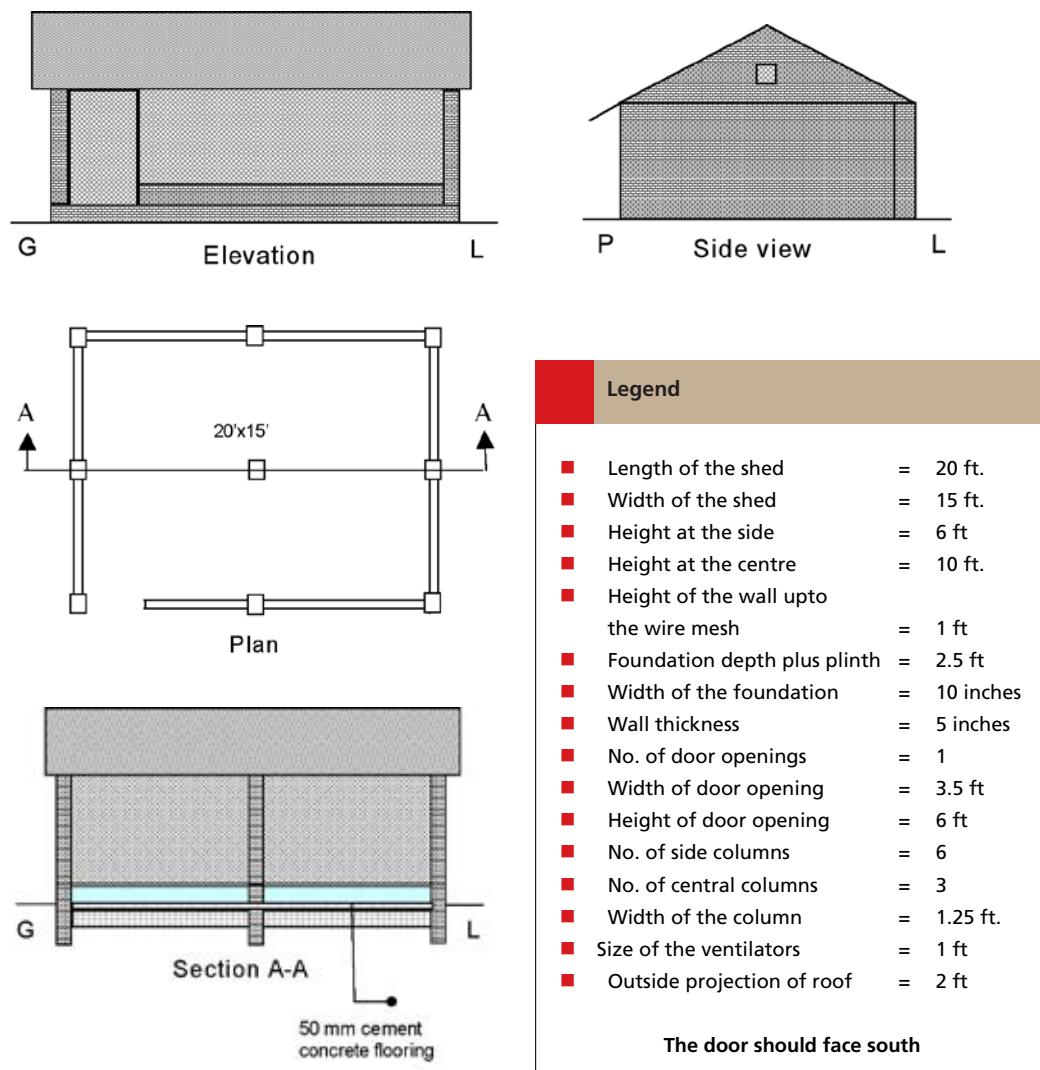


Fig. 5: Tiled Roof Shed



Fig. 6: AC Sheet Roof Shed



Table 4: Typical estimate for a poultry shed

(Amount in Rs)

Component	Dimension				Cost estimate			
	No.	L (ft)	B (ft)	D (ft)	Unit	Qty	Rate	Amount
1.0 Foundation work								
1.1 Earthwork in foundation	1	71.68	0.83	1.50	cu.m	2.50	22.85	57.00
1.2 75-B brick work with cement mortar in foundation and plinth	1	71.68	0.83	2.50	cu.m	4.20		
1.3 Deduction for columns	8	0.83	0.83	2.50	cu.m	0.39		
1.4 Add for columns	9	1.25	1.25	2.50	cu.m	1.00		
				cu.m	4.81	1000.0	4814.00	
Total foundation work								4871.00
2.0 Brick work								
2.1 75-B brick work with 1:6 cement mortar in superstructure								
2.1.1 Two long walls	2	20.00	0.42	1.00	cu.m	0.47		
2.1.2 Rectangular portion of two short walls	2	15.84	0.42	6.00	cu.m	2.24		
2.1.3 Triangular portion of two short walls	1	15.84	0.42	4.00	cu.m	0.75		
2.1.4 Deduction for door	1	3.50	0.42	6.00	cu.m	0.25		
2.1.5 Deduction for side columns	6	1.25	0.42	1.00	cu.m	0.09		
2.1.6 Deduction for centre columns	2	1.25	0.42	10.00	cu.m	0.29		
2.1.7 Add for side columns	6	1.25	1.25	6.00	cu.m	1.58		
2.1.8 Add for centre columns	3	1.25	1.25	10.00	cu.m	1.31		
Total brickwork in superstructure					cu.m	5.71	1000.0	5709.00
3.0 Side cover and doors								
3.1 Wire mesh	1	32.50		5.00	sq m	15.10	85.0	1284.00
3.2 Chowkath in door	1	19.00	0.30	0.25	cu.m	0.04	4000.0	160.00
3.3 Door shutters	1	3.00		5.40	sq m	1.50	300.0	450.00
Total side cover and doors							4385.0	1894.0
4.0 Plastering								
4.1 12 mm cement plastering with 1:6 cement mortar								
4.1.1 Both sides of the long wall	4	20.00		1.00	sq m	7.41		
4.1.2 Both sides of the rectangular portion of two short walls	4	15.00		6.00	sq m	33.33		
4.1.3 Both sides of the triangular portion of the short wall	2	15.00		4.00	sq m	11.11		
4.1.4 Deduction for the door	2	3.50		6.00	sq m	3.89		
4.1.5 Add for side columns	6	5.00		5.00	sq m	13.89		
4.1.6 Add for centre columns	1	5.00		10.00	sq m	4.63		
Total plastering					sq m	66.48	24	1596.00
5.0 White washing								
5.1 White washing three coats over new surface					sq m	38.85	3.75	146.00
6.0 Roofing								
6.1 Cast iron pipes (2") to support the asbestos roof	4	22.00			ft	88.00	17.0	1496.00
6.2 Asbestos sheet (3mx1m)	14				pc	14.00	300.0	4200.00
6.3 Labour charges for fitting and fixing asbestos sheet roofing in proper slope including the cost of hooks, carriage of sheets all complete	2	22.00	10.50		sq m	42.78	10	428.00
6.4 75-B brick work with 1:6 cement mortar over the asbestos roof	1	130.00	1.25	0.75	sq m	3.41	1000	3413.00
6.5 Providing 75B one brick flat soling joint filled with local sand including all costs	1	20.00	15.00		sq m	27.78	50	1389.00
7.0 Flooring								
7.1 Providing 1.5" cement concrete flooring	1	20.00	15.00		sq m	27.78	70.00	1944.00
Total								27086.00
								RS. 27,000.00

Note: Rates are illustrative and are based on the Jharkhand project (year 2002)

22 Shed design and bio security

The key advantage enjoyed by small producers is production efficiency. Thus, the practitioner must incorporate points to accentuate this during shed construction.

- Decentralised sheds break the horizontal spread of disease - never make 4-5 sheds together
- Provide for bio-security systems such as footbath, a small one-foot pavement across the length of the shed and a boundary wall at 5 feet all around, restricting the entry of outsiders into the shed would be useful.

10.0 TIPS ON SHED CONSTRUCTION

Efforts must be made to reduce the construction cost of the shed without compromising on quality. The following are the tips and suggestions:

- Prepare a 'bill of materials' with item-wise quantity break-up: how many bricks of what dimensions are required for brick masonry work, cement in 1:6 cement-mortar masonry work, etc. The actual use can sometimes vary from the calculated figures. For example, as the specifications used in computing may not be uniformly available. Very often the bricks available in villages are smaller than the stated dimensions.

23 What goes wrong in shed construction?

Aspects/issues	Common mistakes	Suggested measures
SHED LAYOUT	<ul style="list-style-type: none"> ■ Unequal dimensions ■ Location chosen on immediate convenience 	<ul style="list-style-type: none"> ■ Diagonals must be equal. ■ Good supervision and well-laid out plan as explained in the guidelines.
FOUNDATION	<ul style="list-style-type: none"> ■ Choice not based on soil conditions ■ Improper packing in open boulder filled foundation 	<ul style="list-style-type: none"> ■ Consult local expert on appropriate foundation. ■ Filling with sand and repeated watering, good compaction and ramming.
MATERIAL PROCUREMENT	<ul style="list-style-type: none"> ■ Poor quality construction material 	<ul style="list-style-type: none"> ■ Bricks - size and firing is critical- lesser size means more bricks as well as mortar. The best test of good firing is the overnight soaking of the bricks in water. ■ Sand - a clear solution when put in glass/tumbler filled with water shows that the sand is of good quality. ■ Cement - check the weight of the bag and caking of cement, if any. ■ AC sheet - go in for vapour-cooked sheets instead of water-cooked sheets as they crack faster. Procure in bulk but ensure immediate distribution.
PLINTH	<ul style="list-style-type: none"> ■ Improper level 	<ul style="list-style-type: none"> ■ Ensure that the mason carries out a water level check.
MORTAR	<ul style="list-style-type: none"> ■ Improper ratio in the cement: sand mixture 	<ul style="list-style-type: none"> ■ Fixing norms for the use of cement bags, use of fixed volume measures (e.g. used oil tin containers) instead of variable measures such as kadai/tagaris.
MASON	<ul style="list-style-type: none"> ■ Masons try to maximise the number of sheds when in contract, thus, stretching the work beyond reasonable time 	<ul style="list-style-type: none"> ■ Ensure that the mason completes one shed before starting the next one.
DURING CONSTRUCTION	<ul style="list-style-type: none"> ■ Damages due to poor brick quality ■ Crevices and gaps ■ Poor curing 	<ul style="list-style-type: none"> ■ It is difficult to get good quality bricks in villages. Get the roof laid first and then immediate plastering of walls, so that damage to walls from rains can be minimised. ■ Ensure all the crevices and gaps are closed before the final payment. ■ Use cement requiring less curing time and make the mason responsible for curing. Educate producers on the importance of curing.

- Look for alternative options of each material (for example, roof materials of country tiles or asbestos sheets).
- Cost reduction on one component can increase cost on another and vice versa. For example, moving from a 9"x4"x3" brick to a 8"x4"x4" brick might be costly but can greatly reduce the mortar (cement-sand) requirement apart from reducing the number of bricks. Similarly, asbestos sheets cost more than tiles but the roof under-structure costs are lesser in asbestos and overall they are cheaper.
- Separate the materials into those that are locally available and items that need outside purchase. The locally available items can be further broken up into owner contribution and out-of-pocket purchase items. PRADAN's experience shows that locally available items should be left for individuals to procure and the outside purchases should be made jointly.
- Provide a system for women to tie the feeders with three steel tubes at 6.5 ft across the shed. Such small, useful improvements can make the shed women friendly.

11.0 EQUIPMENT FOR BROILER FARMING

Good equipment is a pre-requisite for proper poultry management. Poultry equipment is basically meant for three purposes: brooding, feeding and watering.

The objective of brooding equipment is to provide a suitable temperature to chicks from the day-old stage up to the time they are able to adapt and regulate themselves to the ambient environment. The use of proper quality and required number of 'drinkers' or 'waterers' and brooding devices is crucial.

11.1 Equipment for broiler rearing



Broiler farming requires proper poultry equipment.

The description of various items, specifications and utility aspects are as follows:

■ Feeders

Feeders are equipment used to feed the birds. They may be conventional, semi-automatic or automatic available in various designs and shapes, such as linear, circular or hanging, made of either metal or plastic.

Sufficient numbers of feeders are necessary for proper feed intake by the broilers without any competition, cannibalism or starvation.

■ Waterers

Waterers or drinkers are used to provide water to the birds. Like feeders, waterers are available in different sizes, designs and shapes. They may be conventional, semi-automatic or automatic channels, troughs, cups, nipples or basins, made of metal, plastic or both.

■ Brooders

Brooders are equipment used to provide warmth and light to rear the baby chicks during the first few weeks of life. The brooders consist of some heating source, reflectors to reflect the heat and light towards the chicks. The other items are light and heat adjustment devices, such as stands, thermostats and other accessories, depending on the model chosen.

There are different types of brooders such as electrical brooders, gas brooders, coal/charcoal brooders and kerosene wick stove brooders.

Gas brooders are used wherever gas is cheaper or in farms where 'biogas' is available. Coal, charcoal, wood, lignite (Leco) and kerosene wick stoves are used as brooders in places where electricity is not available or costly and where power failure is quite common.

■ Chick guards

Chick guards are thin sheets of metal, hard board, cardboard or bamboo mat of 35 to 45 cm height and of varying lengths. They are used to restrict the movement of chicks, so that the chicks are kept closer to the brooders to prevent them from chilling. The arrangement of the chick guard sheets in a circular manner without sharp corners prevents the trampling of chicks while catching them for vaccination and debeaking as also at nights when chicks have a tendency for huddling.

While brooding, the chick guards are arranged in a circular fashion, by joining several pieces end-to-end, around the brooder. A diameter of 2.0 to 2.5 m accommodates 250 to 300 chicks in each brooder.

11.2 Essential equipment

In a smallholder poultry model the following equipment is essential. The type and number of equipment needed for a batch of 300 broiler birds is as follows:

■ Basic minimum requirement

- Chick drinker with stand (3 litre) - 6
- Feeder (8 kg) - 8
- Tubs and grill (5 litre) 12 " x 3.5" or grower drinker (8 litre) - 10

■ Additional useful items

- Reflector - 1
- Chick guard - 1
- Gas/ singri / coal stove - 1
- SS water tank (50 litre) - 1

Fig. 7: Broiler equipment



Training curriculum 7 days intensive programme

Day 1

Forenoon (9.00 a.m. onwards)

- Introduction and ice breaking
- Expectation mapping
- Introduction to organised poultry farming
- What is a broiler bird?
- Rudimentary economics of the activity
- Motivation games

Afternoon (2.00 p.m. onwards)

- Poultry sheds - site selection, direction, size, ventilation, etc.
- Poultry equipment - Chick guard, feeding tray, feeder, drinker, tubs and grill, partition, water tank, etc.

Practicals

- Scrapping and removal of old litter
- Cleaning, washing and drying of poultry sheds and curtains
- Cleaning and washing of equipment

Evening (6.00 p.m. onwards)

- Review of learnings through a quiz

Day 2

Forenoon (9.00 a.m. onwards)

- Cleaning and disinfection of sheds - scrapping and removal of litter, washing of sheds and curtains, flaming, whitewash, fumigation (with litter material, chick guard and all equipment inside), spraying
- Preparation of chick guard/ring

Afternoon (2.00 p.m. onwards)

- Hygiene and sanitation - regular removal of filthy papers, cleaning of feeder, drinker and tubs, water sanitisation, cleanliness of sheds and surroundings, foot bath-lime powder, controlling human traffic to poultry premises, rodent control, disposal of dead birds
- Whitewash and flaming of sheds
- Spreading of litter
- Preparation of chick guard
- Placing of equipments inside the brooder, making brooder air tight for fumigation

Practicals

- Whitewash and flaming of sheds
- Spreading of litter
- Preparation of chick guard
- Placing of equipment inside the brooder, how to provide heat, fumigation method

Evening (6.00 p.m. onwards)

- Review of learnings through a quiz

Day 3

Forenoon (9.00 a.m. onwards)

- Early chick management - checking chick weight, chilling, dehydration and lameness, counting and placing chicks inside chick guard, initial medication - why and how?, brooding - importance, why and how?

Afternoon (2.00 p.m.onwards)

- Nutritional requirement - feed composition, types of feed (prestarter/ starter/finisher), feeding process (ad-lib/restricted), time of feeding and watering, storage of feed, Feed Conversion Ratio (FCR) - factors governing FCR and measures to be taken for correction

Practicals

- Counting of chicks
- Chicks placement inside ring
- Initial feeding and medication
- Visit to feed factory and feed stores
- Brooding

Evening (6.00 p.m.onwards)

- Trainees will stay at different poultry sheds where chicks are placed for brooding .

Day 4

Forenoon (9.00 a.m. onwards)

- Removal of dirty papers, cleaning of utensils, feeding and providing water
- Concept of microbes - bacteria, virus, fungi and algae, etc.
- Concept of disease - infectious, non-infectious and contagious diseases, preventive and curative measures

Afternoon (2.00 p.m.onwards)

- How to measure feed and medicine and how to store it
- Morning class continued

Practicals

- Field visit to farms having young chicks
- Post-mortem of dead birds
- Management and brooding of chicks

Evening (6.00 p.m.onwards)

- Trainees will stay at different poultry sheds where chicks are placed for brooding

Day 5

Forenoon (9.00 a.m. onwards)

- Removal of dirty papers, cleaning of utensils, feeding and providing water
- Disease-preventive measures
- Vaccination -schedule and method, storage of vaccine, maintenance of cold chain, etc.

Afternoon (2.00 p.m.onwards)

- Topic on diseases, prevention and vaccination continued

Practicals

- Post-mortem of dead birds
- Management and brooding of chicks

Day 6

Evening (6.00 p.m.onwards)

- Trainees will stay at different poultry sheds where chicks are placed for brooding

Forenoon (9.00 a.m. onwards)

- Removal of dirty papers, cleaning of utensils, feeding and providing water
- Management of grower and finisher birds - space allotment, litter management, placement of feeder and waterers, importance of ventilation, management in summer, rainy and winter seasons

Afternoon (2.00 p.m.onwards)

- Morning session continued

Practicals

- Field visit to farms having grower and finisher birds, management and brooding of chicks

Evening (6.00 p.m.onwards)

- Trainees will stay at different poultry sheds where chicks are placed for brooding
- Visual demonstration

Day 7

Forenoon (9.00 a.m. onwards)

- Removal of dirty papers, cleaning of utensils, feeding and providing water
- Briefing about the cooperatives, its system and laws
- Revision of learning - question and answer session, troubleshooting

Afternoon (2.00 p.m.onwards)

- Brief economics of poultry farming, market assessment and successful marketing
- Efficient production organisation
- Action plan preparation

Practicals

- Vaccination of chicks against ranikhet disease
- Post-vaccination management and brooding



Training curriculum

35 days comprehensive programme

3 days

*before the arrival
of chicks*

Forenoon (9.00 a.m. onwards)

- Introduction and ice breaking
- seasonal variation of production efficiency and return
- Introduction to organised poultry farming
- What is a broiler bird and how does it differ from the desi fowl?

Afternoon (2.00 p.m. onwards)

- Expectation mapping
- Risk involvement with the activity
- Seasonal variation of production efficiency and return
- Expected average return
- Rudimentary economics of the activity

Practicals

- Arrangement for boarding and lodging

2 days

*before the arrival
of chicks*

Forenoon (9.00 a.m. onwards)

- About the cooperative, history, present status, mission and vision
- Prerequisites and other formalities to be a member of the cooperative
- Rules and regulations for producer members

Afternoon (2.00 p.m. onwards)

- Manpower and time requirement for the activity
- Requirement of infrastructure, such as shed, equipment, etc., along with cost
- Requirements of various inputs, such as DOC, feed, litter, vaccines and medicines, etc., along with price list
- Price list for the ready birds and how it differs from the market and why?

Practicals

- Familiarisation with poultry shed and various equipment such as brooder ring, feeder drinker, tubs and grill, gas brooder and flame gun, etc.

1 day

*before the arrival
of chicks*

Forenoon (9.00 a.m. onwards)

- Poultry shed - site selection, direction, size and design
- Poultry equipment - chick guard, drinker, feeder, tubs and grill, partition and water tank, their size, use and price
- The importance of cleaning, washing and drying of poultry sheds and curtains

Afternoon (2.00 p.m. onwards)

- Process of preparation of shed for chick placement
- Scrapping and removal of old litter, cleaning, washing, drying, flaming, whitewashing, cleaning of curtains, fumigation and terminal spraying

Practicals

- Cleaning of shed and curtains

on

the day

of the arrival of chicks

Forenoon (9.00 a.m. onwards)

- Process of the preparation of shed for chick placement
- Scrapping and removal of old litter, cleaning, washing, drying, flaming, whitewashing, cleaning of curtains
- Fumigation and terminal spraying
- Chick guard - preparation and importance

Afternoon (2.00 p.m. onwards)

- DOC - source, price, quality
- Early chicks management - judging for weight, lameness, chilling, dehydration, counting and placing of chicks, initial medication schedule - importance
- Brooding - why and how ?
- Precautions while brooding

Practicals

- Preparation of sheds for chick placement
- Preparation of chick guard
- Fumigation

Day 1

Forenoon (9.00 a.m. onwards)

- Early chicks management - Brooding - importance and duration, effect of under and overheating, use of paper, feeding and watering at early age

Afternoon (2.00 p.m. onwards)

- Hygiene and sanitation - regular removal of filthy paper, regular cleaning of drinker, feeder and water tubs, cleanliness of the shed and surroundings
- Concept of bio security - traffic control, control of rodent and free ranging fowl, use of foot bath, regular spraying and disinfection

Practicals

- Chicks weighing and placement, feeding and watering, initial medication and brooding

Day 2

Forenoon (9.00 a.m. onwards)

- DOC - source, price, quality
- Early chicks management - judging for weight, lameness, chilling, dehydration, counting and placing of chicks, initial medication schedule - importance
- Brooding - why and how ?
- Precautions while brooding

Afternoon (2.00 p.m. onwards)

- Early chicks management - brooding - importance and duration, effect of under and overheating, use of paper, feeding and watering at an early age
- Causes of early chick mortality - congenital anomalies, injuries, feed poisoning, gas poisoning, over/under heating, infections, etc.

Practicals

- Removal of filthy paper and wet litter, washing of drinkers, feeding and watering, initial medication, brooding
- post-mortem analysis of dead chicks

Day 3

Forenoon (9.00 a.m. onwards)

- Hygiene and sanitation - regular removal of filthy paper, regular cleaning of drinker, feeder and water tubs, cleanliness of the shed and surroundings
- Concept of bio security - traffic control, control of rodent and free ranging fowl, use of foot bath, regular spraying and disinfection

Afternoon (2.00 p.m.onwards)

- Concept of microbes - bacteria, virus, fungi, etc.where and how they live?
- Concept of disease - incubation period of disease, difference between infectious and non-infectious diseases, contagious and non-contagious diseases

Practicals

- Removal of filthy paper and wet litter, washing of drinkers, feeding and watering, initial medication, brooding
- Post-mortem analysis of dead chicks

Day 4

Forenoon (9.00 a.m. onwards)

- Common diseases of broilers
- Non-infectious - toxicity, vitamin and mineral deficiency, SDS, etc.
- Infectious (non-contagious) - colibacillosis, yolk sac infection, fowl cholera, coccidiosis, etc.
- Infectious (contagious) - ranikhet, IBD, IB, etc.

Afternoon (2.00 p.m.onwards)

- Ranikhet - its causes, incubation period, mode of transmission, symptoms, preventive measures
- Measures to be taken to control ranikhet during an outbreak

Practicals

- Complete removal of papers, raking of litter, use of feeder, washing of drinkers, feeding and watering
- Post-mortem analysis of dead chicks, good brooding practices

Day 5

Forenoon (9.00 a.m. onwards)

- Bio security measures
- Vaccination - What is a vaccine? Different methods of vaccination
- Importance of maintaining cold chain
- Pre-and post-vaccination measures
- Precautions to be taken during vaccination, disposal of used vials, etc.

Afternoon (2.00 p.m.onwards)

- Bio security measures, such as traffic control, control of rodent and free ranging fowl, use of foot bath, regular spraying and disinfection, regular cleaning/ washing of feeders and drinkers, disposal of dead birds, use of foot bath, etc., to prevent the diseases

Practicals

- Cleaning of feeders and drinkers, raking, vaccination, feeding and watering, brooding

Day 6

Forenoon (9.00 a.m. onwards)

- Nutritional requirement of broilers
- Nutrients in feed, brief idea about feed composition
- Different types of feed such as prestarter, starter and finisher
- Process of feeding such ad-lib/meal based on climate
- Time of feeding and watering

Afternoon (2.00 p.m.onwards)

- Standards for broiler performance
- Weekwise standard for mortality, feed consumption, weight gain, FCR, etc.
- Factors affecting weight gain such as brooding, feed quality, feeding practices, disease condition like CRD, NSD, etc.

Practicals

- Cleaning of feeders and drinkers, raking, feeding and watering, brooding

Day 7

Forenoon (9.00 a.m. onwards)

- Feed conversion ratio - FCR. What does it mean?
- Factors affecting FCR such as ventilation, light, temperature, arrangement of feeder and drinker, litter condition, type of feeding, activity of birds, age at marketing, etc.

Afternoon (2.00 p.m.onwards)

- Storage of feed - How to store feed?
- Precautions to be taken in the rainy season
- About feed-borne toxicity
- How does storage impair FCR?
- Standards for broiler performance
- Weekwise standard for mortality, feed consumption, weight gain, FCR, etc.

Practicals

- Cleaning of feeders and drinkers, weighing, allotment of space, raking, feeding and watering, brooding

Day 8

Forenoon (9.00 a.m. onwards)

- Arrangement of feeder and drinker in brooding ring and thereafter, importance of proper arrangement, adjustment of groove in automatic feeders
- Space requirements of birds based on body weight gain, effect of overcrowding, use of partition to restrict bird's activity

Afternoon (2.00 p.m.onwards)

- Water management -clean and potable water preferably from tube well, pH of water and how does it govern FCR, treatment of water using water sanitiser and acidifier
- Water-borne diseases such as E.coli infection, fowl cholera, NSD, etc.
- Requirement of water at different body weights and seasons
- Water management especially in summer when requirement increases and monitoring of pH becomes critical

Practicals

- Cleaning of feeder and drinker, raking, feeding and providing water, brooding

Day 9

Forenoon (9.00 a.m. onwards)

- Management of litter - role of litter, various litter material, quantity required for single lot, fumigation of litter prior to chicks placement, use of unslaked lime powder in litter, raking of litter, screening and removal of caked up litter, wet and dry litter problems and how does it govern FCR
- Litter-borne diseases such as coccidiosis, brooder's pneumonia, CCRD, etc.

Afternoon (2.00 p.m.onwards)

- Medication schedule for broiler - initial medication, use of liver stimulant, growth promoters, etc.

Practicals

- Cleaning of feeders and drinkers, raking, feeding and providing water, brooding

Day 10

Forenoon (9.00 a.m. onwards)

- Arrangement of feeder and drinker - repetition
- Space requirements of birds - repetition

Afternoon (2.00 p.m.onwards)

- Water management - repetition

Practicals

- Cleaning of feeders and drinkers, raking, feeding and providing water, brooding

Day 11

Forenoon (9.00 a.m. onwards)

- Management of litter - repetition, litter disposal

Afternoon (2.00 p.m.onwards)

- Bio security measures - repetition, concept of vaccine and vaccination - repetition

Practicals

- Cleaning of feeders and drinkers, racking, feeding and watering, use of liver stimulant, brooding

Day 12

Forenoon (9.00 a.m. onwards)

- Concept of disease - IBD etiology, mode of transmission, symptoms, economic impact of the disease, curative and preventive measures

Afternoon (2.00 p.m.onwards)

- Bio security measures for the prevention of IBD-traffic control, use of foot bath, disposal of dead birds, regular spraying with a virucidal agent, proper vaccination

Practicals

- Cleaning of feeders and drinkers, raking, feeding and providing water, use of liver stimulant, brooding

Day 13

Forenoon (9.00 a.m. onwards)

- Concept of disease - IBD - repetition

Afternoon (2.00 p.m. onwards)

- Bio security measures for the prevention of IBD - repetition

Practicals

- Cleaning of feeders and drinkers, raking, feeding and providing water, use of liver stimulant, brooding

Day 14

Forenoon (9.00 a.m. onwards)

- Vaccination - concept and schedule - repetition

Afternoon (2.00 p.m. onwards)

- Standards for broiler performance - repetition

Practicals

- Cleaning of feeders and drinkers, weighing, raking, vaccination, hanging of feeders and use of waterers+C160, allotment of space, feeding and watering, brooding

Day 15

Forenoon (9.00 a.m. onwards)

- Feed conversion ratio - Factors affecting FCR - repetition

Afternoon (2.00 p.m. onwards)

- Arrangement of feeders and drinkers
- Space requirements of birds - repetition

Practicals

- Cleaning of feeders and drinkers, raking, feeding and watering, brooding in winter

Day 16

Forenoon (9.00 a.m. onwards)

- Water management - repetition

Afternoon (2.00 p.m. onwards)

- Management of litter - repetition

Practicals

- Cleaning of feeders and drinkers, raking, feeding and watering, brooding in winter

Day 17

Forenoon (9.00 a.m. onwards)

- Management in various seasons - summer, winter and rainy season

Afternoon (2.00 p.m. onwards)

- Management in summer - measures to be taken to prevent a heat stroke
- Measures to combat E.coli and CCRD in summer

Day 17

Practicals

- Cleaning of feeders and drinkers, raking, feeding and watering, brooding in winter

Day 18

Forenoon (9.00 a.m. onwards)

- Management in various seasons - summer, winter and rainy season

Afternoon (2.00 p.m. onwards)

- Diseases of broilers - repetition

Practicals

- Cleaning of feeders and drinkers, raking, feeding and watering, brooding in winter

Day 19

Forenoon (9.00 a.m. onwards)

- Bio security measures - repetition
- Vaccination - repetition

Afternoon (2.00 p.m. onwards)

- Ranikhet prevention - bio security measures for the prevention and spread of the disease, ring vaccination practice during an outbreak in the farm, importance of proper vaccination against ranikhet

Practicals

- Cleaning of feeders and drinkers, raking, feeding and watering

Day 20

Forenoon (9.00 a.m. onwards)

- Chain of diseases - CCRD, E. Coli infection, IBD, Ranikhet
- Relation between stress and CCRD, water pH and E.coli, mycotoxins and IBD, seasonal variation and IBD, CCRD and ranikhet

Afternoon (2.00 p.m. onwards)

- Chain of diseases - repetition

Practicals

- Cleaning of feeders and drinkers, raking, feeding and watering

Day 21

Forenoon (9.00 a.m. onwards)

- Vaccination schedule - repetition, how is it altered based on disease prevalence at field
- Methods of vaccination - care and management during vaccination

Afternoon (2.00 p.m. onwards)

- Standards for broiler performance - repetition

Practicals

- Cleaning of feeders and drinkers, weighing, vaccination, space allotment, raking, feeding and watering, brooding in winter

Day 22

Forenoon (9.00 a.m. onwards)

- Space requirement and litter management - repetition, relation between space allotment and litter quality
- Repetition of the litter-borne diseases with due emphasis on coccidiosis

Afternoon (2.00 p.m. onwards)

- Litter management - repetition

Practicals

- Cleaning of feeders and drinkers, raking, feeding and watering, use of growth promoters

Day 23

Forenoon (9.00 a.m. onwards)

- Process of the preparation of shed for chick placement - scrapping and removal of old litter, cleaning, washing, drying, flaming, whitewashing, cleaning of curtains, fumigation and terminal spraying

Afternoon (2.00 p.m. onwards)

- Process of preparation of shed for chick placement - scrapping and removal of old litter, cleaning, washing, drying, flaming, whitewashing, cleaning of curtains, fumigation and terminal spraying
- Chick guard - preparation and importance

Practicals

- Cleaning of feeders and drinkers, raking, feeding and watering, use of growth promoters

Day 24

Forenoon (9.00 a.m. onwards)

- DOC - source, price, quality
- Early chicks management - judging for weight, lameness, chilling, dehydration, counting and placing of chicks, initial medication schedule - importance
- Brooding - why and how?
- Precautions while brooding

Afternoon (2.00 p.m. onwards)

- Early chicks management - brooding-importance and duration, effect of under and overheating, use of paper, feeding and watering at early age

Practicals

- Cleaning of feeders and drinkers, raking, feeding and providing water, use of growth promoter

Day 25

Forenoon (9.00 a.m. onwards)

- Hygiene and sanitation - regular removal of filthy paper, regular cleaning of drinkers, feeders and water tubs, cleanliness of the shed and surroundings
- Concept of bio security-traffic control, control of rodent and free ranging fowl, use of foot bath, regular spraying and disinfection

Day 25

Afternoon (2.00 p.m.onwards)

- Bio security measures - repetition of the overview

Practicals

- Cleaning of feeders and drinkers, raking, feeding and providing water, use of growth promoters

Day 26

Forenoon (9.00 a.m. onwards)

- Medication and vaccination schedule - repetition

Afternoon (2.00 p.m.onwards)

- Diseases - ranikhet and IBD - repetition

Practicals

- Cleaning of feeders and drinkers, raking, feeding and providing water, use of growth promoters

Day 27

Forenoon (9.00 a.m. onwards)

- Management in various seasons - summer, winter and rainy season - repetition

Afternoon (2.00 p.m.onwards)

- Management in summer - special emphasis on measures to prevent heat stroke

Practicals

- Cleaning of feeders and drinkers, raking, feeding and watering

Day 28

Forenoon (9.00 a.m. onwards)

- Management of large birds - feed and water requirement, space allotment and litter quality, ventilation and lighting, management in summer and rainy season, etc.

Afternoon (2.00 p.m.onwards)

- Management of large birds - repetition with special emphasis on summer and monsoon management

Practicals

- Cleaning of feeders and drinkers, space allotment, raking, feeding and providing water

Day 29

Forenoon (9.00 a.m. onwards)

- Feed conversion ratio - Factors affecting FCR
- Standard for broiler performance - repetition

Afternoon (2.00 p.m.onwards)

- Arrangement of feeders and drinkers
- Space requirements of birds - repetition

Day 29

Practicals

- Cleaning of feeders and drinkers, raking, feeding and providing water

Day 30

Forenoon (9.00 a.m. onwards)

- Revision of learning - question and answer session
- Tips for troubleshooting

Afternoon (2.00 p.m. onwards)

- Brief economics of poultry farming
- Profit/loss for trainee
- Feedback from trainer

Practicals

- Cleaning of feeders and drinkers, raking, weighing of birds, feeding and providing water



Running the business

1.0 INTRODUCTION

In poultry production, a livelihood option for the smallholder farmers, 'running the business' comprises two distinct operations - one at the individual producer's level and one that involves the aggregate entity.

The smallholder model is based on small individual units that are networked for the procurement of inputs and the sale of outputs. This business model requires the efficient functioning of both the individual as well as collective enterprise. This chapter looks at the functional framework and the systems that are required for both the facets of enterprise.



Ready birds for marketing

2.0 BUSINESS SERVICES

Small individual broiler production units of 300–400 birds capacity find it difficult to procure day-old chicks, feed and other inputs as also to market the birds on their own. It is through collectivisation that they can procure efficiently a package of business services. It is only through a viable support system that they can become competitive and the enterprise as a whole becomes sustainable.

In the individual broiler production units, the woman producers require the following services:

- Production scheduling
- Timely delivery of inputs
- Help in monitoring production and variances
- Veterinary services
- Lifting schedule and marketing of birds
- Bookkeeping

These services are delivered by the cooperative, either directly or through a set of local village-based service providers or supervisors. The supervisor is the key person who delivers the package of services to the producers. The supervisor is the cooperative's visible face for the producer, and is accountable to the members of the cooperative. This system of service delivery is detailed in Table 7 (on the next page).

3.0 MONITORING PRODUCTION

As per the breed specifications, the broiler birds have well-set performance standards measurable at various stages of growth and development. For variance monitoring, the production cycle is marked in weekly stages, usually six weeks starting from the 8th day to the 42nd day. During these stages, the actual performance is compared with standards on five important parameters: average weight, feed conversion ratio, mortality, cost of medicine and other expenses.

As feed is the major item of production cost, consistent weight gain coupled with the quantity of feed consumed to gain one kilogram of live weight (FCR) is the most critical indicator of production efficiency. The mortality of birds at various stages has its adverse effect in terms of reduction in overall live weight, which has an unfavourable effect on FCR. Thus, variance monitoring helps to take corrective measures well in time and to make the enterprise profitable.

Table 7: Service delivery

Services	Supervisor	Cooperative	Decision
<p>■ Production scheduling:</p> <p>Production scheduling involves shed-wise plan for the placement of chicks, drawing up a calendar for induction on different dates, matching the requirement to ordering of chicks with supplier and sequencing all the preparatory steps for the placement of birds.</p>	<ul style="list-style-type: none"> Discusses with individual producers Organises disinfection of sheds Informs the producer about chick supply and ensures timely distribution 	Decides the monthly placement of chicks and allocates to different villages	Weekly meeting of supervisors
<p>■ Timely delivery of inputs</p> <p>This involves the supply of chicks to producers on pre-specified dates and arranging feed supply and medication as per the changing requirement of chicks with each producer, depending on the stage of growth and problems encountered, if any.</p>	<ul style="list-style-type: none"> Stocks inputs and supply requirements on a daily basis Reports stock depletion to cooperative, and arranges replenishment 	Procures inputs in bulk and supplies to different supervisors	Regular ongoing activity
<p>■ Production monitoring:</p> <p>This service requires checking the performance of birds, noticing deviations, providing feedback and initiating corrective action.</p>	<ul style="list-style-type: none"> Undertakes regular farm visits Provides weekly reporting of performance against standards Ensures protocol compliance to the cooperative 	Undertakes through the veterinarian/CEO weekly stocktaking, routine visits and special visits in the case of major variances and problems	Weekly meeting of supervisors
<p>■ Veterinary services:</p> <p>This involves providing on-the-spot help as also bringing doctors help and advise for preventive and curative action.</p>	<ul style="list-style-type: none"> Provides round-the clock rudimentary vet services Initiates immediate curative measures, and reports severe cases for doctors service 	Provides referral veterinary services	Regular ongoing activity
<p>■ Lifting of birds:</p> <p>The birds on attaining marketable stage (around 35-40 days) need to be collected, weighed and transported to marketing centres.</p>	<ul style="list-style-type: none"> Informs the cooperative when the birds are ready Reports any specific problems of producers Ensures the correct weighing of the birds 	Based on market demand deciding the lifting schedule and communicating to supervisors	Weekly meeting of supervisors
<p>■ Accounts and profit distribution:</p> <p>This requires making authentic records of transactions in producers' book and other records. Providing periodical feedback to the cooperative is also part of this service.</p>	<ul style="list-style-type: none"> Ensures the proper recording at the point of transaction in producers' book and other records 	Reconciliation of accounts and arranging payments	Regular ongoing activity

An efficient monitoring system helps in comparing performance against set standards, in figuring out the reasons for variations and in taking corrective measures. The parameters given under Table 8 are used by the supervisor to capture data on the

salient indicators of a batch. These sheets are also provided in the producers' book that records data for a year, so that the practitioner can also do a time-series analysis of the producer's performance.

Table 8: Parameters for monitoring individual batch variance

		Av. wt. (gm)	FCR	Mortality	Medicine cost Rs/bird	Misc. cost Rs/bird	Remarks
7th day	Standard Actual	160	0.95	1.0%	0.60	0.40	
14th day	Standard Actual	400	1.15	1.5%	1.10	0.60	
21st day	Standard Actual	700	1.35	2.0%	1.25	0.80	
28 th day	Standard Actual	1100	1.50	2.5%	1.50	0.90	
35 th day	Standard Actual	1500	1.65	3.0%	2.00	1.00	
42nd day	Standard Actual	2000	1.75	3.5%	2.50	1.00	

Note: Production standards are specific to breed, climatic conditions and quality of management.

Table 8.1: Variance analysis

Parameters	Variance	Tolerance limits	Corrective action

24 Producers' book

This is a pre-formatted book that captures the different transactions and production efficiency indicators of batches. The book is filled with the help of the supervisor. It keeps a record of inputs supplied, flock performance and sale of birds for each batch. The batch-wise production and performance is recorded in this book. The book provides for recording the particulars of 7 batches to cover a period of one year.

The producers' book is the most essential record, which makes the system authentic and transparent paving the way for an enduring relationship between the producers and the collectivisation agency. Format 6, given at the end of this chapter, shows the actual sheets from the producers' book, used in the Kesla project.

हजिद अर्थात् ०१/०२/०३ / ०४/०५/०६ / ०७/०८ / ०९/१०

**केसला पोल्ट्री सहकारिता मर्यादित,
मुख्यतया**

प्रोड्यूसर किताब

वर्ष २०००

प्रोड्यूसर का नाम _____
 विभाग/पट्टी का नाम _____
 गाँव का नाम _____
 संस्थापक का नाम _____
 को. पी. एम. कोड नं. _____
 सुपरवाइजर का नाम _____
 संस्थापक भंडार संख्या _____

झूठर (रोड)चन्नाई का विवरण

झूठर की जमीन का खसरा नं. _____
 झूठर पूरा होने की तारीख _____
 झूठर पर कुल लागत _____
 कुल लागत का हिसाब _____
 कुल बर्बाद _____
 बर्बाद की राशि _____
 झूठर होने की तारीख _____

००१ - केसला पोल्ट्री सहकारिता मर्यादित द्वारा प्रेषित, जहाँ नं. सुपरवाइजर, केसला पोल्ट्री सहकारिता

Fig. 8: Day-old chicks



Fig. 9: Chicks at 7 days



Fig. 10: Chicks at 14 days



Fig. 11: Growers at 21 days



Fig.12: Growers at 28 days



Fig.13: Finishers at 35 days



3.1 WEEKLY MEETING OF SUPERVISORS

The weekly meeting of supervisors is an important forum where decisions are taken on production scheduling, lifting schedule, protocol compliance and production performance. The information collected is shown in Format 1. This statement is prepared in duplicate; one copy is filed in the production cluster folder after the meeting and the other copy remains with the supervisor to compare the data across weeks within the batch.

Critical information regarding production scheduling essentially includes compliance on whether all the disinfection steps have been completed in full and whether the shed is fully ready for placement.

The information on the lifting schedule has details of the average flock weight, available number of birds, whether there is any urgency due to disease in the flock, or the family is unable to give time due to some problem in the household.

A bird lifting register is maintained at the cooperative to keep the records of all the marketable birds across producers, spread over villages and with categorisation into ages/weight class so that prompt and efficient decisions can be taken. This information is very handy when the daily plan is made. The lifting plan for each vehicle/trader is communicated to the supervisor. Formats 7 and 8 at the end of this chapter are used for administering these activities.

Format 1: Batch - wise production and performance record

• Lot no. <input style="width: 80%;" type="text"/>	• Batch No. <input style="width: 80%;" type="text"/>	• Hatch Date <input style="width: 80%;" type="text"/>
• Start Date <input style="width: 80%;" type="text"/>	• Finish Date <input style="width: 80%;" type="text"/>	

■ Main inputs

Day Old Chick (DOC)				Broiler Fees					Medicine			
Billed No.	Free	Rate	Amount	Bill no.	Feed	Qty/bag	Rate	Amount	Name	Qty.	Rate	Amount
					Maize				F1 Vaccine			
					Starter				IBD Vaccine			
					Finisher				Lasota Vaccine			
Total (b)				Total (b)					Total (c)			

■ Miscellaneous inputs

Lime			Saw Dust			Total	
Bags	Rate	Amount	Bags	Rate	Amount	Amount	
						Total (d)	

■ Returned feed stock

Feed	Qty/bag	Rate	Amount
Total (e)			

■ Scale of broiler birds

No.	Date	Bill No.	Buyer	No.	Wt	Rate	Amount	Remarks
Total (f)								

Accounts summary (amount in Rs.)

• Total Sales (f)	
• Material Cost (a + b + c + d -e)	
• Gross margin	
• Interest	
• Deposit	
• Net paid	

Performance summary

• Duration (days)	
• Mortality (%)	
• Average Weight (kg/bird)	
• Feed Consumed (kg/bird)	
• F.C.R.	
• Efficiency index	

Producer

Production

Accountant

Format 1.1: Daily mortality monitoring card

Date	Day	No.	Reason	Supervisor 's signature

4.0 FORMS OF COLLECTIVE ENTERPRISE

The collective organisation of producers needs to be a legal entity for its effective functioning, to raise finance and transact business with its members. The collective can be registered as a :

- Cooperative society
- Cooperative under the liberal law - mutually aided/self reliant
- Private company

- Producer company
- Mutual benefit trust

In this manual, the focus is on Mutually Aided Co-operative Society (MACS) as the business organisation. A similar type of organisation under company law is a producer company. A comparison of these two types of legal entities is presented in Table 9 (on the next page).

Table 9: Comparison of cooperative and producer company

Parameters	Cooperative society	Producer company
■ Registration	State Act-Registrar of cooperative societies	Company registrar of the states where its registered office is located
■ Membership	Individual	Individual/group
■ Members' stake	No linkages with no. of shares held and patronage quantities.	Article can provide for linking supplies with share holding. Provisions reinforce business-based rights and control, enabling a true recognition and exercise of stakes by the owners.
■ Government and bureaucratic interference	Being registered under a State Act, it is vulnerable to state government directives and control.	The Act being central the provisions are not susceptible to state-level political expediencies.
■ Objective	Interest of members and community.	Interest of members
■ Voting power	One person one vote principle applies	Voting rights can be linked to patronage if provided in article.
■ Distribution of profits	Law specifies proportion of net profits transferred to the general reserve and the maximum dividend	Law specifies proportion of net profits transferred to the general reserve and the maximum dividend
■ Taxes and MRTP applicability	Exemptions applicable to cooperative sector	Some exemptions applicable to cooperatives apply at the centre, but not in the states.
■ Control/regulation	Registrar of cooperative societies	Governed by the company registrar of the states where its registered office is located
■ Disclosure norms and audit requirements	Annual report to regulator	Very stringent, as per company law. As per the Companies Act, audit must be conducted on time, and the required documentation to the authorities filed, barring which severe penalties are imposed.
■ Professionals as Board members	Is not provided, Board is exclusively of members	Experts can be co-opted as Board members
■ Raising external finances	Apart from regular channels, can tap into cooperative specific finance sources	Regular financing routes, cannot tap into cooperative specific finance sources
■ External equity	No provision	No provision

5.0 BUSINESS AT COLLECTIVE

useful when the cooperative is organised.

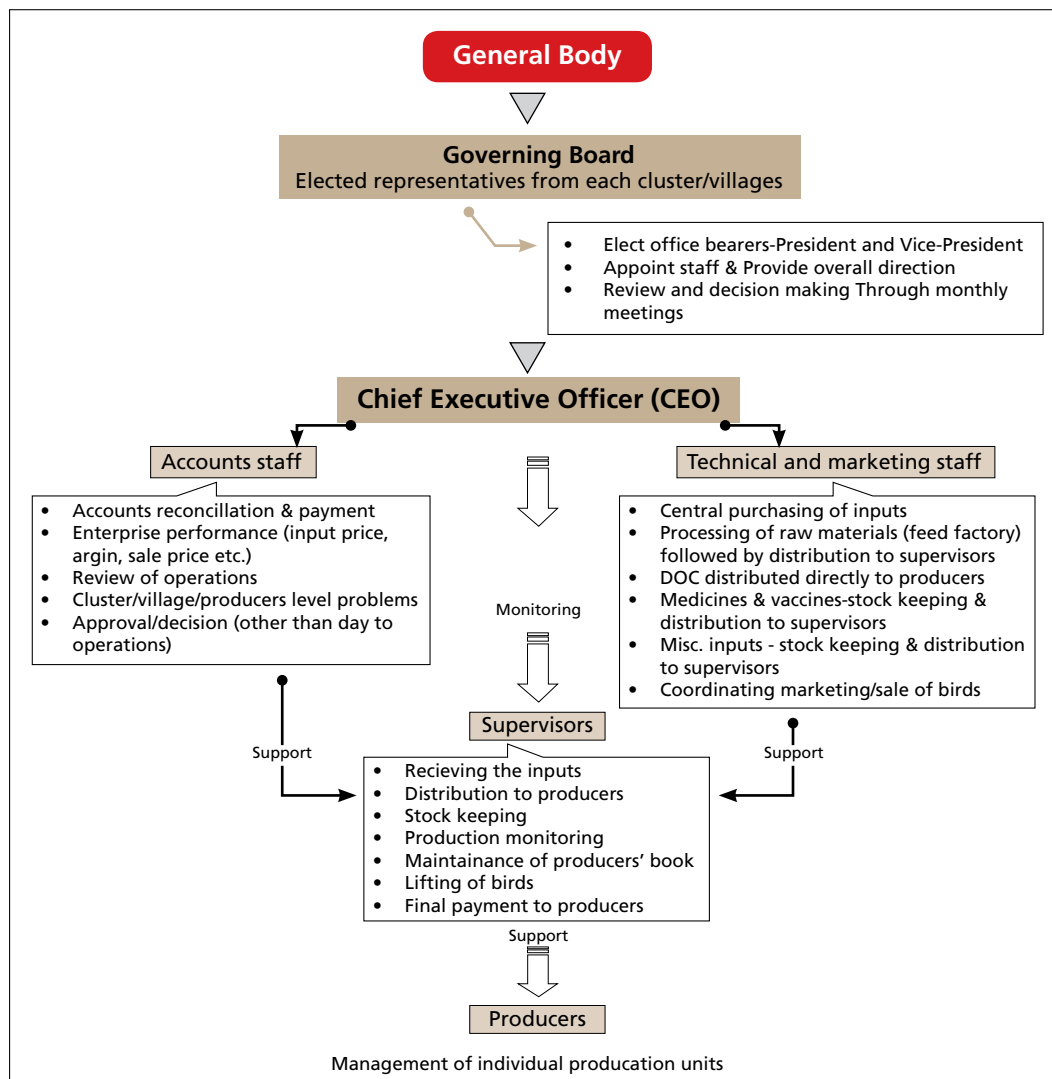
For competitiveness, sustainability and to achieve economies of scale, the producers aggregate together as smallholder broiler farmers' cooperatives. Through such an organisation, even the small-scale broiler rearing by individual producers becomes profitable. Such cooperative societies can be registered under the self-supporting act (Mutually Aided), prevalent in different states. Some states have not enacted the new generation acts. Producer companies could be another option. Prior social mobilisation, may be in the form of SHGs, is

- Experience in existing smallholder poultry projects shows that a cooperative becomes viable when there are about 190 broiler producers as its members.
- Decision-making and other functions in the cooperative are performed according to the well-laid out democratic procedures.
- The governing board meets every month to take stock of the business and to make some decisions on behalf of the members as well as for the cooperative as a whole.



The Kesla Poultry Society- a thriving cooperative of 375 producers

Flow chart 2: **Organisational chart of a model poultry cooperative**



- It is important that cooperatives mobilise local service providers and back them with quality veterinary support.
- Legal and statutory formalities, such as audit and income/sale tax registration, are given priority.

5.1 DEPLOYMENT OF SUPERVISORS

Producers deploy service providers or supervisors to render services to them for which they are paid. It is useful not to have service providers and board members from the same family. It has been found that service providers from different villages perform well when selected in the presence of Board members. Their performance is also reviewed in the Board meeting so that s/he responds to the members in a responsible way.

25 Role of the CEO in cooperatives

The CEO is responsible for the overall, day-to-day business of the cooperative. S/he heads the operational functions and is the focal point of members' interaction. The CEO has to be well informed about the production management. S/he coordinates with the accounts staff and needs to be well versed in accounts and financial management. S/he attends to the input procurement and marketing of the birds, and, thus, must acquire good negotiating skills. The CEO is accountable to the Board of Directors and is subject to performance reviews. S/he calls a Board meeting every month and presents the status of the cooperative before them. S/he attends village-level meetings and weekly supervisors' meetings. S/he provides an overall professional management to the enterprise.

5.2 SERVICES TO INDIVIDUAL UNITS

Cooperative or collectivisation of individual poultry units is required for doing things that an individual unit would find difficult or economically unviable to do on its own. The individual producer, thus, depends on the collectivised agency to help her in this part of the business. Further, this holds the key to the enterprise, giving it the benefit of economies of scale.

Broadly, there are three services that the cooperative provides to its members:

- Arranging working capital loans
- Organising the supply of inputs
- Marketing the broilers

Through an appropriate financial plan, the cooperative can estimate the working capital requirement to support production, and mobilise resources to meet the working capital needs of its members. On the same lines, a planned approach to the procurement of inputs and marketing of birds is necessary. As these are three independent functions, one needs to be cautious if they are done together, because the inefficiencies in one operation may not be clearly identifiable.

26 Employees vs stakeholders: Issues in governance

In the process of developing an integrated enterprise, there has to be a good working relationship between the stakeholders (owner members) and the employees. The problem arises when a critical feature of the business gets to be managed and decisions are taken by employees. The real stakeholders, due to their distribution, smaller unit size, capability gap and information asymmetry, are unable to play their expected role. This can lead to underperformance, leakages, over-regulation and bureaucratisation. The other issue is that, sometimes, especially in the early phase of the enterprise, the interests of the 'cooperative business' clashes with 'individual business'. However, members and employees should understand that, in the long term, individual interests are aligned with cooperative interest and, thus, there is little reason for clash. These issues, arising out of collectivisation, that is, the exercise of ownership and alignment of individual interests with the collective; are to be given due attention.

5.3 COOPERATIVE BUSINESS FUNCTIONS

The business functions of the cooperative are:

- Procurement of inputs
- Storage, processing and distribution of inputs
- Collection and sale of ready birds

In addition, the cooperative also carries out the work related to the collection of money from broiler traders, payment to member-producers and suppliers, accounts and bookkeeping.

5.3.1 Procurement of inputs

The twin issues of quality and price are to be kept in mind when procuring inputs. A prudent system to be followed is that whenever a purchase is effected, the price is to be checked with at least two

Format 2: Input sourcing register

Date	Party	Terms of payment, discount and delivery	Ordered quantity	Rate	Signature of person negotiating

or three suppliers of comparable quality; it is to be recorded in a register open for members' viewing. It is advisable to maintain such a record for chicks and feed procurement as shown in Format 2.

5.3.2 Storage and distribution of inputs

Some time-tested practices help in proper storage and distribution. The person receiving the inputs must record his acceptance on the bill itself before submitting it for settlement. It is always good to make one person responsible for stock keeping and putting down simple but firm, clear-cut rules for distribution. There should no flexibility, for example, s/he should not decide whether to sell to outsiders or not and do it by cash or credit. Such terms of sale and matters related to credit are executive decisions, which should not be transgressed by others.

5.3.3 Sale of ready birds

Here, the decision on price is very crucial. A simple variation of 0.50 paise can play havoc with the system. Although some discretion needs to be given to the person in charge, it is good to make systems which identify the factors of decision and help members understand it. A simple record of broiler prices at different places, which determine the market rates and rates offered by the cooperative can be quite useful if displayed as shown in Format 3.

Format 3: Market rate display chart

Date	Market A Rate of broiler birds			Market B Rate of broiler birds			Cooperative (ex-farm) Rate of broiler birds		
	Big	Medium	Small	Big	Medium	Small	Big	Medium	Small

6.0 TRANSACTION RECORDS

A transparent recording of all the transactions is an essential requirement of building member trust in the system. The transactions arise between the supervisor and producers, between supervisor and cooperative and between producer and coopera-

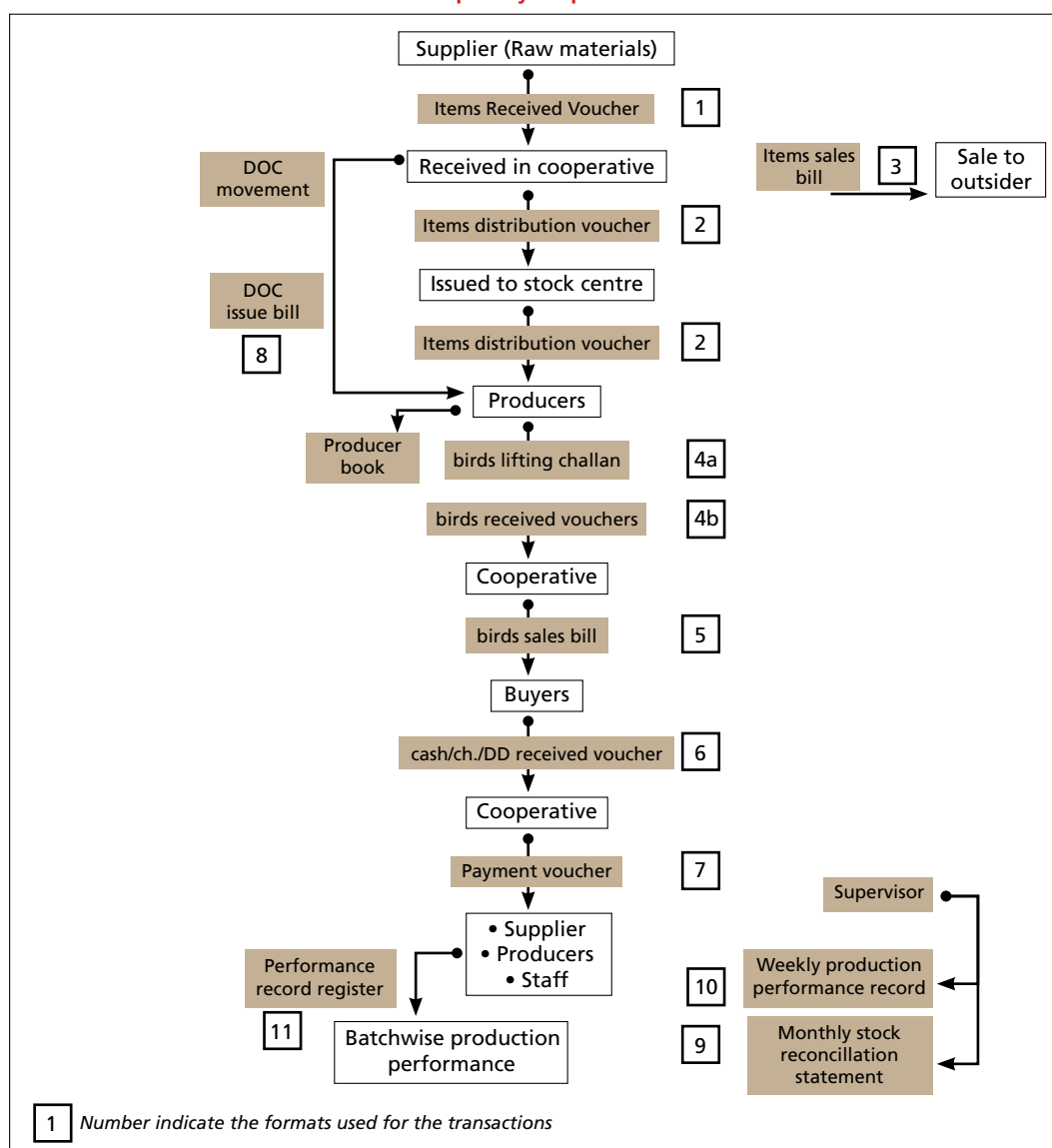
26 Producers as 'production divisions'

The members in the enterprise model discussed are similar to the divisions of a big firm and it is the responsibility of the management to ensure that these 'production divisions' at member premises are well run. Thus, it becomes important to record all the transactions at the member level as well as the cooperative levels. Service providers handle all the stock, which is about 70 per cent of the business of the cooperative. Given the low literacy skills at the producer level, the enterprise needs to keep track of these transactions particularly well.

tive. The transactions cover the supply of chicks and inputs, lifting of birds and payment to producers. For all these a well-defined system of 'receipts', challans and vouchers is required.

To cite the example of the supply of birds to traders, it would require making quadruplicate copies of challans; one each to be with the producer, the trader and the cooperative office and one for

Flow chart 3: Transaction record for a model poultry cooperative



future reference. It is absolutely critical to get the issuer and receiver of material record their acceptance at all the stages, for example, when the inputs are sent in cooperative's own vehicle, the delivery boy in the vehicle, farmer and supervisor must record their acceptance for the transaction by signing on the voucher. Moreover, this transaction must be recorded in the producers' book also.

The following financial records needs to be kept for proper monitoring at different levels.

- **Individual level:** At the individual level, the key financial indicators capturing business performance are batch profits, capacity utilisation or batch intensity. Similarly, the stock transactions with the cooperative and the batch margins, the financial transactions, such as payments received, and the repayment to banks in case the cooperative is a guarantor, are also to be recorded.

- **Service provider level:** All the stock transactions and the financial transactions of the enterprise are recorded.

7.0 GOVERNANCE

Information flow is a prerequisite for decision-making, and decisions form the crux of governance. There is need for a good Management Information System (MIS) to bridge the information gap between professional management and producers. The MIS, on the one hand, helps to review the progress and, on the other, paves way for solving problems and facilitates planned action.

There is need to provide some critical information to the Board on an ongoing basis. The MIS report to the Board covers the highlights of batch performance, productivity parameters data on market interface, performance of the cooperative in terms of various financial parameters and indicators of

28 Computerised accounts

The poultry software, '*Udyogmunshi*', especially designed for smallholder poultry, has many useful features. Through this, the books of the cooperative are maintained in auditable form as per standard accounting norms using the concept of stock centres. It facilitates the maintenance of decentralised stocks on a village/cluster basis with the option of consolidation across stock centres. There is also provision for maintaining books of producers for each individual batch separately.

The user can create his/her own 'chart of accounts', that is, ledgers and sub-ledgers organised into assets, liabilities, income and expenditure, with the option of creating groupings of the general ledger heads.

Some user-friendly features of this software are:

- Cash or credit transactions from the same screen
- Stock quantity and value transactions from the same screen
- Financial vouchers organised month-wise for easy entry and search
- Browse and search options with different data fields readily organised
- Performance of select/all batches of one/many producers for any given period can be viewed

The basic consolidation reports that the software can generate include balance sheets as on any date, profit and loss statements for any given period, consolidated stock statements and daily information on cash and bank transactions, sales and purchases, etc. The more specific reports include:

- Customised balance sheet, profit and loss, with schedules and groupings
- Item-wise sales and purchase summary
- Buyer and supplier summary
- Stock centre balances
- Reconciliation of live stock items such as day-old-chicks and marketable birds
- Performance indicators for individual batch

performance efficiency as shown in Format 4 (on the next page).

of productivity parameters, such as FCR and mortality on unit profitability, is provided in the following tables.

8.0 ECONOMICS OF THE INDIVIDUAL BROILER UNIT

As a standard basic unit for the smallholder poultry model, the economics has been worked out for a broiler unit of 300 birds. The model presented here is premised on delinking the production risks from the enterprise risks. Profitability in the individual unit is only influenced by productivity. The impact

- Table: 10 Sample financial analysis of a broiler unit
- Table: 11 Effect of mortality on profitability
- Table: 12 Effect of FCR on profitability
- Table: 13 Combined effect of FCR and mortality on profitability
- Table: 14 Effect of unit size on profitability



Office of kesla Poultry society, Sukhtawa

Format 4: MIS report to the Board

Report for the month of				
	Parameters	Previous month	Current month	Cumulative position
A.	Batch performance			
A1	No. of batches			
A2	Batches with profit > Rs 1500			
A3	Total batch margin			
B.	Productivity parameters			
B1	Mortality			
B2	FCR			
B3	Efficiency Index (EI)			
C.	Cooperative performance			
C1	Market interface			
■	Average price of DOC			
■	Average price of feed			
■	Average price of birds sold			
C2	Financial parameters			
■	Net profit			
■	Buyer outstanding			
■	Stock-in-hand			
■	Cash and bank balances			
■	CC + OD + supplier credit			
■	Working capital			
D.	Production cost (Rs per kg)			
D1	Material including transport			
D2	Market linkage			
D3	Personnel and administration			
D4	Growing charges			
D5	Production support			
E.	Other parameters			

Table 10: Sample financial analysis of a broiler unit

Financial model for broiler farming				300 bird unit
■ Assumptions				
■ Material costs of fixed infrastructure as grant				
■ Labour component of infrastructure creation as producer contribution				
■ Working capital from seed funds				
■ Technical parameters				
■ Number of batches in a year (no.)	7	■ Mortality		3%
■ Batch duration (days)	35	■ Free chicks from hatchery		2%
■ Average weight (kg)	1.5	■ Time input (hrs/day)		3
■ Feed conversion ratio (FCR)	1.85	■ Total time input (person days/batch)		13
	Unit	Quantity	Rate	Amount (Rs)
1.0 Fixed capital				
1.1 Production shed	sq ft	300	90	27,000
1.2 Equipment	set	1	3500	3500
Total				30,500
2.0 Inputs				
2.1 DOCs	no.	12	300	3,600
2.2 Feed	kg	10	824.18	8,242
2.3 Medicines	no.	2	300	600
2.4 Power and misc.	no.	1	300	300
2.5 Insurance	no.	0.5	300	150
2.6 Vet services	no.	1	300	300
2.7 Interest on WC loan	Rs.	12%		152
Total				13,344
3.0 Output				
Ready-for-sale birds	kg	34.5	445.5	15,370
Total				15,370
4.0 Margin per batch				2,026
5.0 Return per day				58
6.0 Margin per year				14,180

Note: Rates provided are for illustrative purposes only.

Table 11: Effect of mortality on profitability

	A	B	C
■ No. of chicks	300	300	300
■ Mortality %	3%	4%	5%
■ Loss of birds due to mortality (no.)	9	12	15
■ No. of birds sold	291	288	285
■ Live weight (kg) per bird	1.5	1.5	1.5
■ Total live weight sold (kg)	436.5	432	427.5
■ Selling rate (Rs/kg)	34.5	34.5	34.5
■ Total money earned (Rs)	(a) 15059	14904	14749
■ F.C.R	1.85	1.85	1.85
■ Feed required/bird (kg)	2.775	2.775	2.775
■ Feed rate (Rs)	10	10	10
■ Total feed (kg)	807.53	799.2	790.88
■ Total feed cost (Rs)	(b) 8075.3	7992	7908.8
■ Chick cost (Rs/chick)	12	12	12
■ Chicks cost (Rs)	(c) 3600	3600	3600
■ Other cost Rs 2/bird	(d) 600	600	600
■ Profit a – (b + c + d) Rs	2784	2712	2640
■ Difference		72	144
■ Per bird profitability	9.28	9.04	8.80
■ Decline in per bird profitability		0.24	0.48

Note: Rates provided are for illustrative purposes only.

Table 12: Effect of FCR on profitability

	A	B	C
■ No. of chicks	300	300	300
■ Mortality %	3%	3%	3%
■ Loss of birds due to mortality (no.)	9	9	9
■ No. of birds sold	291	291	291
■ Live weight (kg) per bird	1.5	1.5	1.5
■ Total live weight sold (kg)	436.5	436.5	436.5
■ Selling rate (Rs/kg)	34.5	34.5	34.5
■ Total money earned (Rs) (a)	15059	15059	15059
■ FCR	1.85	1.90	1.95
■ Feed required/bird (kg)	2.77	2.85	2.92
■ Feed rate (Rs)	10	10	10
■ Total feed (kg)	806.07	829.4	849.72
■ Total feed cost (Rs) (b)	8060.7	8293.5	8497.2
■ Chick cost (Rs/chick)	12	12	12
■ Chicks cost (Rs) (c)	3600	3600	3600
■ Other cost Rs 2/bird (d)	600	600	600
■ Profit a – (b + c + d) Rs	2798.6	2565.8	2362.1
■ Difference		232.80	436.50
■ Per bird profitability	9.33	8.55	7.87
■ Decline in per bird profitability		0.78	1.46

Note: Rates provided are for illustrative purposes only.

Table 13: Combined effect of mortality and FCR on profitability

	A	B	C
■ No. of chicks	300	300	300
■ Mortality %	3%	4%	5%
■ Loss of birds due to mortality (no.)	9	12	15
■ No. of birds sold	291	288	285
■ Live weight (kg) per bird	1.5	1.5	1.5
■ Total live weight sold (kg)	436.5	432.0	427.5
■ Selling rate (Rs/kg)	34.5	34.5	34.5
■ Total money earned (Rs) (a)	15,059	14,904	14,749
■ FCR	1.85	1.90	1.95
■ Feed required/bird (kg)	2.77	2.85	2.92
■ Feed rate (Rs)	10	10	10
■ Total feed (kg)	806.07	820.8	832.2
■ Total feed cost (Rs) (b)	8,060.7	8,208	8,322
■ Chick cost (Rs/chick)	12	12	12
■ Chicks cost (Rs) (c)	3,600	3,600	3,600
■ Other cost Rs 2/bird (d)	600	600	600
■ Profit a – (b + c + d) Rs	2,798.6	2,496	2,226.8
■ Difference		302.55	571.8
■ Per bird profitability	9.33	8.32	7.42
■ Decline in per bird profitability		1.01	1.91

Note: Rates provided are for illustrative purposes only.

Table 14: Effect of unit size on profitability

(Amt. in Rs.)

Parameters	Unit size					
	300 birds		400 birds		500 birds	
	Grant	50% Loan	Grant	50% Loan	Grant	50% Loan
Fund deployed						
Capital Investments	20,400	0	13,600	13,600	17,000	17,000
Working capital required	0	13,380	0	17,840	0	22,300
Return to producer						
Return per annum	9,817		9,411		11,763	
Return per day (RPD)	40.9		39.2		49.0	
Financial indicators						
NPV	57,816		55,421		69,275	
DSCR	8%		34%		34%	

Assumptions :

- Working Capital is taken as loan (cash-credit); the debt servicing liability is only for the interest component
- Grant for capital investments is as provided
- Interest on cash-credit is 12% and on capital is 11% with a tenure of 5 years
- Price assumptions: DOC Rs 14, Feed Rs 10/kg, Med+Misc. Rs 3/bird, Bird sold at av. wt. of 1.5 kg @ Rs 35/kg, FCR. 1.7, Mortality 3%
- Batch Intensity of 6, that is, 6 batches in a year
- Shed cost @ Rs 60/sq ft, equipment @ Rs 8/bird, space 1sq ft/bird
- Economic life 10 years, discount factor 11%

9.0 FINANCIALS OF COLLECTIVE ENTERPRISE

The sample financial projections for a smallholder broiler farmers' cooperative is given in Table 15. The five-year projection given in the financial plan shows an increase in the number of producers from 30 to 350 with an increase in the placement of chicks from 45,000 to 5,77,500. The basic assumptions are given under item C of the subject table. The financial projections show that initially there is need for external funding and the enterprise can sustain itself from the 4th year onwards.

Table 15: Financial projections of a model smallholder broiler farmers' cooperative

A. Production capacity and feed consumption

	Year I	Year II	Year III	Year IV	Year V
■ No. of producer members	30	110	210	310	350
■ Placement of chicks (no.)	45,000	1,65,000	3,46,500	5,11,500	5,77,500
■ Birds sold (no.)	43,650	1,60,050	3,36,105	4,96,155	5,60,175
■ Live weight of birds sold (kg)	65,475	2,40,075	5,04,158	7,44,233	8,40,263
■ Feed consumption (kg)	1,21,129	4,44,139	9,32,691	1,37,6830	1,55,4486

B. Financial projections

(Rs in lakhs)

	Year I	Year II	Year III	Year IV	Year V
INCOME					
■ Sales	41.12	150.76	319.27	474.99	540.44
■ Service charges from producers	0.45	1.65	3.47	5.12	5.78
■ Interest on fixed deposits	0.06	0.22	0.41	0.61	0.63
■ Revenue receipts from DPIP	4.00	5.00	2.00	-	-
■ Membership fees	0.03	0.08	0.10	0.10	0.04
Total	45.66	157.72	325.25	480.81	546.88
EXPENDITURE					
■ Cost of traded items	39.96	147.07	310.93	462.11	523.75
■ Staff cost	2.90	5.44	6.95	8.13	9.05
■ Irrecoverable debts	0.33	0.82	0.86	0.76	0.76
■ Other administrative expenses	1.56	1.95	2.17	2.38	2.61
■ Finance charges		0.17	0.44	0.63	0.69
■ Depreciation	0.18	0.85	0.85	0.85	0.85
■ Total expenditure	44.93	156.29	322.20	474.86	537.71
■ Net profit/(loss)	0.73	1.43	3.05	5.95	9.17
■ Taxation	0.00	0.00	1.00	1.00	2.00
■ Surplus available for distribution	0.73	1.43	2.05	4.95	7.17
■ Dividends distributed	-	-	0.51	2.00	3.00
Retained earnings	0.73	1.43	1.54	2.95	4.17

C. Financial plan assumptions

C. Financial plan assumptions			
■ Shed capacity (no of birds/batch)	300		
	Year I	Year II	Year III onwards
■ No. of batches per year	5	5	5.5
■ Average live weight (kg/bird)	1.5		
■ Average feed consumption (kg/bird)	2.775		
■ Feed conversion ratio	1.85		
■ Mortality rate	3%		

■ Sales	Includes sale of broilers, sale of DOC, sale of feed, medicines and other inputs
■ Cost of traded items	Includes cost price of broiler birds, DOC, feed, medicines and other inputs
■ Revenue receipts	Funding received from external agency

Selling price	Year I	Year II	Year III	Year IV	Year V
■ Broilers (Rs per kg)	35.00	35.00	35.00	35.50	36.00
■ Day-old chicks (Rs per chick)	15.00	15.00	15.50	15.50	15.50
■ Broiler feed (Rs per kg)	8.90	8.90	9.00	9.00	9.00
■ Medicines and misc. (Rs per bird)	2.00	2.00	2.00	2.00	2.00

Cost price	Year I	Year II	Year III	Year IV	Year V
■ Broilers (Rs per kg)	34.00	34.00	34.00	34.00	34.00
■ Day old chicks (Rs per chick)	13.00	13.33	13.66	14.00	14.35
■ Broiler feed (Rs per kg)	8.50	8.50	8.60	8.70	8.70
■ Medicines and misc. (Rs per bird)	2.00	2.00	2.00	2.00	2.00

■ Transportation cost	Rs per kg	1.00
■ Transportation loss	1%	on live weight

■ Service charge from producers	Rs per bird	1.00
■ Membership fee	Rs per member	100

■ Staff cost	Year I	Year II	Year III	Year IV	Year V
■ No. of producers/staff	7.5	12.22	16.15	19.38	19.44
■ Salary cost/producer (Rs)	9,680	4,946	3,311	2,623	2,586
■ No. of staff	4	9	13	16	18

	Year I	Year II	Year III	Year IV onwards
■ Provision for bad debts	1.5%	1%	0.5%	0.3%

■ Administration expenses (Rs per kg)	Year I	Year II	Year III	Year IV	Year V
	2.38	0.81	0.43	0.32	0.31

■ Finance charges	Interest on OD	11%	average balance assumed	50%
-------------------	----------------	-----	-------------------------	-----

■ OD limit (Rs)	Year I	Year II	Year III	Year IV	Year V
	-	3,00,000.00	8,00,000.00	11,50,000.00	12,50,000.00

■ Asset categories (Rs)	I year	II year	Total
■ Land and building		1,50,000.00	1,50,000.00
■ Furniture and fixtures	1,00,000	-	1,00,000.00
■ Vehicles	-	4,50,000	4,50,000.00
■ Professional equipments	75,000	75,000	1,50,000.00
	1,75,000	6,75,000	8,50,000

■ Depreciation	10%
■ Taxation	20%

■ Dividends	Year I	Year II	Year III	Year IV	Year V
	-	-	25%	40%	45%

9.1 COMPREHENSIVE FORMAT FOR FINANCIAL PROJECTION

A comprehensive format for presenting the financial plan for a smallholder poultry cooperative is given in Format 5. The major heads to be covered as per the format are investment, sources of funds, financial projections and key ratios.

Format 5: Comprehensive financial projection

Parameters	Year I	Year II	Year III	Year IV	Year V
Investments					
■ Producer level					
■ Cluster level					
■ Cooperative					
■ Total					
Source of funds					
■ Member originated					
■ Start-up grant					
■ Bank loan					
■ Total					
Financial projections					
■ Sales					
■ Cost of sales					
■ Gross income					
■ Other income					
■ Administrative expenses					
■ Marketing expenses					
■ EBITDA					
■ Depreciation					
■ Interest					
■ PBT					
■ Tax					
■ PAT					
Key ratios					
■ Debt equity ratio					
■ Fixed asset coverage ratio					
■ Total asset turnover					
■ ROI					
■ EBITDA					
■ DSCR					
■ IRR					

10.0 PERFORMANCE OF A SMALLHOLDER POULTRY

Performance of a smallholder poultry cooperative can be assessed using a number of indicators as shown in Table 16.

11.0 SUSTAINABILITY OF THE ENTERPRISE

The issue of sustainability can be understood from two angles.

Table 16: Indicators for performance assessment

Indicators	Benchmarks	Parameters
Input procurement efficiency	■ Compare to local farmer	□ Average DOC price
	■ Compare to integrator	□ Average feed price
Output competitiveness	■ Market price	□ Price realised
	■ Market linkage costs	□ Average sale weight
		□ Bird transportation + sales person costs
Productivity efficiency	■ Compare to industry standards	□ Mortality
		□ Feed Conversion Ratio (FCR)
		□ Efficiency Index (EI)
Member profitability	■ Compare to industry standards	□ Grower margin (Rs/kg)
		□ Grower margin (Rs/annum)
Integration and collectivisation	■ Establishment costs	□ Personnel and administration
	■ Governance costs	□ Meetings and directors' costs
	■ Production support costs	□ Supervisor costs and travel
Governance/Audit	■ Board/AGM minutes	-
	■ Sub-committees	-
Statutory compliance	■ Statutory audit, annual return	-
	■ IT return, tax audit, TDS return	-
	■ ST return	-
Financial health	■ Trial balance, balance sheet, profit and loss account	□ Gross profit
		□ Net profit
		□ Buyers' outstanding
		□ Working capital
		□ Stock in hand

29 Working capital - Lifeline of business

Working capital is the money required to run the business. A poultry business needs working capital for:

- Procurement - DOCs, feed, medicines
- Production - work in progress in the grower farms, inventory in stores
- Marketing - stock-in-trade/receivables from the traders

A good estimate of the working capital helps in better planning. However, the calculation depends on how the above business functions are structured – whether an individual handles or the collective handles them. In the case of an individual, the production cost can be taken as the working capital requirement. One can arrive at this by projecting costs on the estimated flock weight sold by the unit.

In case of the collective, the following points need to be factored:

- All producers would not place chicks at the same time
- Chicks feed requirement are different for different ages
- Some raw material stock is required
- Some money would be stuck in the trade channels

- The financial sustainability at different levels - individual producer, service provider and cooperative.
- Institutional viability - values, norms, the member interface with professional management, cooperative-buyer interface.

11.1 Financial sustainability at the individual level

In the model, the individual is only responsible for production and is dependent on the cooperative for all the inputs and marketing of outputs. In terms of financial viability, an individual unit can fail if capacity utilisation is poor or the production efficiency is low. For both these, a proper participant selection, training and quality production support are essential.

11.2 Financial sustainability at the service provider level

Service provider handles roles, such as round-the-clock *para-vet* services, and helps the cooperative in the variance monitoring of production units and lifting of birds. S/he is the most important in the collectivisation or networking of production units. One can get good performance with regular monitoring and skill-building of service providers. Proper remuneration based on output to the service providers is another essential aspect. It is towards this end that the charging of Rs 1/chick to the producer and payment of 0.55 paise/bird sold to the service provider has been built in. One, however, needs to ensure that the remuneration matches the prevailing wage of a skilled worker in the locality. Systems are also required to help producers monitor and demand services from the service provider.

11.3 Financial sustainability at the cooperative level

The cooperative provides all the inputs and outputs. The financial viability of individual units is dependent on the healthy functioning of the cooperative. A cooperative also provides a means to small producers to network and neutralise the disadvantages of small production units. However, producers have little role in day-to-day functions.

30	Break-even level of operations	
Weekly DOC placement	7000	
No. of producers	190	
Volume of ready birds	508 mt	
Annual turnover	172 lakh	

Thus, there is need for systems and processes to ensure that the cooperative continues to work for member interests.

The cooperative requires staff for its functioning, and, thus, needs resources to meet the same. It is very important to design the input and output pricing policy of the cooperative to the members in a manner in which the producer grows and cooperative also grows.

PRADAN's experience shows that if there are no leakages, the cooperative can meet its entire costs on levying a charge of Rs 1/chick to the producer. A sample calculation shows that at a level of 190 producers of 300-birds size with an annual turnover of Rs 172 lakhs generates enough resources to meet the costs of a veterinary doctor, a qualified CEO and other service providers.

12.0 DELINKING PRODUCTION AND ENTERPRISE RISKS

There are some problem areas specific to the broiler industry. The output is the grown-up bird, which is sold in live form. The uniquely perishable nature of the product has created a trade channel hugely unfair to farmers. This being livestock, it is not possible to adjust production to match the unusual or even periodic movements in demand. This leads to high price volatility of the finished output, that is, the ready bird, and, correspondingly, the cost of chicks, which is the key input.

The ways to even out or smoothen the volatility is through creating a system of cyclical correction across batches, that is, the below normal price realisation is offset against past or future above normal price realisations. Linking output prices with input prices in real time, the price of ready bird and chick prices usually correlate positively.

The smallholder farms who can only rear one batch at a time due to constraints of investments and management are unable to manage the above as there is a time gap between the selling of birds and the purchase of chicks. The wherewithal of a system to smoothen the cash flow does not exist with them.

Therefore, the delinking of production and enterprise risks constitutes the key to success of decentralised small-scale broiler farming. This is because the market is so very volatile. Designing an appropriate system is very important; however, more important is how well the system has been understood by member-producers and other

stakeholders. Systems used to insulate the producer from market risks and linking producer margins to productivity are:

- Producers are provided inputs at pre-determined fixed prices and outputs are procured from producers at fixed prices - this internal pricing is insulated from the market vagaries and is so designed to give optimal returns to the producers as also ensure that the cyclical fluctuations are smoothened.
- Producers are paid 'growing charges', which is pre-determined, based on productivity parameters.

A good design process includes producers' participation right from beginning. It helps producers understand the business. The members are also made to interact with trade channels and the inherent logic of individual units to come together and the delinking of production and enterprise risks are made known to them. Considerable focus on the business education of members is, therefore, of vital importance to the success of the smallholder poultry model.

Format 6: Page 1 of Producer book

लाँट नं. बैच नं. हैचिंग तारीख:

सामग्री प्राप्ति का विवरण

डी.ओ.सी			दाना प्राप्ति			दाना वापसी			बैच के मध्य एडवांस		
रसीद नं.	मात्रा	रकम (रु)	रसीद नं.	मात्रा	रकम (रु)	रसीद नं.	मात्रा	रकम (रु)	तारीख	रकम (रु)	उद्देश्य
फ्री											
(1) कुल						(4) कुल					
बुरादा व अन्य						(5) दाना खपत (3-4)					
						दवा					
(2) कुल			(3) कुल			(6) कुल			(7) कुल		

तैयार मुर्गा वापसी का विवरण

(8) कुल सामग्री प्राप्ति (1)+ (2)+ (5)+ (6)=.....

रसीद नं.	तारीख	ग्राहक का नाम	संख्या	वजन		दर रु	रकम (रु)	बैच का हिसाब
				कि.	ग्रा			
								(10) वचत (9) - (8) :
								(11) मार्गदर्शन सेवा शुल्क :
								(12) कार्यशील पुंजी सेवा शुल्क :
								(13) अन्य शुल्क :
								(14) कुल वचत :
								(10) - (11) - (12) - (13)

बैच का उत्पादकता रिकार्ड	
बैच अवधि	:
कुल मरे	:
दाना खपत	:
मुर्गे का वजन	:
एक सी. आर	:
औसत वजन	:
उगव संख्या	:

सदस्य के खाते का विवरण	
15. पिछले बैच तक का शेष	:
07. बैच के मध्य एडवांस	:
14. कुल वचत	:
16. कुल	:
17. बैच में नुकसान	:
18. कुल बैलेंस	:
19. सदस्य द्वारा लि गई राशि	:
20. बैच के अन्त में शेष	:

[illegible][illegible]

मुर्गे का औसत वजन

[illegible]

तारीख	दिन	वजन		टिप्पणी
		कि.	ग्रा	

बैंक का हिसाब

तारीख	विवरण	नामे	जमा	शेष
	ओपनिंग			
	बैंच से किश्त			
	कुल			

मुर्गा रखा या बेचा	नग	वजन	रकम

दाना बच गया	वचन	रकम

आज तारीख ----- को हमारे सामने पूरा हिसाब हुआ ।

प्रोड्यूसर सुपरवाइजर एकाउन्टेन्ट मैनेजर

Format 7: Vehicle/trader indent for lifting birds

कोसला पोल्ट्री सहकारिता मर्यादित, सुखतवा

दिनांक

गाड़ी क्रमांक

चालान बुक नं.

गाड़ी इंचार्ज

ड्राइवर

विल बुक नं.

पिय सुपरवाइजर,

1264

गाड़ी भरवाने की जिम्मेदारी आपकी है। आप इस चिट्ठी में लिखे तरीके से हटकर गाड़ी तभी भरवा सकते हैं जब समिति का फायदा हो रहा है। यदि आपके कारण समिति का नुकसान होता है तो इसकी भरवाई आपसे की जायेगी।

क्र.	व्यापारी	एवरेज	नग	वजन	दर	संभावित प्रोड्यूसर	सुपरवाइजर

मार्केटिंग इंचार्ज

कृपया गाड़ी भरते समय निम्न बातों का ध्यान रखें

- प्रोड्यूसर को यदि फायदा हो रहा हो तभी गाड़ी भरवायें
- जहां तक हो सके प्रोड्यूसर का घर खाली करने की कोशिश करें।
 लोक व्यापारी या समिति की दुकान पर 10-15 मुर्गे / 40-50 कि. ज्यादा जा सकते हैं।
- संभावित प्रोड्यूसर की जानकारी आपके द्वारा दी गई साप्ताहिक रिपोर्ट पर आधारित है, इसमें आप वस्तुस्थिति देखकर फेरबदल कर सकते हैं।
- कृपया एवरेज का ध्यान रखें, व्यापारी इसके अनुसार दिक्कत करते हैं।

नोट

कृपया गाड़ी भरवाने के बाद सुपरवाइजर इसे अपने पास ही रखे तथा ऑफिस में जमा करायें।

Format 8: Production monitoring format

क) उत्पादन प्रगति रिकार्ड (7-35 दिन चूजे वाले सभी प्रोड्यूसर, 35 दिन से ज्यादा उन प्रोड्यूसरों के जिनके यहां कुछ शिकायत है।)

[illegible]

Format 8.1: Indent for DOC & ready birds

ख) घूजे डालने के लिए शोड तैयारी का रिपोर्ट
कृपया सभी खाली शोड के बारे में जानकारी दें

[illegible]

ग) मार्केटिंग के लिए दियार भर्ने की जानकारी

क्र.	एयरज	प्रोड्यूसर का नाम (मुर्ग संख्या)	कुल नग	प्रोड्यूसर जिनके यहां से परेशानी के कारण मुर्ग निकालना जरूरी है			प्रोड्यूसर जिनके यहां से बार गायी लग चुकी	नोट
				कार्म पर बीमारी	घरेलू समस्या	अन्य कोई समस्या		
S	1000-1200							
S+	1201-1400							
M-	1401-1600							
M+	1601-1800							
L-	1801-2000							
L	2001-2300							
L+	2300-							
कुल प्रोड्यूसर								

सुपरवाइजर के हस्ताक्षर



Mastering production

1.0 INTRODUCTION

The genetic potential of the new breed of broiler birds can be fully harnessed through proper feed, health care and overall management by the grower.

Besides preparing the broiler house and making all arrangements for receiving chicks, there are many management practices, which must be followed to obtain good results. Some of these points are discussed here, as experience has shown that farmers tend to neglect them and consequently get poor results.

It is possible to grow broilers of desired weight with good feed efficiency in 42–45 days, provided the finer points of management are followed. Using these management practices will help to minimise mortality, get good weights and very good feed conversion. With greater competition in the business, it is efficiency that counts and the grower must give attention to all the management points in order to remain in this profitable business for a long time.

Good broiler production depends on meeting the basic requirements of the birds based on a well-designed management programme. Thus, a controlled systematic and efficient management programme is the key to successful poultry husbandry. The different component activities and important learning tips are discussed in detail in this chapter.

2.0 PREPARATION FOR THE PLACEMENT OF CHICKS

- The shed should be washed with clean water preferably using a sprayer.
- The floor is to be soaked with 10 per cent sodium hydroxide (NaOH) overnight for virus

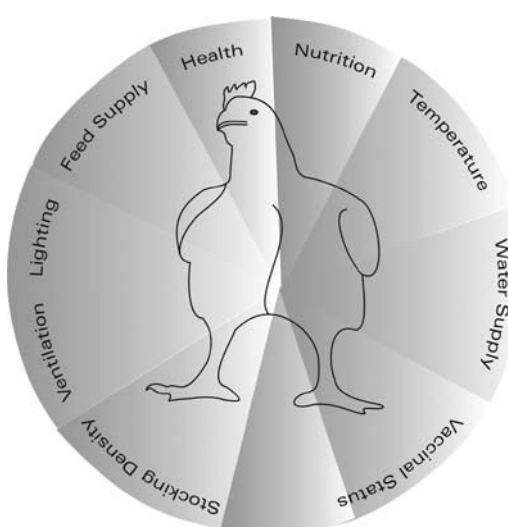


Fig.14: Factors that affect broiler growth and quality

inactivation.

- The floor should be cleaned with water containing 10 per cent phenol and 5 per cent copper sulphate.
- Curtains used for covering the sides of the shed should be soaked in boiling water with phenol and then dried exposing it to sunshine



Fig. 15: Use of flame gun for cleaning

31 Preparing the solution for whitewash

Content	Quantity
■ Lime powder	■ 6kg/300square feet
■ Copper sulphate	■ 3%
■ Kerosene	■ 1%
■ Formalin	■ 5–10%

Make a paste and apply on the floor and sidewalls.

for a reasonable time.

- Feeders and waterers should be treated with boiling water by using caustic soda and mild hydrochloric acid or iodophor compound (Acifer) for a few minutes followed by usual washing. After cleaning, sun dry the equipments for a day or two.
- Burning of the floor, sidewalls and the chicken wire mesh with a flame gun will kill most microbes. There is no alternative to heat treatment, as it kills all the germs.
- The shed is to be whitewashed with a solution containing lime powder, copper sulphate, kerosene and formalin.
- Arrange all the equipment inside the shed, spread litter material, prepare brooder ring and fix the curtains on the open sides to insulate the brooder house.
- The shed is fumigated with potassium permanganate and formalin.
- Use formalin 5–10 per cent or good quality terminal disinfectant at a recommended concentration and for the required contact period. For example, Omnicide @7ml/lit of water can be used as a terminal spray prior to chick placement.
- Provide foot dips in front of the entrance of the sheds and fill it with lime powder or any other disinfectant solution.

32 Fumigation method

- Fumigation is done with 40 gm of potassium permanganate and 80 ml of formalin for 100 cubic ft area. Keep the shed closed for at least 12 hours after fumigation. Spraying the shed with 5 per cent formalin prior to fumigation gives better results.
- Fumigation is effective in poultry houses, which are reasonably airtight. Close all openings and fumigate while the shed is still wet.
- Fumigation should be done under the strict supervision of a village supervisor.

2.1 PREPARATION OF A CHICK GUARD

The chick guard may be an aluminum sheet, 1½ ft in height and 20–25 ft in length for 300– 400 birds.

- The chick guard should be ready prior to fumigation to make it germ free.
- Arrange the chick guard in a circular manner. Increase in the number of corners increases the chance of huddling and mortality.
- Fill sawdust and/or rice husk inside the ring up to 4 inches as a soft bedding to the day-old chicks.
- Spread 5–6 layers of newspaper sheets on the litter.
- Put the brooder (heating arrangement), may be a sigri or a gas brooder in the centre of the chick guard.



Place the germ free chick guard in a circular manner



The sigri should be kept in the centre of the chick guard

2.2 INDUCTION OF CHICKS

- Light the firewood/coal or gas brooder an hour prior to the arrival of chicks so that ring temperature reaches 90–95° F.
- Count the chicks properly while receiving and releasing.
- Release the chicks inside the chick guard after dipping their beaks in water.

33 Receiving the chicks

Since the demand for good quality day-old broiler chicks is high, the producers should order and book their requirement of chicks sufficiently in advance, confirming the exact date, time and mode of arrival of chicks and accordingly prepare the broiler house.

The vehicle used for the transport of chicks should be properly disinfected at a central place prior to sending it to villages for delivery.

Before receiving the chicks, keep clean, safe, sanitised drinking water or boiled and cooled drinking water containing 1 g glucose and 1 g electrolytes per litre of water, vitamins and a mild antibiotic as per the recommended dose. The chicks will drink this medicated water, soon after they are placed inside the chick guard. Immediately after receiving the chick boxes, check whether the hatchery seal, packing, etc. are intact. If any tampering or malpractices are noticed, immediately bring it to the notice of the suppliers.

Gently transfer the chicks from the chick box into the brooder and count the chicks. Dip the beak of the chicks in the drinking water and place them gently near the heat source.

Once the chicks start drinking the water, sprinkle the broiler prestarter, starter mash or crumbled feed in the feeders or shallow trays and watch how the baby chicks are taking the feed. A well-balanced broiler starter mash or crumbs may be given to the chicks on the first day itself, for faster growth rate.

Observe the movements of the chicks inside the chick guard. The chicks should be active, move freely, scratch, take the feed and water and make chirping noise. If the chick distribution is not uniform, correct the brooding temperature and ventilation accordingly.

Return the weak chicks, if any, immediately or destroy them. Dispose off the dead chicks and intimate the short supply, if any, immediately to the suppliers, requesting them for replacement.

- Wait for some time to allow the chicks to drink water and keep feed in a feeding tray. Do not sprinkle feed on papers as it gets contaminated.
- For the first three days, watch the chicks at 2–3 hours intervals, whether they have taken feed and water properly.
- Remove and replace the top paper layer daily and remove wet litter, if any, immediately from the bed.
- Alert the chicks at periodic intervals as it facilitates faster yolk absorption in the first week.

3.0 BROODING MANAGEMENT

A newly hatched chick has not developed the mechanism to regulate its body temperature. Therefore, it cannot maintain the body temperature properly for the first few weeks and may be subjected to chilling, if not properly taken care of. Hence, artificial brooding is mainly aimed at providing the right temperature to the chicks.

Thus, brooding helps to provide extra heat, from external sources, to the newly born chicks. This is not to prevent them from huddling/piling, which is only an incidental benefit.

If heat is not provided from an external source,

the chicks won't take sufficient feed and water. It leads to the retardation of growth and the poor development of visceral organs, such as liver, pancreas, spleen, which are responsible for digestion. Thus, the chicks won't be able to digest the yolk completely. Egg yolk is highly nutri-

tious. If egg yolk is not absorbed completely by the chick, there would be growth and multiplication of bacteria on the yolk leading to Early Chick Mortality (ECM) and growth retardation. This condition is termed as omphalitis (yolk infection).

The recommended brooding temperature is pro-

Table 17: Recommended brooding temperature for broilers

Days	Temperature	
	Centigrade (°C)	Fahrenheit (°F)
1-7	35.0	95
8-14	32.2	90
15-21	29.4	85

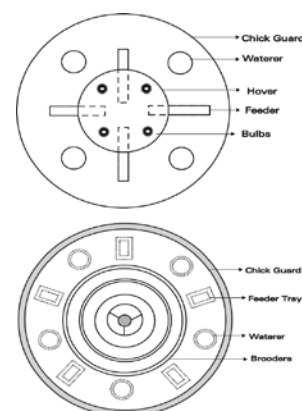


Fig. 16: Arrangement of feeders and waterers under the brooder

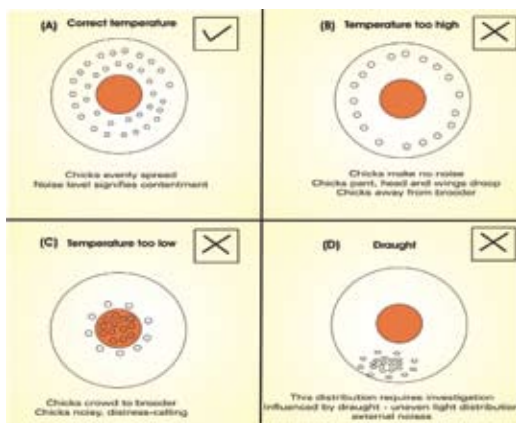
vided in the following table.

Note: The ideal brooding temperatures are as measured at the edge of the hover and 5 cm above litter surface.

Evening is the best time to observe the chicks and make temperature adjustments. During this time, respiratory problems or vaccination reactions can also be noticed.

Thermometers often do not work correctly and may vary a few degrees. Therefore, in addition to using the thermometer, use the behaviour of chicks as a guide since they will indicate by their actions whether they are comfortable or not.

Fig. 17: Brooder comfort and the distribution of chicks



In addition to temperature, adequate floor, feeder and water spaces, relative humidity (RH), ventilation and light should be provided for optimum comfort and growth of chicks. There should be free moving space all around the feeders and waterers, so that the chicks can take the feed and water comfortably.

4.0 CHICK MORTALITY

In the early stages, broiler birds are quite delicate. Some common diseases in the early stages include omphalitis, pullorum and colibacillosis. It is important to know the reasons of early chick mortality as they can be prevented or the supplier can be made accountable for such losses due to mortality. Some reasons for early chick mortality are:

- **Poor brooding conditions** – high brooding temperature leads to dehydration, gout and vent pasting, whereas low brooding temperature leads to chilling or brooding pneumonia or omphalitis ultimately leading to smothering and death.
- **Poisoning of feed** – fungal and other toxins, excess salt in drinking water leading to toxicity, ammonia, carbon monoxide and carbon dioxide poisoning, litter poisoning (ingestion of toxins such as tannins in saw dust).
- **Injuries** – rough handling and prolonged transportation stress.
- **Starvation** – inadequate spacing, less number of feeders and waterers.
- **Humidity** – high/low RH in the broiler shed.
- **Nutritional deficiency** – inadequacy or non-availability of vitamin A, D3, E, C, B-complex and essential amino acids such as lysine and methionine.
- **Genetic disorders** – the chicks could be simply weak and deformed and can die early. The genetic causes of early chick mortality could be congenital problems where chicks die within a week and in the case of 'tremor' symptoms they may die within a month.
- **Predators** – depletion and damage due to attack by predators such as cats, snakes, etc.

34 LPG gas brooders

LPG gas brooders give much more uniform heat as compared to conventional brooding devices such as electric lamps/coal or wood-based heaters. The radiant gas brooder creates the right type of micro-climate for the chicks, so that they have the most comfortable warmth all the time. This results in uniform growth and weight gain. LPG gas brooding can be done by individually controlled infrared radiant gas brooders. The brooding system with a temperature control device helps in saving energy and to meet precisely the changing heat requirement of the birds in accordance with their age.

The infrared radiant brooder can be placed 90 to 130 cm above the ground level depending on the heat requirement. The number and types of gas brooders can be decided as per the manufacturer's specifications. It is very important to note that the gas brooder selected spells out the specifications in terms of BTU, KW rating or operating pressure. It is always safe to select the brooder, which has an international quality mark for safety and reliability. The temperature can be sensed by a sensor connected to individual gas brooder.

Before chicks arrive ensure that the filled LPG gas cylinders are kept ready at the site.

- Maintain a temperature of 32° to 34° C on day one.
- Measure the same at 10 to 25 cm above the litter level.
- Lower the temperature approx. by 3°C per week until you reach a temperature of 25°C.

35 Mortality of broilers at different stages

■ First week mortality:

This may be due to incubation faults, brooding errors and faulty transport. Faulty brooding arrangement may also result in heavy mortality. Incubation faults include excess humidity in the final stages of incubation resulting in pot bellies and unhealed navels. Infection also might have set in, resulting in a condition called omphalitis. In such cases, when chicks die, one can see the unabsorbed yolk in the belly.

Transportation faults may lead to disastrous results. If packing material is not properly disinfected, it may lead to infections. This is more so especially in monsoon when packing material has been seen to carry fungus, which can affect chicks. Congested packing and incorrect time of transport must be avoided to reduce stress on the chicks. The vitamin and /or mineral deficiency in breeder flock causes lameness in chicks.

■ Second week mortality:

Mortality during the second week is mostly due to bacterial infections contacted at birth or immediately after the placement, for example, salmonellosis, a disease, which is transmitted from parents to chicks and colisepticemia. These diseases can also be contacted during transit and immediately after placement, if the farm has infection and the cleaning is improper.

■ Third to fifth week mortality:

Mortality due to viral infections and feed deficiency sets in after the third week. Viral infections, which can cause severe mortality, include ranikhet, gumboro, infectious bronchitis and Marek's disease. Diseases, such as coryza and chronic respiratory diseases, are commonly seen after completion of the third week.

■ Finishing stage mortality:

Mortality during the finishing stage may be due to an outbreak of various infections. The hot weather conditions at the farm also results in heavy mortality. Vigorously growing birds in the finishing stage are easily affected when economic losses could be very severe. Toxicity is a major cause of mortality in marketable birds especially in the rainy season.

5.0 LITTER MANAGEMENT

Litter is a soft, fibrous material harmless to the birds and which can easily absorb moisture. Broiler birds need to be reared after spreading a suitable litter material on the floor. This litter bedding helps to avoid leg weakness, breast blisters, ammonia smell, soiled feathers and other rearing problems.

Various agro-industrial byproducts and waste products can be utilised as litter material. Some of the

commonly used litter materials are saw dust, paddy husk, chopped straw, coir pith, etc. The choice of the litter material mainly depends on the cost and local availability.

Normal dry litter contains 20 to 25 per cent moisture. The objective is to maintain litter in a dry condition. Whenever it holds more moisture, it becomes caked. Therefore, additional ventilation and the removal of wet or caked litter is important, so as to maintain litter quality. Replenishment of

36 Qualities of a good litter material

- It must be cheap and locally available.
- It must be non-toxic, inert and compressible.
- It must be soft, light in weight and should have medium-sized particles.
- It must be free from mould growth.
- It must be free from sharp objects and other harmful materials.
- It should possess good insulating properties and protect chicks from extremes of climate.
- It must absorb moisture from droppings quickly and absorb minimum moisture from the atmosphere.
- It must release moisture and dry up rapidly and have least tendency for cake formation.
- It must be amenable for the birds to scratch and play in the litter as otherwise they may develop vices such as pecking due to boredom.
- It must be biodegradable and form good quality manure later.



Proper litter management helps to avoid various diseases and rearing problems

37 Factors affecting litter quality

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fresh litter will help in maintaining proper litter condition. It is to be ensured that litter is not dusty as it can be harmful to birds.

As litter is the bedding material for rearing, attention should be given to the litter hygiene of a poultry farm. The following points should be kept in mind for proper litter management:

- Coarse litter has low water absorption capacity whereas fine litter causes respiratory problems.
- Ideal litter should be a mixture of paddy husk and saw dust with uniform particle size, loose and not caked.
- The litter must be of 3–4 inch thick. In summer it could be reduced to one-inch depth.
- The litter should be added with dehydrated lime@2 kg/100 sq ft area to neutralise the uric acid excretion by birds.
- The litter should be stirred at least once a day to keep it dry. Wet litter should always be replaced with fresh litter.
- Never reuse old litter for new batches.

5.1 Dry and wet litter problems

Dry litter predisposes birds to respiratory infection because it acts as a vehicle for many micro-

organisms. In wet litter, ammonia is produced from uric acid breakdown by bacterial action. Ammonia levels of more than 20 ppm have a negative effect on broiler performance. It damages the membrane of the respiratory tract and predisposes birds to respiratory infection. It also causes eye irritation. Prolonged exposure to high levels of ammonia (more than 50 ppm) causes blindness.

The causes, effect and prevention measures of dry and wet litter problems are given in the table no. 18 (on the next page).

6.0 MANAGING FEED

Feed is the single largest item of expenditure, accounting for nearly two-thirds of the total

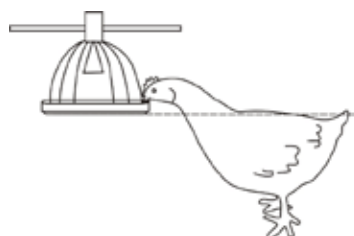


Fig. 18: Adjustment of feeder height

expenditure in broiler production. The expenditure on feed can be reduced by minimising the feed wastage and by proper feed management.

Table 18: Problems related to litter condition

	Dry litter problems	Wet litter problems
Causes	■ Low humidity	■ Poor drinker management - drinkers too low or too full leading to spillage of water, leakage in drinkers, etc.
	■ High temperature and excessive ventilation	■ Bird density - overcrowding and inadequate ventilation
	■ Litter of small particle size	■ Feed - dietary changes such as high intake of minerals, mouldy feed, high fishmeal, old feed, etc.
	■ Combination of all these factors	■ Age of litter - old, used litter loses its moisture absorption capacity
		■ Weather - rain, fog, high ambient humidity, etc.
		■ Diseases such as bacterial or viral enteritis, etc.
Effect	■ Aspergillosis and air sacculitis	■ Downgrading of carcass such as breast blister, burn footpad and skin, leg problem, etc.
		■ Increased fly population leading to maggot wound in birds
		■ Coccidiosis, brooder pneumonia in young birds, E.coli and CCRD
Prevention	■ Adding moisture to the litter in dry climate	■ Frequent raking of litter
	■ Using better quality litter material	■ Proper ventilation
	■ Adding litter additives - Magnesium chloride (hygroscopic material)	■ Managing the waterers
		■ Proper medication to prevent diarrhoea
		■ Frequent removal of wet/caked litter
		■ New litter mixed with dehydrated lime powder@2kg/100 sq ft area, which will act as water absorbent

Note: The breeder should use a pair of sandals exclusively for the broiler shed to avoid contact with high nitrogenous wet litter, which reacts with the skin and has a harmful effect.

6.1 Providing feeders

The feeding management process starts with providing sufficient number of feeders of proper size. One automatic hanging feeder (8 kg capacity) for every 40 birds would be required. The feeders should be uniformly distributed in alternate rows parallel to the waterers, so that a bird need not walk more than two metres to reach the nearest feeder.

Since the broilers are fast growing, they need at least two or three different size feeders, to suit their body size. Moreover, the height of the feeders must be adjusted in such a way that the brim of the feeder must be at par with the back of the birds. Proper height of the feeders will encourage comfortable feeding, without any spillage and wastage of feed. If the height is too low, there will be excess feed wastage. On the other hand, if

the feeders are kept high, the birds may not be able to take feed properly, leading to poor growth rate. This results in weak birds and lack of uniformity in the flock.

In automatic feeders, the feed will be flowing continuously as the birds eat it and there will not be any over flowing and wastage, if they are properly adjusted.

The manually filled feeders should not be filled to full capacity, because it leads to feed wastage. Moreover, the birds may be reluctant to take the stale feed accumulated in the feeders. Further such stale feed will also lead to various health problems and poor growth rate. Therefore, the manual feeders must be filled at least three times a day, to only two-thirds of its capacity. This will not only prevent feed wastage, but also make the birds take several fresh meals a day, leading to better growth and

development.

While filling the feeders, remove the caked up feed, feathers, litter, etc., if any, and then transfer the feed into the feeders, taking care to fill up not more than two-thirds of the capacity. Mix thoroughly the old left over feed and the new feed in the feeders to ensure its full utilisation.

6.2 Feed requirement

The feed requirement of broilers will increase rapidly with age as shown in the following table.

Table 19: Feed requirement for a broiler unit of 300 birds

Age (Days)	Body weight (g)	Cumulative feed requirement		
		Feed/ Bird/ day(8)	Per bird (gm)	For 300 birds (kg)
7	160	22	154	46.2
14	400	45	469	140.7
21	700	70	959	287.7
28	1100	100	1659	497.7
35	1500	118	2485	745.5
42	2000	145	3500	1050.0

Note: Feed requirement as given above is based on performance standards, under good management conditions assuming an FCR of 1.75. Actual consumption could vary with breed, season, rearing conditions and quality of management.



6.3 Storage of feed

- The godown should be well ventilated and there should not be any water leakage from the roof or wall. Feedbags should be kept at least one foot away from the sidewalls.
- Feed should not be stored on the floor as it has possibility of dampness. It should be stored on wooden planks with tarpaulin on it.
- The godown should be rat proof. Rats not only damage feed but also carry lot of diseases for poultry.
- Feed should not be stored for longer periods (not more than two weeks).
- The feed should never be stored inside the

poultry farm as there is every possibility of feed contamination.

6.4 Tips on feeding

- Feeders should be cleaned regularly to prevent any mould growth.
- The feeders should be kept near the drinker so that the birds don't have to walk much to get the feed.

38 Feeding during hot weather

Since broilers have to grow faster and attain market weight in the shortest possible time, they must be fed continuously with good quality feed, without any interruption. However, in hot climates, where the environmental temperature exceeds 37°C, that too associated with high RH (above 60 per cent), the broilers over 1 kg body weight, may not be given feed during hot hours, to prevent deaths due to heat stroke.

In case of automatic feeders with winches, lift the feeders up, beyond the reach of the birds, during hot hours and bring it down in the evening. In case of conventional manual feeders, keep the feeders empty during hot hours.

In order to encourage normal feed intake during hot weather, change the feeding timings to 4, 17 and 22 hours, so that more feed will be consumed during night time.

- The height of the feeder should be adjusted at par with the level of the back of the bird so that birds eat while standing. Taking feed while sitting results in poor digestibility.
- The feeder should be filled up to two-thirds only to avoid wastage.
- The leftover feed in feeders should never be thrown in the litter as birds may pick it up.
- The broiler birds should never be underfed except if there are incidences such as ascites, diarrhoea, gout and high temperature.
- The required feed in a day may be provided in 5 to 6 split meals at short intervals. The short period without feed will stimulate appetite and birds remain quiet during this period.
- Avoid overfilling and spillage of water on the litter. This will lead to wet litter condition and ammonia production, which predisposes the birds to various respiratory infections.
- For adequate feed intake, availability of drinking water is essential. Like feeders, the waterers also must be uniformly distributed in the poultry shed. Preferably, the waterers must be kept in alternate rows with feeders; so that a bird need not walk more than two metres, to reach the nearest waterer.

7.0 WATER MANAGEMENT

Water is the most essential requirement for all animals. Clean drinking water should be provided to the broilers round the clock from day-old stage to disposal stage.



Clean drinking water must be provided to the birds

As water makes up 60–70 per cent of the body weight, even a 10 per cent loss through dehydration and excretion results in serious physical disorders. Death results when about 20 per cent of the body water is lost. Water is necessary for all life process such as digestion, metabolism and respiration.

- A water space of 3 to 8 cm per broiler depending on their age, one drinker (3 litre capacity) for 50 chicks, has to be provided for comfortable water consumption. It should be replaced by tubs and grills (5 litre capacity) - one pair for 30 birds after the 14th day.

39 Water - the most important requirement

A steady supply of clean, cool water is vital for poultry operations. Water performs the following important functions:

- Moving the feed through the digestive system of birds
- Digestion and absorption of nutrients
- Transfer of nutrients to different organs
- Completion of many chemical reactions in the body, which are necessary for the formation of meat
- Removing waste and toxic substances
- Lubrication of joints
- Maintaining body temperature, particularly in a hot environment

Water deprivation, in young chicks, for a short time causes high mortality and affects growth. The electrolyte balance of the body fluids is disturbed due to deprivation and this imbalance gets worse when birds return to water. Sufficient water allows the birds to maintain a mineral balance and eliminate potential toxic elements from the body.

7.1 Water requirement

Water consumption is higher during summer based on the ambient temperature. The thumb rule for determining the approximate water consumption is:

Consumption of water in ml = consumption of feed in gm x 2

In summer, water consumption may increase to 3–4 times based on the ambient temperature.

At 20°C, a broiler will consume water, which will roughly be two times that of the feed. But as the temperature increases, the water intake also goes up proportionately. The approximate daily water consumption by broilers in open sided tropical broiler houses at different temperatures is shown in the following table.

Table 20: Water consumption for 300 birds (litres/day)

Age (weeks)	Temperature				
	20°C	25°C	30°C	35°C	40°C
1	13	15	16.5	18	19.5
2	27	28.5	30	33	36
3	42	46.5	52.5	58.5	67.5
4	60	66	75	84	93
5	70	77.5	88	97	106
6	87	96	108	117	129

Note: Values are for broilers reared on deep litter and fed with all mash diets containing 3000–3200 kcal M.E./ kg diet.

7.2 Water quality

Water samples should be periodically analysed. If the bacterial count is above the permissible level, it is advisable to sanitise the water. Take water samples and get them tested at a laboratory. Use a sterile bottle for collecting the water sample for testing.

**Vaccination of 7 day old chick against New Castle****Table 21: Water quality standard for broilers**

Particulars	Maximum permissible limits
■ Number of bacteria/ml	□ 10–15
■ Number of coliforms/ml	□ 0
■ Organic substances	□ 1 mg/ litre
■ Nitrates	□ 0–15 mg/ litre
■ Ammonia	□ 0 mg/ litre
■ Cloudiness/Turbidity	□ 5 U
■ Iron	□ 0.3 mg/ litre
■ Manganese	□ 0.1 mg/ litre
■ Copper	□ 1 mg/ litre
■ Zinc	□ 5 mg/ litre
■ Calcium	□ 75 mg/ litre
■ Magnesium	□ 50 mg/ litre
■ Sulphates	□ 200 mg/ litre
■ Chlorides	□ 200 mg/ litre
■ Fluoride	□ 1 mg/ litre
■ pH	□ 6.8–7.5

One should always use a good quality water sanitiser. It should be used in the recommended dose and for sufficient contact period prior to providing the water to the birds. It will help to minimise bacterial load in water and, thus, reduces the incidence of water-borne infections. If the water is alkaline in nature one can use an acidifier to reduce the water pH. This will discourage the growth and multiplication of gram-negative bacteria, such as E.coli, Salmonella, in the gut.

8.0 VACCINATION AND MEDICATION

Though hybridisation in broiler breeding has made them grow faster with better feed efficiency, they also in this process become more delicate and highly susceptible to various poultry diseases.

Hence, utmost care must be exercised to minimise the mortality and morbidity. It is better to prevent poultry diseases rather than treating them, because treating is not only costlier but also the disease outbreak causes major economic loss in the form of poor growth rate, feed efficiency and mortality.

8.1 Immunity and vaccination

Immunisation is the process of protecting the bird against disease by means of vaccines or serums. Vaccines provide immunity by causing the body to manufacture disease-fighting substances called antibodies. Serums furnish immunity by adding antibodies directly to the blood. There are two types of immunisation. Active immunisation involves

the use of vaccines while in passive immunisation serums are used. It is the active immunisation method, through the use of vaccines, which forms the vital component of broiler health management. The vaccination programme for commercial broilers is given below.

- 5–7 days of age: Newcastle disease or ranikhet disease vaccine - Fuller's (RDVF) or Lasota (RDVL) strain (Lentogenic) to be given by the oculo-nasal method (one drop each in the eye and nostril).
- 14th day: I.B.D. or gumbro disease - live Georgia or IBD plus strain vaccine by eye drop or drinking water method.
- 21st day: ND or R.D. Lasota vaccine through drinking water.

- Other vaccines may be administered, depending on the need and availability of the vaccine.

It is important to follow instructions of the supplier very carefully. Vaccination failure could become lethal for the farm. The maintenance of cold chain and the proper disposal of the ampoules and diluents are very critical.

Minimise stress during vaccination by handling the birds gently and avoiding vaccination during extremes of weather. Further, avoiding over crowding and trampling during vaccination is important. Administer anti-stress drugs through water during and after vaccination for 3 days. One should use Vit E/Selenium 3 days prior and after vaccination, if the situation is acute and challenging.

40 Care during vaccination

- Vaccinate only healthy flocks.
- Do not vaccinate during very hot and very cold weather conditions.
- Store vaccines in a refrigerator at or below 4°C. Keep the vaccine under frozen/chilled condition until inoculation to the bird, duly maintaining the cold chain.
- Never expose the vaccine to direct sunlight.
- Never use frozen diluents.
- Keep diluted vaccine in cool condition.
- Use the diluted vaccine within one hour of preparation.
- Destroy the leftover vaccine, along with its container - by boiling - and dispose them off safely.
- Dispose off the empty ampoules by burial.
- Minimum six to seven days gap should be given between two vaccinations.
- Do not vaccinate in early stages (within 10 days) through drinking water.
- Always use a sterilised syringe or a pre-sterilised disposable set. Sterilisation can be done either by boiling the set in water or using chemical disinfectants.
- Note down the brew number, expiry date, name of the manufacturer, dealer and other details regarding the vaccine for claiming loss if any due to faulty vaccine.
- Stick the vaccine label in the flock record book/sheet on the day of vaccination.
- Vaccinate all the birds in the shed in one go.

41 Vaccination by drinking water

- Stop the application of the water sanitiser for 12 hours before and after vaccination.
- Withdraw drinking water two hours prior to vaccination (one hour during summer).
- Scrub waterers thoroughly to remove all dirt and slime.
- Use clean water free from chlorine or other disinfectants.
- Add skim milk powder @ 5gm/lit of water and leave for 30 minutes. It will neutralise chlorine and act as a stabiliser.
- Add ice to the water to cool it, if necessary.
- Handle the vaccine properly. Attention should be given to maintaining the cold chain.
- Add the vaccine in water and distribute evenly in all the drinkers.
- Burn or disinfect all used and opened vaccine ampoules to prevent accidental cross contamination.
- Provide vitamin A, D3, E, C and B-complex on the day of vaccination.

The term **immunity** refers to the bird's ability to resist certain diseases, poisons and toxic substances. Like all other animals, poultry birds also have a mechanism in their bodies to fight **pathogens**. A pathogen is a disease-causing organism such as bacteria or virus. A virus or other foreign substance in the body that triggers an immune response is called an '**antigen**'. A type of protein that attacks foreign invaders, such as bacteria and virus, in the body is called an '**antibody**'. All the steps that the **immune** system takes to destroy foreign invaders are called the immune **response**.

The process of protecting the body against diseases by means of '**vaccines**' is called vaccination. A vaccine contains substances that stimulate the body's immune system to produce antibodies against a particular infectious disease. In fact, many vaccines contain the very same pathogens, which cause the disease, but in a weakened or killed form, which when injected in to the body of the bird triggers an immune response. There are two forms of immune responses; the **humoral immune** response and **cell-mediated immune (CMI)** response. The word 'humoral' refers to the body fluids that carry the antibodies.

The immune system is a complex mechanism that involves specialised cells called lymphocytes produced in two specific organs in the bird's body called **Bursa** and **Thymus**. Depending on the organs from where they are produced the **lymphocytes** are called B-cells (Bursa) and T-cells (Thymus). **Macrophages** are yet another type of specialised cells, a part of the immune system, which engulfs pathogens.

Another organ involved in the immune system is the **spleen** to which B-cells migrate to produce antibodies on stimulation by an antigen. This is referred to as humoral immunity. In the later stage of the chick's life B-lymphocytes are constantly produced by lymphoid organs, such as spleen and caecal tonsil, and no longer requires Bursa. The thymus, which is found in the neck of the bird, produces T-cells that work in cooperation with macrophages to kill invading bacteria or virus. This is referred to as cell-mediated immunity. Generally, humoral immunity is the main defence against bacteria, while CMI is critical for protecting against virus.

Active and passive immunity are the two types of immunity that have relevance in the immunisation programme.

■ Passive immunity

Passive immunity, often referred as 'maternal immunity', helps in the prevention of many diseases in newly hatched chicks. This short-lived immunity is passed on to the chicks from the mother via the ovum of hatching eggs through the immunoglobulins. Immunoglobulins are specific proteins (antibodies) produced by B-lymphocytes. In turn, these antibodies protect the chicks from invasion of specific disease-producing bacteria and viruses for the first few days.

When the level of antibodies in the mother hen is high, the same in day-old chicks will also be high. If the mother hen has not been exposed to a specific disease or has not been vaccinated, the chicks would be highly susceptible to that particular disease. The maternal immunity begins to wane after the chicks hatch. Half of this maternal immunity is lost in just three days and by the end of the second week it is almost ineffective. Thus, at best maternal immunity can be considered effective till two weeks of age. This is why the IBD vaccination is performed in broilers in and around 14 days. The maternal immunity is not always effective. Generally, the antibodies present in the yolk get in to the blood stream once the yolk is fully absorbed. However, in diseases that involve the respiratory tract, organisms bypass blood stream, as respiratory tract is a cartilaginous structure with minimal blood invasion and, hence, get away from antibodies. For example, ranikhet disease, in which localised immunity in the respiratory tract is required to protect the birds against the disease. Hence, vaccination is done on the 5th day through the oculo-nasal route to induce localised immunity against the disease in the respiratory tract.

■ Active immunity

The immunity is produced by the bird's immune system after vaccination or on exposure to the external sources of infection. This type of immunity involves the production of both antibodies and cellular immunity, which protect the birds from diseases.

The primary immune response occurs after the first exposure of the bird's immune system to an antigen. It is slow to develop and of a short duration usually lasting for 2 weeks. Hence, booster vaccination is required against ranikhet disease on the 21st day.

Secondary immune response occurs after subsequent exposures to the same antigen and results in the more rapidly developing and long-lasting immune response. Due to the longer duration of the immunity produced by the secondary immune response, the interval between booster vaccinations is longer than that of the interval between the initial and booster vaccination. For example, in ranikhet disease, where after the 21st day booster vaccination with Lasota, next booster is required on the 42nd day, thus, protecting the birds for 3 weeks against the disease.

8.2 Medication schedule for broilers

Unlike vaccination, there is no universal medication schedule. It varies depending on the health status of the birds and the cost efficiency and availability of the medicines.

The medicines commonly used in poultry are of two major types namely tonics and growth promoters and drugs to counteract infection (antimicrobials).

The tonics include vitamins, minerals, amino acids, protein hydrolysate, liver correctives, appetizers, hormones, enzymes, immuno stimulants, anti-stress factors, herbal preparations, liver extract, fermentation products, unidentified growth promoters, flavouring agents, pigments, probiotics, anabolic agents and similar products or their combinations. These are administered to the birds with the major objectives of improving the growth rate, feed efficiency, and livability and to prevent disease outbreaks.

The drugs are usually scheduled preparations such as antibiotics, antimicrobials, furazolidone compounds, sulpha drugs, trimethoprim, deworm-

ers, coccidiostats, antiserum, antifungals or their combinations. These are given either as preventive or curative measures against bacterial, protozoan, fungal infections and parasitic infestations.

8.3 Administering the medicines

The medicines to poultry are administered either through feed or drinking water, preferably by the latter route. Occasionally, the medicines are administered by injection intra muscularly, sub cutaneously and intra peritonally.

Tonics are usually given continuously through feed at low dose or through drinking water once daily or as suggested by the manufacturer or veterinarian. These are invariably given for a period not less than a week. In contrast, scheduled drugs, except the coccidiostats and furazolidones in the feed, are given for not more than a week, usually for five days continuously. The schedule drugs should preferably be administered under the supervision and prescription of a veterinarian.

Most of the non-nutrient growth promoters and antimicrobials should be withdrawn from feed or water 5 to 7 days prior to slaughter. This is neces-

Table 22: Regular medication and vaccination schedule* for broilers

■ Regular medication						
Sl no.	Medicine	Course	Dose (100 birds)	Total qty gm/ml (300birds)	Price (Rs)/ gm/ml	Amount (Rs)
1	Furaltadone	2nd to 6th day	1gm daily for 5 days	15	1.33	20.00
2	B-complex	1st to 3rd day	20 ml daily for 3 days	180	0.10	18.00
3	Vitamin A, D3, E, C	1st to 3rd day	5 ml daily for 3 days	45	0.50	22.50
4	Electrolyte	1st to 3rd day	1gm/2lit of water	10	0.12	1.20
5	Liver tonic	11th to 13th day	15 ml daily for 3 days	135	0.07	9.45
6	Growth promoter	21st to 28th day	10 ml daily for 7days	210	0.19	39.90
■ Regular disinfection						
1	Phenol	Shed preparation	10 ml/lit of water	150	0.08	12.00
2	Copper sulphate (CuSO ₄)	Shed preparation	5 gm/lit of water	75	0.08	6.00
3	Potassium permanganate	Shed preparation	20 gm/100 cu ft	60	0.40	24.00
4	Formalin	Shed preparation	40 ml/100 cu ft	120	0.07	8.40
5	Kohrsolin-TH	Shed preparation	10 ml/lit of water	50	0.60	30.00
■ Regular spraying						
1	Virkon*S	Weekly	5 gm/lit of water	60	1.50	90
■ Regular vaccination						
1	F1/Lasota vac.	5-7th day	2 lit of water	300	0.15	45.00
2	IBD+ vac.	14th day	2 lit of water	300	0.50	150.00
3	Lasota vac.	21st day	2 lit of water	300	0.15	45.00
Total for 300 birds						521.45

* Schedule in practice in the Kesla Poultry Society

sary to ensure that there is no drug residue in the broiler meat, especially in liver, which may be harmful to the human beings, if consumed continuously or in large quantities.

8.4 Drugs incompatibility

Some drugs are not used in combination in treating poultry birds as they can reduce the efficacy of each other or produce some toxic effects in birds. Such drugs, which cannot be used in combination, are said to be incompatible.

A key to profitable poultry keeping is often the accurate and prompt diagnosis of diseases. Not commonly realised is the fact that a disease, which kills even 10 per cent of birds, cuts off all profit. Many a disease problem can be traced to errors in management, as shown in the following examples.

- A faulty brooding arrangement could cause chilling, overheating or asphyxiation.
- Wet patches in deep litter are a predisposing factor for many diseases.

43 A sample list of drugs incompatibility		
Category	Drugs	Incompatibility
■ Anticoccidials	Monensin sod.	Tiamulin, Sulpha's and Erythromycin
■ Antibiotics	Salinomycin	Tiamulin
	Tiamulin	Monensin, Salinomycin, Narasin
	Tylosin	Not used in layers
	Furazolidone	Amprolium
	Tetracycline	Vitamin A, Ca, Mg, Fe, etc.*
	Erythromycin	Monensin, vitamin B complex and C*
	Flumequine	Sulpha drugs
	Amprolium	Inhibits vitamin B1 utilisation
	Enrofloxacin	Neutralised by chlorinated water*
	Antibiotics	Hard water*
	Antibacterials	Damages the probiotics
■ Antimycotoxins	Toxin binder	Bound vitamins, trace minerals, etc.

* incompatibility related to water quality and items other than drugs

44 Minimise outbreak of diseases	
<ul style="list-style-type: none"> ■ Through proper farm sanitation and personal hygiene. ■ Provide balanced feed, free from toxins and enriched with various antibacterial and anticoccidial drugs. ■ Carry out the vaccination programme as per the schedule without any deviation. ■ For the early detection of the diseases, observe the birds regularly, especially at the time of feeding and watering, to notice their general health status, feed intake, etc. ■ Take note of any abnormality in the feed intake, movement and posture of birds, colour of droppings and mortality. ■ Immediately take the dead birds to a nearby veterinarian, specialised in poultry, for the diagnosis and treatment of the flock. 	

9.0 HEALTH CARE AND DISEASE MANAGEMENT

Intensive raising of poultry in commercial farms inevitably exposes the flock to various diseases, which cause morbidity, mortality and loss of production. The need for the development of a disease-free environment in the poultry house and the application of sound management practices, including a vaccination programme, are of utmost importance. Not all losses due to poultry diseases can be avoided but they can be kept at the minimum through disease control and by preventive measures.

- Mouldy grains and contaminated litter can give rise to aspergillosis and many mycotic diseases.

9.1 Disease detection

Despite all possible precautions, diseases do occur. So, a farmer must be alert to detect the first symptoms of a disease for timely treatment. Some of the symptoms that indicate the onset of a disease problem are: drop in feed consumption and body weight, inactivity and lack of vigour; droopy ruffled feathers, respiratory distress, such as gasping, sneezing and coughing, loose droppings and mortality. A list giving the conditions and possible

■ BODY

Stunted, uneven growth: Gizzard impaction
Emaciation: CRD; worms; gizzard impaction
Trembling: RD; gumboro; encephalomyelitis
Incoordination: Gumboro; encephalomalacia; RD
Nervousness: RD; encephalomalacia; MD
Paralysis: Encephalomyelitis; MD; RD

■ HEAD

Cyanosis (Bluish): Fowl cholera
Pale: Anaemia; coccidiosis; worms
Swollen: Fowl cholera; infectious coryza; RD

■ COMB

Cyanosis: Fowl cholera
Pale: Anaemia; fowl typhoid; haemorrhagic disease; spirochaetosis
Nodules, eruptions: Fowl pox
White scaly crust: Favus

■ FEATHERS

Matted with pale mucus: Infectious coryza
Matted with white urates at the vent: Gumboro
Ruffled: E.coli; coccidiosis; thrush
Deposits at base: Lice
Loss: Moulting

■ EYES

Watery discharge: Fowl pox; IB; infectious coryza
Inflamed eyelids: Fowl pox; fowl cholera;
Aspergillosis; Conjunctivitis
Sticky eyelids: Nutritional deficiency (Vitamin A)

■ SKIN

Pale: Anaemia
Wart-like scabs or nodules: Fowl pox; MD (mainly legs)
Dehydration: Non-specific

■ NOSE

Discharge: CRD; fowl cholera; fowl pox; IB; RD;
infectious coryza

■ WATTLES

Lesions: Fowl pox
Scaly crust (scruffy): Favus
Swollen: Fowl cholera; infectious coryza

■ MOUTH

Discharge: Thrush
Gasping: RD; aspergillosis; IB
Pustular: Fowl pox; infectious coryza

■ NECK

Paralysis: MD
Twisted: RD; fowl cholera
Retracted: Encephalitis: RD

■ BREAST

Swollen: Infectious synovitis
Paralysis: Botulism: Encephalomyelitis: MD; RD;
nutritional deficiencies
Scaly and rough: Fowl pox
Displaced tendon at hock: Perosis

■ FEET

Swollen foot pad: Bumblefoot; infectious synovitis

■ CROP

Impacted: Impaction of the crop
Sour: Bluecomb

■ DROPPINGS

Brown: Indigestion
Green: Fowl typhoid; infectious synovitis; lymphoid leucosis
Loose: Coccidiosis; round worms
Greenish-yellow: Fowl cholera; spirochaetosis
Red (blood): Haemorrhagic disease; coccidiosis
Watery White/fluid: IBD; pullorum
Yellow (sulphur colour): Blackhead; staphylococcosis

■ WINGS

Dropping: Fowl cholera; intestinal coccidiosis
Paralysed: MD; RD

■ RESPIRATORY DISTRESS

Coughing: IB; infectious coryza; RD
Gasping: Aspergillosis: IB: RD
Rattling: CRD; IB; RD
Sneezing: CRD; IB; infectious coryza

causes in the general context of poultry diseases is given in the following box.

9.2 Disease control

In the control of poultry diseases, prevention is the aim. The individual treatment of birds is rarely economical to the commercial poultry farmer. The regular use of drugs as a preventive measure and for growth promotion must be done with cau-

tion. As far as possible, greater attention should be given to good management and prophylactic measures.

9.3 Disease transmission

The diseases of poultry usually spread in four ways - carry-over from previous flock via contaminated premises, egg borne, brought on the farm with new stock, or introduced later by natural and me-

46 Sending diseased birds for diagnosis

Sometimes it may be necessary to send a few diseased birds as a sample for disease testing in a specially equipped diagnostic laboratory. The following aspects are to be noted while sending such samples.

- The birds with disease symptoms are to be sent to the lab as live birds. For this purpose you need to send four chicks or two grown-up birds as a sample.
- While sending dead birds, wrap them well in thick sheets of paper and put them in a closed box.

The following details are to be furnished to the lab along with the sample:

- flock size of the farm
- age of the birds
- number of diseased birds on the farm
- mortality - number of birds dead due to disease
- the day and time from when the symptoms were noticed
- observed behavioural changes and symptoms

47 Disposal of dead birds

The immediate disposal of dead birds is an important part of a good disease-prevention programme. One should never leave the dead birds in and around the poultry shed. Dead birds act as a source of disease that can be spread by rats, mice, dogs, cats, flies, etc. to neighbouring poultry sheds.

Various methods, such as incineration, disposal pit and composting, are used for the disposal of dead birds in commercial farms. But in small decentralized farms of the smallholder poultry model, the producers generally dispose the dead birds by digging a pit away from the farm premises. The pit should be at least 2–3 ft deep so that birds can't be exhumed by dogs or other wild animals. One can sprinkle lime powder over the carcass and it should be closed with soil and compacted.

chanical carriers associated with improper sanitation.

9.4 Sanitation and isolation

When disease occurs, destroy and dispose of all dead and dying birds. Use separate pens for sick and healthy birds. Different attendants for sick and healthy birds are desirable. Move healthy birds to temporary quarters and give them priority on care. Clean and disinfect the poultry house and equipment. Wait for 30 days before restocking the birds.

9.5 Disease tracing and treatment

Information on some common clues for tracing the disease, making tentative diagnosis, taking precautionary measures and providing treatment for common broiler diseases is given in Anamnesis key and detailed charts (C1 to C11) annexed to this chapter.

9.6 Bio security in broiler farms

Diseases are produced by microbes or germs, which are invisible and can be seen only under a microscope. In less than a day, a single microbe can reproduce and multiply rapidly enough to a number exceeding that of the number of people on earth.

Keeping these prolific killers off the farm premises is the key to flock's health and to the success of broiler business. It is possible to keep germ-free poultry by using a health plan called 'bio security'. Bio security is of particular importance to intensive poultry production. It covers all possible practices considered indispensable for the economic production of chicken meat or eggs. Poultry production programmes must include many procedures and practices necessary to keep flocks in a healthy condition.

Bio security involves a set of management procedures, which protect the poultry birds from the disease-causing organisms by reducing the introduction and spread of the pathogens into and between the farms. In simple terms, it means keeping pathogenic organisms away from the poultry farm and avoiding all possibilities of the sources of infection.

As a part of strengthening the biosecurity systems one needs to:

- Prevent the entry of the pathogenic organisms into the poultry premises.
- Reduce the microbial contamination of the surrounding areas.
- Totally eliminate pathogenic organisms present within the shed.

48 Biosecurity checklist

	Yes	No
■ Do you actually prohibit access to the broiler house to everyone other than those taking care of the birds?		
■ Do you enter the broiler shed only after changing into clean clothes, including footwear?		
■ Are the footbaths cleaned and refilled with lime powder/ sanitiser regularly?		
■ Do you thoroughly clean and sterilise broiler houses between flocks? Does that include all equipment within the house as well as floor, walls and ceiling?		
■ Do you have an on-going programme for the control and eradication of insects and rodents?		
■ Do you keep wild birds away from broiler house?		
■ Do you keep the area around the broiler house clean and free of anything that may attract mice, birds or other wildlife?		
■ Do you take adequate precautions to prevent the spread of disease from the delivery van and the people who visit for the delivery of chicks and inputs?		
■ Do you dispose dead birds by properly burying them as per the prescribed procedure?		

Note: An ideal biosecurity system would elicit an 'yes' for all the questions.

49 Rodent control in poultry farms

The poultry house and its surroundings are an ideal environment for rodents, such as rats, mice, bandicoots, mongoose and squirrel, due to the availability of hiding and feeding spaces and also, as they are fond of poultry feed.

Rodents cause enormous damage and loss to poultry farms in a number of ways:

- They eat considerable quantity of poultry feed.
- Besides eating 10–15 kg of feed per rat per year, they waste considerable quantity of feed, by way of spillage, defecation, urination, etc.
- Cause damage to the feedbags, curtains, plastic equipment, etc.
- They burrow into the soil and damage the floor and foundation.
- They transmit several poultry diseases as they act as carriers from shed-to-shed. They potentially transmit *E. coli*, which is a major infection in poultry.
- Rats kill and injure weak and baby chicks. A single mongoose is capable of killing several hundreds of chicken over night.
- Their movement during nights will cause panic to birds, which in itself affects the performance of birds in various ways.

Some of the recommended control measures are:

- Construct a rat proof broiler house and feed room.
- Always keep the doors of poultry houses closed.
- Attend to damages in the floor, roof, wall, door, chicken mesh etc. promptly.
- Avoid dumping of gunny bags, junk, litter, etc. in and around the poultry houses, as it will attract rodents.
- Use rodenticides, with care to ensure that these do not get in contact with poultry feed, as it will be fatal to the flock.
- Use rat traps, to check the rat population.
- Remove dead and sick birds regularly, which will otherwise attract rodents.

10.0 EFFECT OF GROWING CONDITIONS

RH, temperature, ventilation and lighting are the critical factors that affect the flock right from the brooding stage till disposal.

10.1 Floor space

Floor space has a significant influence on broiler performance and final product in terms of uniformity and quality. Overstocking will reduce growth, livability, litter quality and leg health. It will increase carcass downgrading due to breast blisters, hock burn, bruising and scratching. Improper space

is also an important reason for poor Feed Conversion Ratio (FCR).

Table 23: Floor space requirement for broilers

Age	Floor space in sq ft per bird
1st week	0.25
2nd week	0.45
3rd week	0.65
4th week	0.85
5th week	1.00
6th week onwards	1.15 to 1.25

10.2 Ventilation

Ventilation is required to maintain temperature and RH at an optimum level and to allow sufficient air exchange to prevent the accumulation of harmful gases, such as ammonia, carbon dioxide and carbon monoxide, which leads to increased susceptibility to various respiratory diseases. Increasing ventilation results in lower temperature in a poultry house and, thus, affects the feed conversion efficiency. Adequate supply of fresh, clean air is just as important as fresh feed and water for broilers.

50 Need for good ventilation

For effective and efficient ventilation, the system should be properly designed, maintained, controlled and operated as per the needs. This will help to provide an environment, which maximises the birds' performance.

The need for ventilation of poultry houses today is greater than it has ever been before. The broiler breeds used today being the ones chosen for rapid growth, their oxygen demand and need for good air quality is much higher compared to conventional poultry birds.

A good ventilation system will help in:

- continuous adequate supply of fresh air and oxygen to the birds.
- removal of foul air, harmful gases such as ammonia, carbon monoxide, carbon dioxide, etc.
- maintaining required correct temperature and humidity as per the age of birds.
- reducing the microbial load of disease-causing infective agents and maintain healthy environment in the poultry house.
- maintaining good litter conditions in the broiler shed.
- optimising the shed capacity in terms of space utilisation.

10.3 Temperature

The low and high temperature limits for chicks are 62° and 117° F, respectively. Temperature is the most important factor influencing feed conversion efficiency. In a cool environment, broilers will eat more feed but many calories will be used to maintain normal body temperature and, thus, FCR increases. At high temperature birds will spend energy to support the efforts to cool itself and, thus, FCR increases. Therefore, providing the right temperature is of utmost importance.

51 Aids for cooling

- The external surface of the shed's roof should be white washed to reduce inside temperature.
- Provide a sufficient 'overhang' of the roof to avoid direct sunlight heating up the walls.
- Use good insulation materials for roof and walls, for example, paddy straw, Thatch' plant leaves, etc.
- Hang wet gunny curtains on the sides of the shed fixed with a gap of 3 ft to the wire mesh and sprinkle water occasionally to get the cooling effect.
- The water tubs should be increased by 25 per cent and cool water should be provided at frequent intervals round the clock.
- Avoid feeding during hot weather (from 11.00 a.m. to 4.00 p.m.). Instead feed during cooler hours preferably at night.
- Add sodium bicarbonate @1kg per ton of feed to reduce heat stress.
- Provide electrolytes with vitamin C during afternoons for rehydration. Antistress drugs, such as Zeetress, should be used in afternoon water to avoid mortality in big birds.
- One can also spray cool water directly on the flock during very hot conditions.

10.4 Humidity

The RH of the brooder house should be above 70 per cent for first three days to avoid dehydration. The RH for the remainder of the brooding period should be above 50 per cent. Low RH also hampers feather growth. If it is high it causes wet litter problem, which leads to coccidiosis, aflatoxicosis and aspergillosis.

10.5 Lighting

Among the various environmental factors, light plays a major role in the performance of broilers.

52 Effect of light on broilers

- The light rays will stimulate the anterior lobe of the pituitary gland, via the retina of the eye, to produce various hormones required for growth.
- Light is essential for the birds to locate the feeders, waters, brooders, etc.
- Light provides more time for the birds to eat, feed and grow faster.
- Light prevents piling, stampeding and trampling of birds and death due to suffocation.
- During brooding, enough light is needed to attract the chicks towards the heat source, to prevent chilling.

Natural solar light and artificial electric or fuel lights are the sources of light to the birds. In naturally ventilated open-sided poultry houses, about 12 hours natural light is available. Artificial lighting is necessary to extend the day length.

The photoperiod of 23 hours and darkness for one hour is required from day one to the marketing stage. The intensity of light should be high during the first week (20 lux) and gradually can be reduced to 10 lux after 3 weeks.



A Well Lit Bird-House



A Well Managed Poultry Shed

11.0 SEASONAL MANAGEMENT PRACTICES

One needs to adapt the management practices for different seasons for consistent and uniform performance. Some tips, from experience, are provided in Table 24 (on the next page).

53 Some tips for successful broiler production

- Isolate the smaller chicks (Runt) and provide them liver tonic and growth promoters for five days.
- More uniformity in the first week means higher live weight and better FCR at the time of marketing.
- More the activity of chicks in the first week more will be the weight gain. It increases the Basic Metabolic Rate (BMR) of the chicks, thus, stimulate feed intake and helps in early dissolving of yolk.
- Higher particle size in finisher feed gives better FCR (maximum 6 mm).
- During the cleaning of feeders and drinkers, remove the dirt first from the centre and then from the corners.
- Provide optimal conditions for broilers - temperature: 18–30°C and RH: 50 per cent.
- Follow good bio security measures and a thorough disinfection schedule in the shed.
- Monitor daily feed intake and water intake by birds – any variance is a sure indicator of coming troubles.
- Look for morbidity and mortality on a daily basis and assess the reasons. Culling the infected birds is very useful.

Table 24: Seasonal management

	Summer	Winter	Monsoon
1	Make the poultry house cool by putting straw/leaves on the roof, hang curtains of gunny bags. One can spray water on the flock itself.	Increase litter thickness to 3.5–4 inch with addition of lime @ 2 kg/100 sq ft of area.	Repair poultry house for any leakages.
2	Provide 25 per cent more space. Reduce litter thickness to 1 inch. To avoid wet litter, add lime @2kg per bag of litter.	Close the side net with plastic curtains, but keep space on top for fresh air to enter.	Plastic curtains are required in the rainy season to avoid wet litter.
3	The water tubs should be increased by 25 per cent.	Lukewarm water should be provided to the chicks in the initial days to stimulate water consumption.	In the rainy season water gets contaminated. One should always use a good water sanitiser.
4	Do not feed during peak temperature. Feed during night. Use lights at night to enhance feed consumption.	During morning and evening provide plenty of water and feed.	Wet litter, if any, should be immediately replaced with dry one and use lime @2kg per bag of litter.
5	Provide electrolytes with vitamin C and antistress drugs. Provide antistress drugs especially in post-vaccination situation. Use sodium bicarbonate in feed to reduce heat stress.	Fungal growth appears more in winter because of poor ventilation. Take preventive measures against ascites, coccidiosis, respiratory diseases and fungal infections.	Diseases, such as enteritis and coccidiosis, may create problem during this season. Feed should contain good quality antimicrobials and anticoccidials in this season.
6	Use wet mash where feed intake is drastically reduced.	Increase energy level in the feed for better results.	Feed ingredients should be well dried and should not contain moisture more than 12 per cent. Feed storage - care should be taken to avoid fungal growth and toxin production in the feed.
7	Provide brooding during late night, as temperature will be < 320 C. The incidence of diarrhoea increases because of E. coli and other enteric bacteria. Water pH should be six and water sanitiser should be used from day one.	Adequate brooding arrangement should be made. Brooding may be required even in daytime when temperature goes down.	Brooding will be required at night. Hence, brooding material must be organised prior to the rainy season.

12.0 PERFORMANCE INDICATORS

The important performance indicators used in broiler farming and their relation to profit, method of computation and some basic standards are provided in the table below. Standards are relative and vary with duration, breed, season and the technology used.

13.0 STANDARD PERFORMANCE PARAMETERS

An example of general broiler performance standards is given below, however, this varies for male and female chicks, as also with breed and season. There is a need to ascertain the performance standards from the chick supplier for straight run,

Table 25: Performance indicators in broiler farming

Indicators	Relation to profit	Computation	Standards
Weight gain	Lower weight gain implies longer duration, lesser batches and, hence, lower annual profits. It is also symptomatic of poor flock health.	Total flock weight/ Number of birds	1100 gm in 28 days
FCR	Captures both mortality and feed consumption. An important cost component, a poor FCR corresponds to poor profits.	Total feed consumed / Weight of live birds sold	1.50
Mortality	This becomes critical to understand - lower profits in case of high early chick mortality which is shown in poor FCR	Birds dead / DOCs placed	3%
Efficiency Index	Holistic indicator capturing all the other indicators in one shot that is now widely used in advanced countries and big integrators.	Average body weight (kg) x livability (%) x100 / FCR / No. of days	250 and above

54 Managing a good FCR

Take care of the following aspects for managing good FCR.

- Ensure good ambient conditions: impact of temperature, air, ventilation, humidity and space on FCR has already been discussed.
- Water quality: water is the most important requirement for broilers. Clean, fresh water is equally important as feed and air for better FCR.
- Disease level and mortality: culling of the seriously sick or disabled chicks and separation of the runts.
- Age at marketing: it is a critical variable to determine FCR. Birds reared beyond the sixth week may consume proportionately more feed resulting in high FCR.
- Meal feeding: the required feed in a day is provided in 5 to 6 meals at short intervals. The short period without feed will stimulate appetite and birds remain quiet during this period.
- Light: light stimulates the chick's activity. Chicks will eat more and grow fast.
- Socialization: birds respond to good treatment. External disturbances lead to stress and loss of energy that could have gone towards weight gain. Tender, Love and Care (TLC) improves conversion efficiency.
- Rodents: Rats cause feed wastage and also act as a vehicle for many diseases.

55 Computation of the Efficiency Index (EI)

$$\text{Efficiency Index} = \frac{\text{Average body wt (Kg) X Livability (\%)}}{\text{FCR X No. of days}} \times 100$$

Example: One producer received 300 DOC, sold 290 birds weighing 340kg on the 28th day. Total feed consumption was 560 kg.

Average body wt	1.17 kg	Average body wt. = Wt. sold/No. of birds sold
Livability %	96.7	Livability = Birds sold/DOC received*100
FCR	1.65	FCR = Feed consumed (Kg) /Birds sold (Kg)
No. of days	28	
EI	245.75	

that is male:female 1:1 and compare the same with local private farms.

Table 26: Performance standards for broilers

Day	Body wt. (g)	Feed/bird /day (g)	FCR	Space / bird (sq ft)	Mortality (%)	Medicine cost (Rs/bird)	Other costs (Rs/bird)
7	160	22	0.95	0.25	1.0	0.60	0.4
14	400	45	1.15	0.45	1.5	1.10	0.6
21	700	70	1.35	0.65	2.0	1.25	0.8
28	1100	110	1.50	0.85	2.5	1.50	0.9
35	1500	118	1.65	1.00	3.0	2.00	1.0
42	2000	145	1.75	1.00	3.5	2.50	1.0



Input sourcing and marketing

1.0 INTRODUCTION

Broiler production involves the procurement of high-quality day-old chicks from a hatchery, purchase of good quality feed and feed ingredients and sourcing vaccines and medicines from reputed agencies. In addition, there is need to buy necessary rearing equipment. Thus, understanding markets to source all these inputs is a prerequisite for successful broiler production. Along with this, a good understanding of marketing the broiler birds is of vital importance.

2.0 INPUT SOURCING

The supply chain and issues involved in sourcing the three important inputs are discussed below.

2.1 PROCUREMENT OF CHICKS

Broilers are fast growing birds, which mature rapidly and are market ready in 4 to 6 weeks weighing 1.25 to 2.0 kg. These are genetically manipulated

Table 27: Critical issues in understanding markets

Market segment	Critical issues
Input markets	■ Getting best products at most reasonable prices
	■ Checking on quantity and quality
	■ Cash vis-à-vis credit purchases
	■ Reliability of suppliers
■ Chicks	■ Going beyond the retailers
■ Feed	■ Knowing the supply chain
■ Medicines	■ Choice of breed based on market need
	■ Keeping track of market rates
	■ Establishing best procurement practices
	■ Negotiating based on potential scale
	■ Parameters for quality assessment of inputs
Output markets	■ Cash vs credit sale
	■ Weight loss and perishability
	■ Targeting the market share
■ Broiler birds	■ Wholesaling and retailing
■ Manure	■ Sale of live birds vs poultry meat
	■ Branding and direct marketing

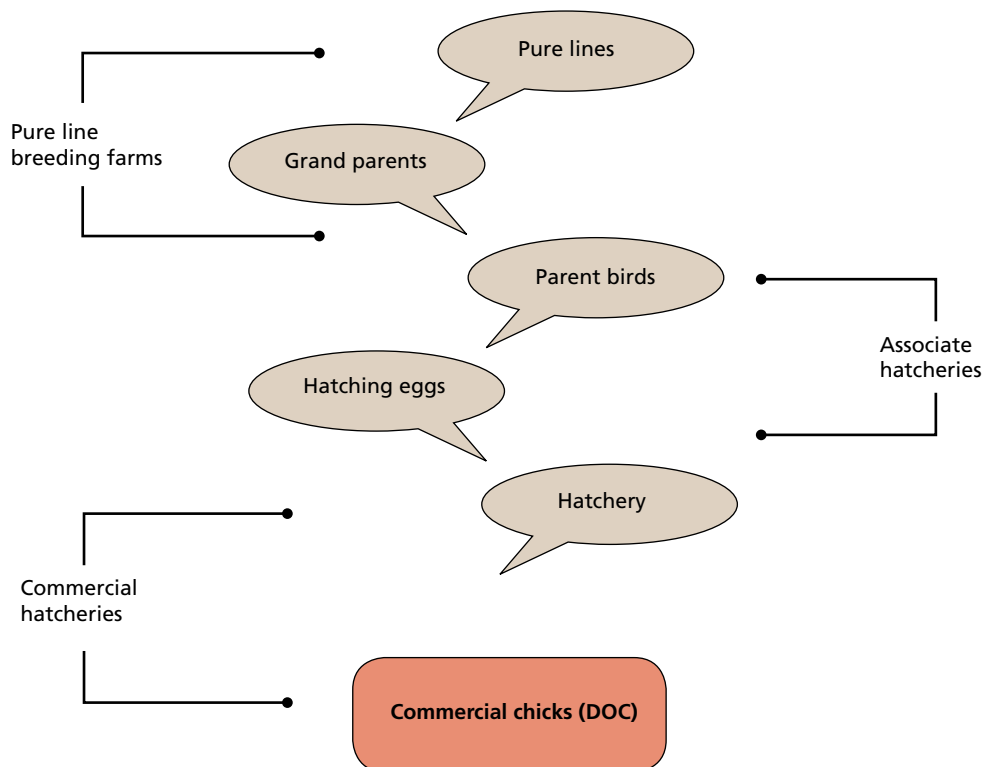
56 Cash and carry the best bet for quality

- Cash purchases are generally cheaper and the quality is more reliable. There is a cost of buying on credit and this is recovered mostly by way of poor quality or higher price, which may be often much higher than the interest costs.
- Even if a product has been bought from the most reputed suppliers, there is need to check quantities. In the Kesla project there was a case of a reputed supplier supplying underweight feed bags. Though it was later realised that it was not intentional and was only a mistake, but by then the producers had lost a good deal simply because it was not noticed earlier.

birds selected for best traits in meat quality, optimum feed conversion and rapid growth. The desirable characteristics are an outcome of a breeding programme commencing from a carefully chosen parentage that starts with 'pure lines' as shown in the flow chart 4. The understanding of the various linkages in the supply chain will help the grower/manager to pre-plan the regular supply of good-quality chicks at best prices.

imported at 'Grand Parent level'. Later on some big firms adapted these imported breeds to create their own breeds. For example, Venkateshwara Hatcheries, Pune, the first large corporate in the poultry sector and still one of the largest players in the industry, imported the 'Cobb' breed from US major Tyson Foods Inc. Later they adapted this breed and maintained their own pure line and named it 'Vencobb'. The C&M Group, another

Flow chart 4: Broiler lineage



2.1.1 Lineage and breed

The breeds, which start with the creation of a 'pure line', are proprietary products of various commercial or research organisations. Initially, most of the commercially acceptable breeds in India were

prominent player in the broiler chicks market, used the 'Hubbard' broiler breed to create their brand of commercial chicks 'Classique' and 'Marshall'.

2.1.2 Supply chain for day-old chicks

Thus, in the supply chain of day-old chicks (DOC) the first-level players maintain the pure line and this could be in India or abroad; these also operate the downstream chain ending with selling grand parents and also rearing them.

The second-level players called associates or franchisees are small players who get the parent eggs and maintain the parent farm and produce parent chicks. The third-level player downstream is the commercial chick producer who just gets the hatching eggs, which are hatched to get DOC for commercial rearing.

57 Know the breed specifications

Know the lineage of the commercial chicks to understand:

- its adaptability to local climatic conditions.
- the suitability of the bird as per market requirement - consumer preference regarding desired live weight.
- the efficiency standards - performance specifications.
- susceptibility to particular diseases.
- the vertical transmission of diseases.

58 Check quality of chicks

- Each day-old chick should be 40–45 gm.
- 'Lameness' could be due to rough handling and transportation.
- Dry navel ensures reduced chances of omphalitis.
- 'Crazy chicks' indicate vitamin E deficiency.
- Take note of chilling and piling up, which induces early chick mortality in winter.
- Observe dehydration symptoms - 8-10 per cent induces early chick mortality in summer.

2.1.3 Chick quality

After choosing the breed based on the market requirement, the choice of a reliable and reputed hatchery and the farmer's ability to handle the flock are critical factors. It is important to know that the quality of chicks much depends on the production conditions and the care taken at hatcheries.

- Some important diseases, such as mycoplasmosis and salmonellosis, playing havoc in broiler rearing could be vertically transmitted, that is the infection in the grand parents or the parent flock passes on to the commercial chicks.
- Information on the parent flock health management is very critical as the vaccination schedule also sometimes varies with maternal antibodies present in the commercial chicks.



Vehicle delivering DOCs

- Vaccines, such as Marek's and IB, are administered in the hatchery itself on day one. Moreover, general hygiene, sorting and grading of chicks that happens in the hatchery determine the performance of chicks in the farms.

2.1.4 Chick price

For the price of day-old chicks the market always follows the sale price of ready birds or overall market projections for broilers. The market is quite volatile; often open to price negotiation, particularly when dealing with smaller hatcheries. Keeping track of broiler markets on a regular basis is a very important part of negotiating a good price for broiler chicks.

59 Best practices in chick procurement

- Purchase chicks from suppliers who maintain their own parent flock. It would be even better to buy commercial chicks from suppliers who maintain their own grand parents or pure line flocks.
- Always procure from 2–3 suppliers - such multiple sourcing would take care of market fluctuations. It will also help in the better availability of chicks during shortages in the market. However, rear the chicks procured from different hatcheries in different locations.
- Good price and reliable supply naturally comes with scale of operations. So focus on scaling up chick placement and be in a buyer's market.
- Chick is a livestock and being a perishable item, the production cannot be increased in the short term. It requires long-term planning from the hatchery. Being so, in situations of rising market demand, buyers are at a disadvantage but in falling market demand, buyers have their say. Thus, an understanding of the market behaviour can help to take the best advantage of the situation.

It is well understood that early chick mortality is more often due to the vertical transmission of diseases. Always make out a strong case regarding the mortality of chicks to claim compensation from the hatchery. Remember that in case of mortality the producers lose in two ways i) their unit size drops reducing the absolute margin and ii) they bear the revenue loss on dead chicks.

2.2 SOURCING OF BROILER FEED

Feed is the most significant cost component of broiler farming. Feed alone constitutes 60 per cent of the cost of broiler production. Maximum cost reduction is possible here and it can make a significant difference in the competitiveness of the product.

When ready feed is procured from a manufacturer or a dealer the price depends on the scale of purchase; but it is possible to negotiate, painting a picture of potential scale also. The feed market, though quite competitive, is not very volatile and the price depends on the cost of ingredients such as maize and other items.

The process of making feed is quite simple and can be easily done locally. Making own feed on a collectivised basis has its own merits because manufacturers routinely substitute ingredients for least-cost formulation, sometimes even disregarding its consequences.

2.2.1 Types of feed

Broilers at different ages have different growth needs in terms of energy requirement measured as kilocalories of Metabolizable Energy (ME) and Crude Protein (CP). The preventive medication administered in the early stages is also mixed with the feed. Moreover, the particle size of the feed needs to increase as the bird grows. Based on the

requirements of energy, protein, medicines and the granular size, the broiler feed is classified as pre-starter (0-10 days), starter (till 21 days) and finisher (beyond 21 days till marketing).

2.2.2 Feed ingredients

Poultry diets are composed primarily of a mixture of several feedstuffs such as cereal grains, soybean meal, various animal by-product meals, fats, vitamins and mineral mixture, including trace minerals. The ingredients commonly used in the broiler feed are given in Table 28.

Table 28: Broiler feed ingredients

■ Energy source	Maize, wheat, rice, jowar, bajra, soya oil, etc.
■ Protein source	Soyabean meal, sunflower cake, ground nut cake, fish meal, meat meal, synthetic amino acids such as Lysine, DL-Methionine, etc.
■ Mineral source	Dicalcium phosphate (DCP), lime stone powder (LSP), salt, sodium bicarbonate, trace mineral premix, etc.
■ Vitamins	Vitamin premixes containing A, B2, D3, K, E, C, folic acid, biotin, etc.
■ Additives	Antibiotic feed supplements, coccidiostats, liver stimulants, enzymes, probiotics, toxin binders, etc.

60

Forms of feed

Broiler feed is marketed in three different forms, namely Mash, Pellet and Crumb.

- Mash feed is obtained by grinding and mixing the raw materials. It is cheaper and economic but lower growth rate and uneven growth are its limiting factors.
- Pellet feed is prepared by exposing the mash to heat treatment under pressure. The heat cooks the feed for better digestibility and kills the germs and also destroys anti-nutritional factors present in feed. In this case feed wastage can be greatly reduced. It provides better FCR but can lead to wet litter problem in flock.
- Crumb is the feed of modern generation. It has superior physical quality. The pellets are broken in to granules called crumbs. Crumbs bring better growth in lesser time and with better feed consumption. Cost of feed is the only limiting factor for using crumbs.

Reckoned from the day of hatching the body weights of commercial broilers increase at least 40 times in six weeks. Therefore, adequate amino acids, which are the building blocks of proteins, should be included in the diets. Considerable importance is laid on the amino acids - Lysine and Methionine - levels of broiler feeds, along with the provision of high-energy source touching the 3,000 calories level. Oil is added to broiler rations to produce higher energy rations, even exceeding 3,000 calories per kg.

2.2.3 Feed making

The first step in feed making is to decide the type of feed to be prepared and production quantity per batch. Find out the availability of feed ingredients and feed supplements as suggested in the

61 Know the raw material quality

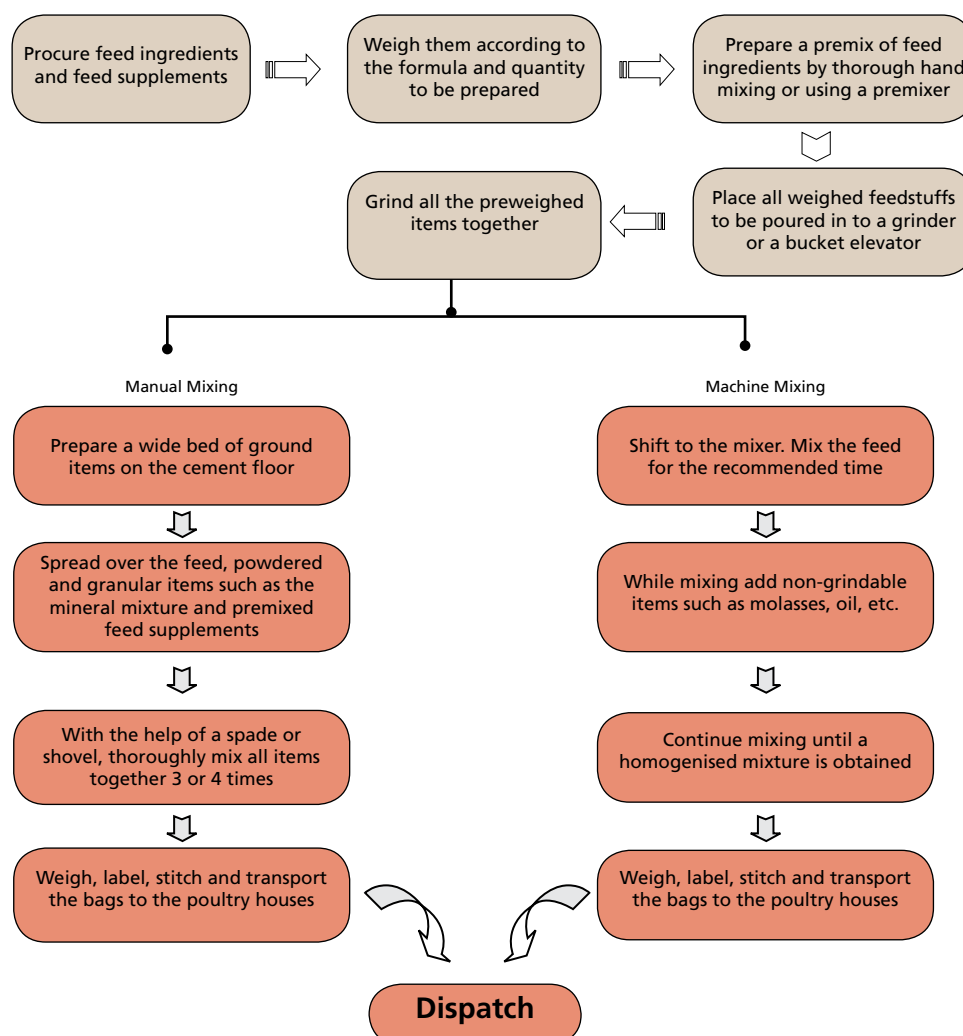
Ingredient	Evaluation
■ Maize	□ Moisture should be maximum 10 per cent
■ Other grains	□ Check for damaged/old stock, weevil infestation, uric acid content and pesticidal residues
■ Rice bran	□ Free from rancidity
■ Soyabean meal	□ Properly roasted. Urease activity not to exceed 0.25 per cent.
■ Groundnut meal	□ Free from castor (adulteration). Check the aflatoxin level
■ Maize gluten	□ Moisture not more than 10 per cent
■ Other cakes and extractions	□ Free from castor cake
■ Fishmeal	□ Watch for high salt content, sand, silica content and urea adulteration. The quality of fishmeal undoubtedly plays a very important role in nutrition.

formula. Dry the feed ingredients, whenever the moisture levels are more than 14 per cent.

Feed making is a simple process involving the grinding of the cereal grains in standard size particles such as 3 mm for the starter and 6 mm for the finisher feed. The raw materials for the broiler starter must be finely ground and for the broiler finisher be medium-coarse ground.

The energy and the protein sources are bulked and put in a mixer as required by the formulation. The other ingredients are then weighed according to the formulation and a premix is prepared. The premix is then poured in the mixer. Generally it takes 10–12 minutes for good mixing. Prepare the feed by following the step-wise procedure stipulated in flow chart 5.

Flow chart 5: Steps in feed making





Manufacturing of broiler feed

Table 29: **Broiler feed formulation** - Ingredients for making one tonne of broiler feed

Sl no	Composition	Ingredient quantity (kg)	
		Starter mash	Finisher mash
■	Carbohydrate source		
1	Crushed maize	(59%) 590.00	(64%) 640.00
■	Protein source		
2	Soya DOC	(36%) 360.00	(30%) 300.00
■	Amino acids		
3	Lysine	0.40	1.00
4	DL-Methionine	1.80	1.50
■	Fats/oils		
5	Soya oil	10.00	20.00
■	Minerals		
7	Dicalcium phosphate (DCP)	19.00	19.00
8	Lime stone powder (LSP)	11.00	11.00
9	Salt	3.00	3.00
10	Sodium bicarbonate	1.00	1.00
11	Trace minerals	1.00	1.00
■	Vitamins		
12	Vitamin premix (Iavit)	0.65	0.65
■	Growth promoters		
13	Coccidiostat (Coccistac)	0.50	0.50
14	Tylosin phosphate	0.20	0.20
15	Antibiotic (Stefac20)	0.50	0.50
16	Liver pow (Livoliv250)	0.25	0.25
■	Other items		
17	Bio-choline	0.80	0.80
18	Vitamin C (in summer)	0.00	0.05
19	Vitamin E 50	0.10	0.10
20	Antioxidant (Proviguard)	0.05	0.05
21	Cocktail enzyme (Nutrizyme Spl)	0.50	0.50
		1001	1001

Table 29.1: Computing ME and CP requirements

ME and CP in feed formulation					
Feed ingredients	Metabolisable Energy (ME)	Starter feed		Finisher feed	
		%	ME	%	ME
■ Maize	3300 KCal	59	1947.00	64	2112.00
■ DOC	2694 KCal	36	969.84	30	808.20
■ Soya Oil	9000 KCal	1	90.00	2	180.00
Total			3007		3100
	Crude protein (CP)	Starter feed		Finisher feed	
		(%)	CP	%	ME
■ Maize	9.2 %	59	5.42	64	5.88
■ DOC	46%	36	16.56	30	13.80
Total			22.00		19.70

Note:
 1. The assumption regarding expected FCR is 1.5 and 1.75 for finisher birds with live weight of 1.0 kg and 1.75 kg, respectively
 2. Critical factors considered during feed formulation:

	Prestarter	Starter	Finisher
■ ME:CP ratio	130	140	160
■ Calcium:Phosphorous ratio	2.2	2.2	2.5

Table 29.2: Nutritional requirement of broilers

Nutrients	0-10 days	11-21 days	> 22 days
	Pre-starter	Starter	Finisher
■ M.E.KCal/kg	2900–2950	3000	3200
■ Crude protein (%)	22.00–22.50	22.00	19.50
■ Ether extract (%) (min)	3.50	4.50	6.50
■ Crude fibre (%) (max)	4.00	4.00	4.00
■ Calcium (%)	1.00	1.00	1.00
■ Available phosphorus (%)	0.45	0.45	0.40
■ Sodium (%)	0.18	0.18	0.16
■ Chloride (%)	0.17	0.15	0.15
■ Linoleic acid (%)	2.00	3.00	3.50
■ Lysine (%) (min)	1.30	1.20	1.05
■ Methionine (%) (min)	0.55	0.50	0.45

Assumption: digestibility of amino acids is 95 per cent

Table 29.3: Requirement of vitamins

■ Vitamins	Recommended quantity
■ Vitamin A (I.U./kg)	15000
■ Vitamin D3 (I.U./kg)	3000
■ Vitamin B1 (mg/kg)	4.00
■ Vitamin B2 (mg/kg)	8.00
■ Niacin (mg/kg)	50.00
■ Pantothenic acid (mg/kg)	14.00
■ Pyridoxine (mg/kg)	4.00
■ Folic acid (mg/kg)	1.50
■ Cyanocobalamine (mg/kg)	0.015
■ D-Biotin (mg/kg)	0.15
■ Vitamin K (mg/kg)	3.00
■ Vitamin E (mg/kg)	50.00
■ Vitamin C (mg/kg)	100.00
■ Choline (mg/kg)	900.00

2.2.4 Assessing feed quality

The quality of feed depends on ingredients, handling, processing and storage. There are various methods to assess the quality of feed ingredients.

The physical characteristics of feed ingredients can

Table 29.4: Requirement of minerals

■ Minerals	Quantity (gm/tonne)
■ Manganese	90.00
■ Copper	15.00
■ Iron	90.00
■ Iodine	2.00
■ Selenium (max)	0.30
■ Zinc	80.00

be assessed by visual examination - abnormal colour, consistency, and presence of foreign material, mould growth and cake formation. Further physical contact by touch with feed ingredients helps to check for particle size, adulteration and moisture level. Well-dried grains produce a metallic sound. High-moisture grains give a dull and soft sound. The freshness of feed ingredients can be evaluated by taste. Rancid or adulterated feed gives an undesirable taste.

One needs to remember that it is difficult to assess quality parameters, such as energy, crude protein,

- **Chemical analysis:** The quality of feed ingredients is more precisely determined by analysing its nutrient composition. A well-equipped nutritional laboratory is needed for conducting such analysis. Feed samples are analysed for moisture content, Dry matter (DM), Crude protein (CP), Ether extract (EE), Nitrogen free extract (NFE), Ash, Acid insoluble ash (AIA) and calcium and phosphorus on percentage basis.
- **Feed microscopy:** Feed microscopy is the study of the appearance of various feed ingredients, compound feed and its adulterants under a microscope. The colour of the particles of the ingredients to be identified is compared with the reference table.

Colour of the particles

- White
- Black
- Buff
- Brown or Reddish
- Grey
- Yellow or Orange

Possible ingredients

- Limestone, DCP, sodium sulphate, bentonite
- Charcoal, charred bone, blood meal, meat meal
- Soybean meal, bone meal, vitamin A beads, rock phosphate
- Blood meal, fishmeal, liver meal, maize bran
- DCP, rock phosphate, limestone
- Yellow maize, vitamin A beads, dehulled cotton meal

- **Biological evaluation:** The quality of feed depends on its nutrient composition and bio-availability to the birds. To know the digestibility or metabolisability of a feed ingredient, a biological trial is conducted in a metabolic cage with the facility of the separate collection of faeces and leftover feed. Nutrients are chemically analysed in the feed offered and faeces voided to calculate the retention of nutrients for the use of birds. The ME in feed is estimated by this method.
- **Microbiological test:** Sometimes the feed ingredients are infected with pathogenic organisms, such as *Salmonella* sp., or Mycotoxin (Aflatoxin, Ochratoxin, Citrinin, etc)-producing organisms such as *Aspergillus flavus*, *A. niger*, etc. Feed ingredients mostly affected by mycotoxins are groundnut cake, maize and other grains containing a high level of moisture. This method of quality control requires a well-equipped microbiological laboratory.
- **Other tests:**
 - **Test for pesticides: [Thiram test]**
Procedure: Mix 25 gm grain /feed with 50 ml chloroform. Filter the extract. Add few mg of cuprous iodide. Brown colour indicates positive for Thiram. If other colours are interfering, add charcoal to the filtered extract and again filter.
 - **Test for the estimation of the extent of roasting in soybean meal:**
Procedure: Take 15 gm soybean meal. Mix few drops of urea phenol red solution to it and wait for 5 minutes. The extent of roasting can be judged by the colour criteria; Under roasted will be red purple colour, over roasted will not have red purple colour and moderate red purple colour indicates optimum roasting.
 - **Moisture Tests:**
The moisture content of the feed ingredients generally should not exceed 10–12 per cent. The maximum permissible moisture content is 14 per cent for maize, 12 per cent for soybean oil meal and fishmeal.

Four years back when PRADAN initiated poultry in Jharkhand, the status of poultry farming in the area could be judged from the fact that proper inputs were not available even in a city like Ranchi. Initially it had to be a compromise with the quality of inputs. There were even instances of expired vaccines supplied by some well-known medicine shops.

Ranchi consumes as high as 20 tonnes of live birds daily. Still the production nearby is negligible. The nature of the activity is such that, small farmers do not sustain due to market fluctuations and the big farmers and integrators are reluctant to take it up due to various other reasons. The interest of the entrepreneurs can be judged from the fact that there was not a single feed factory in Jharkhand one year back and they used to depend on the feed being supplied from nearby states at higher cost. There are a few hatcheries in Jharkhand with miserable conditions as most of the farmers, for quality sake, depend on chicks supplied from other states.

However, now things are changing. Many big corporates associated with poultry industry are showing interest. They are coming directly to deal with the cooperatives. The costs of inputs have now drastically reduced due to collective dealings. Things are changing and everybody in the poultry industry is seeing a future. The cooperative is now in a position of have the best deal as far as input sourcing is concerned.

etc., by looking and touching the feed. Hence, one should either buy from a very reliable and branded supplier or buy ingredients and make the feed on your own. The best quality check is the perfor-

mance of the flock - compare the performance at regular intervals.

Table 30: Some commonly used poultry drugs

Sl no	Medicines	Company	Package size	Dosage	Duration
■ Disinfectants					
1	Omnicide	Vetcare	5000 ml	7 ml/lit of water	Terminal disinfectant
2	Disfect*S	Pfizer	1000 ml	22.5 ml in 9 lit of water	"
3	Kohrsolin-TH	Glaxo	500 ml	10 ml/lit of water	"
4	Helamid	Intervet	100 gm	3 gm/lit of water	Weekly
5	Virkon*S	Pfizer	200 gm	5 gm/lit of water	"
■ Water sanitisers					
6	Aquaquat	Polychem	5000 ml	1 ml/10 lit of water	Regularly
7	Bioquat	Ventri Bio.	5000 ml	1 ml/ 40 lit of water	"
8	pH-six	Polychem	5000 ml	1 ml/10 lit of water	"
9	Acify	Vetcare	5000 ml	1 ml/5 lit of water	"
■ Vitamins					
10	Groviplex	Glaxo	5000 ml	15–20 ml/100 chicks	3 -5 days
11	Ambiplex	Brihans	5000 ml	8–10 ml/100 chicks	"
12	Vimeral	Glaxo	500 ml	5 ml/100 chicks	"
13	Viselam	Brihans	1000 ml	5 ml/100 chicks	"
14	E-care-Se herbal	Vetcare		250 ml	1 ml/1–2 lit of water
15	Kaysol	Vetcare	5 0gm	1gm/5 lit of water	3 days
■ Growth promoters					
16	Gpromin	Vetcare	5000 ml	5-10 ml/100 birds	7 days
■ Liver booster					
17	Nutriliv forte liq.	Vetcare	5000 ml	5–10 ml/100 birds	3-5 days
■ Antibiotics					
18	Lixen	Glaxo	10x20 gm	0.7gm/100 chicks	3 days
19	Neodox forte	Vetcare	5x50 gm	1 gm/2–4 lit of water	"
20	Enrocare 10%	Vetcare	500 ml	1 ml/lit of water	3 - 5 days
21	Duaprim	Brihans	575	5 gm/100 birds	3 days
■ Anticoccidials					
22	Coxiquin	Vetcare	30 gm	30 gm/50 lit of water	3 - 5 days
23	Coximar	Glaxo	30 gm	30 gm/50 lit of water	"
24	Codrinal	Intervet	100 gm	4 gm/lit of water	"
■ Antimycotoxins					
25	Toxifree liq.	Gallichem	5000 ml	15–20 ml/100 chicks	3 days
■ Drugs for summer stress					
26	Electrocare	Vetcare	1000 gm	1 gm/2 lit of water	Regularly
27	Zeetress	Natural Remedies	50 gm	0.5 gm/100 birds	"
■ Vaccines					
28	Lasota strain (SPF)	Ventri Bio.	100 and 200 doses	One drop/bird in eye from the 5th to the 7th day or through drinking water on the 21st day.	
29	IBD+strain	Ventri Bio.	200 doses	Through drinking water	
30	F1strain	Ventri Bio.	100 and 200 doses	One drop/bird in eye from the 5th to the 7th day	

2.3 Buying vaccines and medicines

In broiler farming paying attention to the quality and price of drugs can make all the difference to the success or failure of the activity. Reliable retail shops selling veterinary medicines are difficult to find not only in the local markets but even in big towns, and more so in areas where commercial live-stock production is on a low key. In such places, the shops may not be well stocked and they mostly sell sub-standard or outdated products. Poor storage of the medicines making it ineffective and unusable is yet another problem.



Buying good quality vaccines is very important

In contrast to human medicines, the problem in veterinary medicines is the lack of stringent norms. For good quality medicines, one needs to go to established brands. Very often in smaller towns, expiry or close to expiry drugs are provided. Thus, it is best to procure from well-known and reliable sources. Going by experience there are two principles of cost reduction:

- The proprietary drug manufacturers often provide the best buy.
- Dealing directly with the company (if one has the scale) or with the C&F agents is always better as there are huge margins at all ends. There is no veterinary drug which sells at the printed price anywhere in India and there are always discounts. This fact itself makes it difficult to know the 'right' price and it is always better to go beyond the retailer to get the best price.

3.0 MARKETING OF BIRDS

There exists a vast and relatively unexplored potential of broiler market in India. The wholesale channels account for the major broiler marketing in the country. Broilers are sold live, fresh dressed,

dressed and chilled, or dressed and frozen. The first two categories account for the bulk of the sales of broiler chicken.



Despatch of ready chickens to the market

When the birds are moved live, considerable losses occur from shrinkage and mortality. These losses can be as high as 10 per cent depending on the season, distance covered and method of transportation.

The current trend in consumer preference is for live or fresh dressed broilers. With the entry of multinationals in the industry, there is a slow but perceptible change in the trend of broiler marketing. Consumers, especially in the urban centers, are accepting chilled, dressed chicken and deep-frozen chicken. The advent of processing plants and fast food joints has helped in changing the trend of broiler consumption especially in urban areas.

64 Changing consumption trends

- Changing socio-economic factors has resulted in more and more vegetarians accepting non-vegetarian food.
- Spiraling costs of living have put other high-priced meats, such as mutton, out of the reach of the average meat eater.
- The consumers are now looking for a quick, easy way to prepare a meal and, therefore, prefer ready-to-cook items.
- Surveys conducted in medium- and small-sized towns indicate that people would eat more chicken if it were more conveniently available.
- With modern families getting smaller, a whole chicken is not required for a meal. Chicken would be consumed more frequently if available in small and convenient packs.



3.1 Tips on broiler marketing

- In livestock trade the best practice is 'always deal in cash'; when sold on credit, it often ends up with bad debts.
- The golden rule in poultry bird marketing is to 'sell and be happy' as opposed to 'keep and repent'. One must remember that the 'product' is a 'live bird', which is the most perishable commodity. Actually the shelf life is very low - 'this moment' is different from 'the next moment'. The 'product' that is the 'bird' actually changes in weight. But more important is the fact that the next moment it could die, lose weight or fly/slip away easily. Further, to

65 Catching and transporting of market ready birds

Broilers should be held by the feet and shanks, never by the thighs. They should be caught and held by both legs to minimise distress, damage and injury, which might otherwise result if they struggle and flap. The birds should be placed carefully into crates. Crates should never be overfilled. The number of broilers per crate must be reduced in high temperature conditions. Transportation should be preferably done in the cooler hours.

The following key points are to be noted:

- Supervise catching and handling methods carefully to minimise trauma and injuries to the birds.
- Remove or raise obstructions, such as feeders or drinkers, before beginning the catching operation and use partition in large houses to avoid injuries caused by crowding.
- Reduce the light intensity prior to catching to keep the birds calm and minimise damage and subsequent stress.
- Adjust bird numbers in crates to allow for bird weight and right ambient temperature during transit.



Broilers should be held by feet and shanks

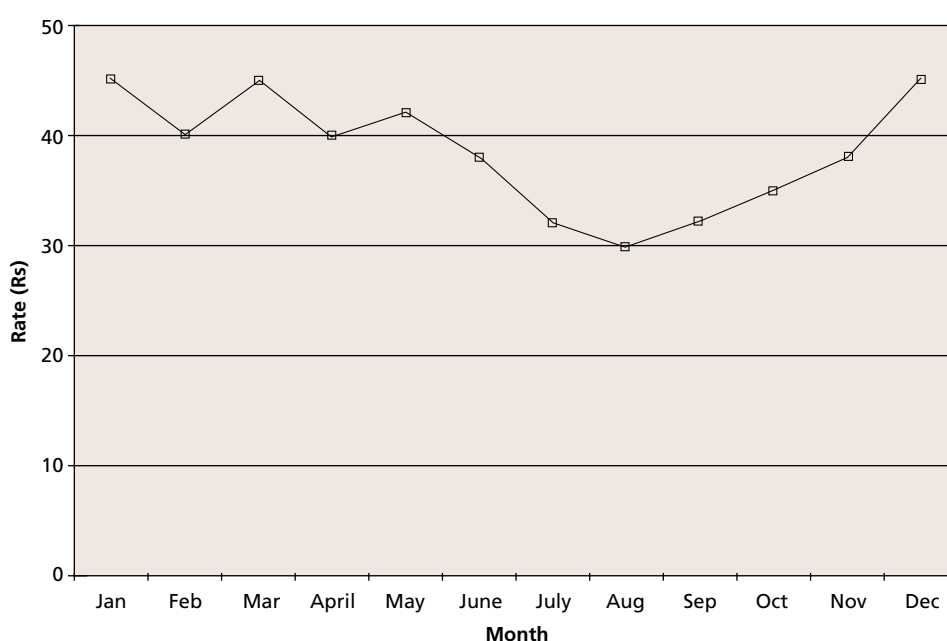
help it survive there is a need to 'feed it' that is incurring costs. This fact needs to be kept in mind. So, the winner in poultry is one who does not speculate much.

- The other good rule in poultry is that the producer-farmer has to gain some control on the market. The choice is whether you are a 'price receiver' or 'price giver'. If you can corner 15 per cent of big markets you get to influence the market significantly. Locating small markets and occupying 50–60 per cent of the market share could be another strategy.
- The key struggle in marketing birds is how much to control the channel - implications on

In Jharkhand, the demand for broilers and the price are mostly influenced by seasonality factor. During the rainy season between July–September the broiler prices fall drastically as the holy month of 'Sawan' falls during this period and most of Hindu families do not take non-vegetarian food during this season. Further, in this season people are very busy in agriculture activities. Women folk also being busy, do not have the time for making any special food preparations and, therefore, the fall in demand.

During this reason the sale of broilers is reduced to 50–60 per cent and the price falls by 30 per cent. In October and mid November festivals, such as Durga Puja, Deewali and Chhath, affect the market prices. However, the sale price is not as bad as in July–Sept and starts an upward trend during this period. From October onwards the market picks up and by December–January due to Christmas, New Year and Holi, the consumption of non-vegetarian food reaches the peak level. Moreover, the marriage season that happens to coincide with this time also enhances the demand for poultry meat further.

Graph 5: Seasonal changes in broiler prices in Jharkhand



time and skills to manage such operations. How to control the traders (retailers/wholesalers) to adhere to a pre-determined price and lifting schedules is the crux of the problem.

- Farm-gate lifting is always preferable to trader delivery.

4.0 POULTRY MEAT

Poultry meat is generally considered healthy food. Meat consists mainly of protein and water. The average water content of chicken meat is 71 per cent, (varying from 65



to 75 per cent) and the average protein content is 20 per cent, (varying from 17 to 23 per cent). The high nutritive value of chicken meat is derived, of course, from its relatively high protein content. Chicken meat is lean meat. On an average, it contains 7.5 per cent fat in the total, divided over the skin and the abdominal cavity. The low fat content makes chicken meat very attractive for consumers who do not want too much fat in their diet. The ratio of saturated fatty acids to unsaturated fatty acids is good (about 40:60).

Of much importance is the so-called organoleptic quality, which is especially the taste (flavour) and tenderness (juiciness) of the meat. This quality aspect is strongly influenced by the age at slaughtering. Tenderness and/or juiciness decreases with increasing age, whereas flavour increases with the age of birds. Perhaps this is the reason why the local poultry is often more appreciated by

67 Broiler marketing experience at Kesla

Experience with own-wholesaling has been a mixed experience at Kesla Poultry Society. Generally it is very difficult to control the leakages, skill-set required for wholesale operations is different and it helps to deal with other wholesalers as you are also a player in the market.

- Own-retailing is easier than wholesaling, leakages are there but one can manage it with rigorous effort. The problem is, one needs to have a large operation to get the volumes required.
- Supplying on fixed price is only possible to retailers operating in 'isolated' markets without local competitors. KPS made many such agreements both with retailers & wholesalers but it has been impossible to make them adhere. Today, only one big retailer operates at fixed terms.
- Supply to wholesalers at market rates from farm gate, on cash down payment is the best option. The pinch is felt when the market is surplus, the trader goes to other distressed farmers, and at this time price realised from own-wholesaling with loyal clients fetches you better price. Same is the case with retail shops.
- Birds can be weighed in especially made cages or tied by the legs and weighed. The cage system is good but it depends on the system in use in different markets. Transportation losses are always less when birds drink lot of water and are not over-fed.

68 Sukhtawa Chicken: branding live chicken

Sukhtawa Chicken is an effort to sell branded chicken directly to the consumers in the cities in a modern, hygienic manner. The chicken is sold live and is machine processed in the presence of the consumer. Today there are four Sukhtawa Chicken outlets in Bhopal. These shops are one-of-its-kind and the brand is most widely known in Bhopal. The salient features of these unique market outlets are as follows:

Location: The shops are preferably located in between the catchment area (where consumers stay) and the market place. One of the shops is located right in the chicken market.

Investments: Purchase/rent deposit varies depending on the locality. The interiors - floor/wall tiles, glass panels, etc. costs Rs 70,000 for a shop of 200–250 sq ft. The equipments portioning machine, defeathering, scalding tank, killing cone and small items would cost Rs 60,000. The entire investment apart from shop deposit/purchase is in the range of Rs 1.30–1.50 lakhs.

Workers: Each shop has a shop manager and one cutter. On special occasions, such as Holi, New Year and even on Sundays, additional manpower is required.

Systems: The birds are supplied by live weight at the shop. The shop is billed at the retail rate (which is decided by the cooperative) less Rs 1. This Rs 1 is provided for feed costs and weight losses. It is the shop manager's responsibility to manage the shop and to ensure that collections are made on a daily basis. Detailed protocols for the maintenance of hygiene and routine tasks are monitored in a compliance report. Sale incentive based on turnover is also provided.

Turnover and financial analysis: Each shop sells on an average 1000-1500 kg every month. A margin of Rs 10–15 per kg live bird takes care of all the operational costs and provides small surplus, which can take care of the cost of capital.

Lessons: The turnover has been much less than the expected level of 2500-3000 kg. The shops have not been able to draw consumers from far and have mostly remained neighborhood shops. Consumer is unwilling to pay premium for the better quality and the shops have to compete with the butcher. These shops become very useful in situations when farm-gate prices slump.

the consumer. Modern producers can easily meet this preference by extending the growth period through a low-protein diet. However, longer use of the housing facilities will increase the costs, and it is certainly advisable to thoroughly explore the market possibilities for such a product.

Poultry manure method

Pure poultry dropping available from cage-rearing of birds can be directly used. However, in deep litter system the litter material like sawdust does not get decomposed during the rearing period and

Poultry manure is known to be one of the richest source of plant nutrients. It is richer in phosphorus content than manure from other domestic animals. Droppings from 40 to 50 birds will produce one tonne of manure per year. Freshly voided droppings have about 80 per cent moisture. The evaporation starts immediately after voiding and as the manure dries, its chemical concentration on weight and volume basis increases. One tonne of poultry manure contains 5–7 kg of magnesium, 25–30 kg of calcium and 5–7 kg of sodium, which are all essential nutrients for plant growth. In fresh droppings, about 65 per cent of the urinary nitrogen is present as uric acid and is readily available for the plants. The following table gives a comparison of poultry manure vis-à-vis other animal manure.

Nutrient content of manures (on air dry basis)

	Source	N %	P ₂ O ₅ %	K ₂ O %
1	Cattle	1.22	0.62	1.20
2	Goat	2.40	0.90	2.00
3	Poultry	0.92	1.60	0.60
4	Vermi-compost	1.90	0.80	0.30

thus direct use in the crop- fields must be discouraged. Direct use can lead to nematode/termite infestation. The litter material obtained after rearing can be easily decomposed to give very good quality manure.

Treatment with standard decomposing thermophilic bacteria nitromonas (available under trade name Biocullum from excel Industries) is able to create in 20 days very good quality manure with higher N-P-K. decomposition with culture like azospirillum, trichoderma, PSB, KOB is able to cre-

ate in 20-25 days highly potent manure with very high N-P-K in available form. A lab test on manure prepared with Biocullum in sawdust litter of 35 days indicated the following:

Particular	N %	P ₂ O ₅ %	K ₂ O %
Treated Poultry Manure	1.3	3.5	2.1

Most important factor to note is high proportion of micro-nutrients, trace elements and available carbon.



Epilogue

A case for professional intervention

Broiler farming has immense potential to make a frontal impact on rural poverty. In the absence of a well-thought out professional intervention, this big opportunity would by-pass the poor and the growth would be largely appropriated by rural elite and urban/peri-urban rich. Hence, it would be useful to discuss why the poor have remained largely untouched by the impressive growth in modern poultry and the policy-related issues of the sector.

Poultry production has been growing faster than any other agricultural sub-sector. It is predicted that by year 2020 poultry would account for the largest portion of the livestock output, which in financial terms would be more than 50 per cent of the total global agricultural output.

The increasing demand for livestock products (protein source) is driven by sustained economic growth and rising incomes. In addition, the income elasticity of demand for meat products is high. Meat consumption has been increasing by over 80 per cent between 1983 and 2000. The greatest increases (in percentage terms) have occurred in the poultry sector. The income elasticity of demand for meat and eggs is highest in rural areas, estimated at around unity for poor and very poor groups¹. So rapid increases in consumption are likely to continue in these areas.

In fact, to the resource-poor farmers the poultry revolution presents both opportunities and threats. The growing demand for poultry products could

mean sustained revenues for them. On the other hand, they could be marginalised due to increased competition from larger, more commercially oriented production units. One dimension of the poultry revolution has been the industrialisation of poultry production, with production changing from being the traditional, local, multi-purpose activity to an increasingly market-oriented and vertically integrated business².

There is a real danger that large-scale intensive producers could undermine the viability of small-scale production, thereby exacerbating rural poverty³. Whether or not this happens will depend on two factors - first, the government policies and how supportive they are of small-scale production, and second, the extent to which small-scale producers are able to increase the efficiency of their operations and the productivity of their farms.

■ Why poultry missed the poor?

A report by Czech Conroy showed that the enabling environment for livestock, particularly poultry has not been pro-poor. In particular, the research and extension systems have not been well geared to addressing the needs of poor livestock producers. Table 31 excerpted from Czech Conroy's paper shows a comparison of poultry with dairy.

It can be seen that the poor enabling framework of weak research and the extension and lack of any affirmative policy for the participation of poor in the sector was an important reason for the industry

Table 31: Livestock in India (1970-2000) - A comparison of poultry with dairy

Enterprise	Research	Extension	Policy	
			Livestock	Other
■ Dairy farming	Strong	Strong	+ve	+ve ¹
■ Poultry				
▪ Traditional scavenging	Weak	Weak	Neutral	Neutral
▪ Semi-confined and intensive	Weak	Weak	Neutral	Neutral
▪ Confined and intensive	Strong	Strong	Neutral	Neutral

¹Trade policy provided protection against the import of dairy products.

¹Mehta et al., 2003. ²Delgado et al., 1999; Steinfeld, 2002. ³Steinfeld, 2002

to remain aloof to the needs of poor. The other equally important fact was the abiding faith of Dr B. V. Rao, the father of modern Indian poultry, that poultry industry needs to go the corporate way for world-class facilities and growth. This was in sharp contrast to the crusade of Mr. Verghese Kurien in the dairy sector, where he made relentless efforts to make the system amenable for the participation of poor and brought to fore the salient role of cooperatives.

■ Can the poor 'cash' on poultry?

The competitiveness of the smallholder poultry vis-à-vis the intensive industrial one is a serious issue. Nevertheless, there are various grounds for believing that collectivised small-scale units can be sufficiently competitive and robust to withstand the challenge.

70 Challenge of linking small farmers

The big opportunity in poultry with fast double-digit annual growth rate has essentially been cornered by the large growers. This process of the concentration of production in the hands of big producers has also been aided by the failure of small growers, their inability to negotiate with an industry increasingly becoming market-oriented and vertically integrated. The real challenge is how the small-scale producers are able to increase the efficiency of their operations and the productivity of their farms.

Most of the broiler markets deal with live birds and, hence, any transportation beyond 200 km becomes difficult because of haulage losses. Thus, a larger commercial poultry unit would need to be situated within that radius for it to pose a competitive threat to small-scale units.

The experience of promoting the small-scale poultry model for nearly 12 years at Kesla in M.P., and more recently in Jharkhand shows that the producer operations are quite competitive compared with local commercial farmers. Except for the industrial poultry units, primarily in southern and western India, the smallholder model would be very competitive elsewhere in India. The following points emphasise the workability of the smallholder poultry model:

- When small farmers are brought together through a cooperative, they gain economies of scale that make them quite competitive with larger scale producers for input procurement, and output marketing.
- The smallholder poultry system that is being promoted is not technologically inferior to commercial farms; and in fact they being owner-operated farms their production efficiency is much better than that of commercial farms.
- The poor farmers involved in poultry production are looking for self-employment; whereas the large-scale producers view poultry produc-

71 Profile of a typical broiler farmer in the smallholder prototype

A typical broiler farmer of the collective is a rural woman from disadvantaged communities, hitherto, dependent for her sustenance on rainfed agriculture and wage earning. Through systematic intervention at all the enterprise stages she gathers skills, infrastructure, inputs and marketing arrangements for a successful home-based broiler poultry unit.

- She requires a minimum area of one cent of land (435 square feet), either owned by her or taken on lease.
- She earns between Rs 9,000–16,000 a year, which works out to Rs 45–80 a day for her 200 days of engagement in poultry activity.
- The income so earned is available to her in a regular stream of cash flow. It helps her to meet the needs of cash expenses and also of capital formation in terms of family assets.
- The regular flow of income strengthens the woman to negotiate a better deal for herself within her family and in the society.
- Income from the activity equivalent to 200 wage days reduces out-migration and helps the family to invest on existing resources, most notably the arable land - homestead or otherwise; thereby further augmenting the sufficiency in the hitherto deficit household.



tion as a commercial business and are looking for higher returns on their investment. This makes the smallholder model more robust.

Thus, backed by the field experience it can be strongly advocated that once the poultry sector is organised as a collective enterprise, particularly in areas where industrial poultry activity is generally absent, the sector can be made accessible to poorer small-scale producers in a robust and sustainable manner.

■ Scaling up constraints

Experience has shown that creating growth clusters for any income-generating activity in new areas and that too in infrastructurally poor pockets, such as Kesla, requires investments in capacity building and setting up marketing systems. The same is true with promoting broiler growth clusters also. The following are the specific constraints that are very critical for scaling up:

- Poor access to broiler markets which primarily exist in urban centres
- High costs of procurement and distribution of inputs - chicks, feed and medication

The product here is very unique - delicate, fragile and live, handling this is, thus, more problematic than the most perishable commodity. Hence, it is absolutely essential to have some control over the market systems. Otherwise traders and other channel intermediaries take undue advantage of the product's unique nature. This is reflected in the wild fluctuation in the chicken wholesale market. Access to the ultimate consumer is the key to success in broiler farming. Markets in urban centres are largely accessible to well-established traders and urban or peri-urban farmers. The most important disadvantage of small, decentralised farms is diseconomies during the initial period wherein investments for backward and forward integration are not available.

■ Potential for expansion

A comparative analysis of the poultry sector in different states shows that the potential for expansion is enormous. For example, Goa, a state smaller than many of the districts in Orissa or Jharkhand produces more chicken than Jharkhand, Bihar, Orissa combined. The states of Jharkhand, Bihar, Madhya Pradesh, Chattisgarh, Uttar Pradesh, Uttaranchal, Orissa and Rajasthan, accounting for close to half of the country's population (44 per cent) contribute less than 10 per cent of the broiler production. It should come as a surprise that Orissa was one of the pioneering states where efforts in

72 Why does the smallholder model succeed?

- Scale neutral when the opportunity cost of labour is low
- Poor are aiming at self employment, the enterprise returns expected by big unit becomes the margin of safety
- Owner labour in smaller units create better production efficiency as compared to employed labour
- Integration in interface with input-output markets through cooperative creates scale-economies similar to bigger units

73 Smallholder poultry model - outreach status

Sl. No.	Location of the small holder cooperative	State	No. of producers (Aug 2006)	Placement of chicks per month
1	Lohardaga	Jharkhand	420	70000
2	Senha	Jharkhand	339	50000
3	Jamshedpur	Jharkhand	219	30000
4	Gumla	Jharkhand	380	40000
5	Khunti	Jharkhand	230	30000
6	Petarbar	Jharkhand	132	20000
7	Koderma	Jharkhand	108	10000
8	Raigarh	Chhattisgarh	160	20000
9	Sidhi	M.P.	370	50000
10	Kesla	M.P.	410	65000
11	Orchha	M.P.	60	8000
12	Rajnagar	M.P.	50	6000
13	Jatara	M.P.	80	10000
14	Dinodri	M.P.	30	5000
			2988	414000

Note: The state wise address list of the smallholder poultry cooperatives is annexed to this chapter (Table 32).

- Income from poultry has provided for reduction in the family deficit and has replaced wage earning in the existing livelihood portfolio of the target community. Today about 200 producers earn an average of Rs 10,000 per annum, which at prevailing local wage rates of Rs 40 translates as 250 person days per family.
- With proper arrangements made to provide inputs at the doorsteps, intensive training, recording of transactions at the farm and collecting ready birds for sale. The whole activity has been designed to help the women to participate in the programme.
- With the income going into the hands of women the entire household has now become more women oriented. Incidences of wife beating in some cases have reduced, as there are no such incidents being reported.
- Women producers have become more assertive, which is visible in their interaction with outsiders.
- Women have become health conscious due to an increased awareness of diseases and medication, because of orientation to the same in poultry training. Further, better availability of cash with them allows them to take care of medical expenses.
- Out-migration has significantly reduced. There have been 4–5 cases of producers making investments from their own resources or taking loans for expanding the poultry production infrastructure. Many producers have expanded their poultry sheds.
- In many cases, producers have bought assets, such as ornaments, cycles, agricultural lands (also on lease), from the poultry income. Quite a few producers have built new residential houses.
- If community response is an indicator of impact, in these clusters there exists tremendous demand for poultry as a livelihood activity. The positive demonstration by the project has motivated many private entrepreneurs to start broiler farming. Many independent poultry farms have also come up in the area.

early sixties proved the efficacy of modern poultry-rearing practices. Today, those efforts have been thoroughly dissipated. These states are part of the low poultry-producing states where some focused efforts and increased resource allocation and investments can make all the difference.

Large investment funds are already available under poverty-alleviation programmes, such as SGSY, RSVY, and other area development programmes.

Argument

The wage component in the final product is just 9–11 per cent giving poor very little competitive advantage. The huge capital investment required makes it very risky for poor.

There is a strong case that the smallholder poultry model has the best chance of success here - as there exists huge rural unemployment leading to low wages, more so for women. Given the fact that poultry is still undeveloped, a professional set-up can bring the technology along with modern poultry-rearing practices that would help create very viable robust production systems in these areas.

■ Arguments 'for and against' poultry

Some development activists have argued that initiating poultry as a tool for poverty eradication is beset with economic, moral and ecological hazards. Some of the major arguments along with response/comments for the same based on years of enriching experience in promoting poultry for livelihood are given in the following paragraphs.

- **Response/Comment:** There is no case of comparison with other activities. The whole idea is to help poor 'cash in' the fast growth in a big sector. Within the sector, given the state of technology - the criticality of 'husbandry' make small owner-account broiler units more efficient than big 'employed labour' units. This is the defining, in-sector competitive advantage of the smallholder model. Right sizing the enterprise and making it less risky is possible through the creative organisation of the supply chain. The experience shows that it is definitely possible. Nonetheless, this remains the biggest professional challenge in a fast growing and dynamic industry.

- **Response/Comment:** Past experience of small-holder poultry had never been built on the strengths such as horizontal spread of disease and production efficiency of owner account firms. Further, it had failed to bring the state-of-the-art technology and possibility of cost reduction with integration. The experience at Kesla and other similar cooperatives show that this can indeed work in view of the inherent robustness of the model.

Argument

The smallholder poultry model built on the lines of industrial poultry would be very difficult to survive, given the scale required to succeed. This is amply demonstrated by the fact that smaller units have almost disappeared; in southern and western India one would not find many small units.

- **Response/Comment:** It is now well documented that with the advent of compound live-stock feed manufacturing, maize productivity has gone up by three-fold and the industry has created millions of livelihoods through the commercial production of maize. For example, the rabi maize belt in Bihar, home to some of the poorest in India, could grow because of the demand for maize by the feed industry. The other argument is the quality of food produced through the conversion of maize in to chicken is much superior on all the nutrient and protein scores. Further, the industry also uses more than 30 per cent of the waste of the solvent oil extraction units as poultry feed ingredients. This conversion of by-product into high-value food is well recognised as the reason for growth of both the industry and farming sectors, such as soyabean, which provides more than million livelihoods. The argument that the activity is inherently anti-poor is, therefore, fallacious.

Argument

The poultry production uses ingredients, such as maize, which is a staple diet of poor people and converts them into broiler meat, a food product that is at best a luxury food product for the rich.

- **Response/Comment:** This is a matter of personal preference and some have equally compelling arguments against milk. The case of animal welfare and environmental hazard needs to be incorporated to make the programme holistic. The efforts at machine processed chicken shops are in this direction.

Argument

Cruelty to birds during rearing, for subsequent killing and the process of butchering is abhorrent.



Good feed, water and air are required to grow healthy chickens

Address list of smallholders poultry cooperatives

Madhya Pradesh

1

- **Name and address of cooperative** Mahila Murgi Palak Sahakari ta Maryadit
C/o Poultry Training Centre, Village Sarra,
Tehsil Churhat, Distt Sidhi, Madhya Pradesh
Telephone: (07802) 272276
- **President** Ms. Urmila Bai
- **CEO** Mr. Om Prakash

2

- **Name and address of cooperative** Kesla Poultry Sahakarita Maryadit
Post Sukhtawa, Kesla Janpad,
Dist.Hoshangabad, Madhya Pradesh 461 553
Telephone: (07572) 271418, 271428
- **President** Mrs. Sarojbai
- **CEO** Dr. M.P.Hazarika

3

- **Name and address of cooperative** Mahila Murgi Utpadak Swattya Sahkarita
At & Po: Jatara, Tikamgarh, Madhya
Pradesh - 472118
Telephone: (07681) 254787
- **President** Mrs. Kamla bai
- **CEO** Mr.K.V.S. Choudary

4

- **Name and address of cooperative** Orchha Garmeen Mahila Murgi Utpadak
Sahkarita Maryadit
At & Po: Orchha,Tikamgarh,Madhya Pradesh.
Telephone: (07680) 252342
- **President** Mrs. Parbati bai
- **CEO** Dr.Alimaz Hussain

5

- **Name and address of cooperative** Rajnagar Garmeen Mahila Murgi Utpadak
Sahkarita Maryadit
At & Po: Bamitha, Teh- Rajnagar,
Chhatarpur, Madhya Pradesh
Telephone: (07682) 240973
- **President** Mrs. Guddi bai
- **CEO** Mr.Subhankar Chatterjee

Jharkhand

6

- **Name and address of cooperative** Torpa Grameen Poultry Cooperative Society Limited
C/o Ms. Shobha Jaiswal, Torpa Road,
Near Check Post, Khunti, Jharkhand 835210
Telephone: (06528) 220164
Bhaskar: 9431168680
- **President** Ms. Magdali Bhangra
- **CEO** Mr. Bhaskar

7

- **Name and address of cooperative** Lohardaga Grameen Poultry Cooperative Society Limited
PRADAN Campus, Raghutoli, Lohardaga,
Jharkhand 835302
Telephone: (06526) 224358
- **President** Ms. Susma Devi
- **CEO** Mr. Subhendra Sanyal

8

- **Name and address of cooperative** Gumla Grameen Poultry Self-supporting Cooperative Society Limited
C/o PRADAN, Near Bina Cinema Hall,
Chettar Road, Gumla, Jharkhand 835207
Telephone: (06524) 223807
- **President** Ms. Pairba Devi
- **CEO** Dr. Pankaj Das

9

- **Name and address of cooperative** Potka Grameen Poultry Sahakari Samiti Ltd.
C/o PRADAN, 44, Circuit House Area (Old),
Jamshedpur, Jharkhand 831001
Telephone: (0657) 2234087
- **President** Ms. Puspa Mala Sardar
- **CEO** Ms. Sumon Laskar

10

- **Name and address of cooperative** Senha Grameen Poultry Cooperative Society Limited
PRADAN Campus, Raghutoli, Lohardaga,
Jharkhand 835302. Telephone: (06526) 224358
- **President** Ms. Sahmania Devi
- **CEO** Mr. Aswini Bhattacharyya

11

- **Name and address of cooperative** Petarbar Grameen Poultry Cooperative Society Limited
C/o PRADAN, Near New Bus Stand,
Post Petarbar, Distt Bokaro,
Jharkhand 829121,
Telephone: (06549) 265757
- **President** Ms. Daibaki Devi
- **CEO** Mr. Rabindra Nath

12

- **Name and address of cooperative** Koderma Grameen Poultry Cooperative Society Limited
C/o Kishore Chatterjee, Devi Mandap Road,
Jhumri Telaiya, District Koderma,
Jharkhand 825409
Telephone: (06534) 225533
- **President** Ms. Chameli Devi
- **CEO** Mr. Sukanta Sarkar

Chattisgarh

13

- **Name and address of cooperative** Raigarh Grameen Poultry Cooperative Society
C/o PRADAN, Vinobha Nagar,
Boirdadar Chowk, Post Boirdadar Raigarh,
Chattisgarh 496001
Telephone: (07762) 225887
- **President** Ms. Rangmet Rathia
- **CEO** Mr. Kasinath Metiya

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Glossary

A

All-in-all out system: The induction of a fresh batch of chicks only after the completion of the earlier batch so that at any time the farm will have a single batch of birds of one age group.

Ambient condition: The prevailing or surrounding environmental conditions including temperature, humidity, etc.

Amino acids: The building blocks of proteins. It is in this form the proteins are absorbed into the blood vessels. They are defined as essential and non-essential. Requirements for the essential amino acids – Lysine, Methionine and Tryptophan - are critical in the analysis of raw materials and formulation of diets of birds.

Ammonia: An unpleasant gas (NH₃) given off by fermenting droppings. Since this pollutes the shed atmosphere it should be minimized. Keeping the droppings dry, removing them frequently and increasing ventilation are the three ways of keeping ammonia levels low in poultry sheds.

Anabolic agents: The biological process in which complex molecules are synthesised from simpler ones is called anabolism. The agents, which promote such processes, are the anabolic agents.

Antibiotic: A substance produced by microbes, especially moulds, which has the ability to inhibit growth of, or to destroy other microbes.

Antibody: A type of protein that attacks foreign invaders, such as bacteria, virus, etc., in the body. These are immune substances, which provide protection against diseases by reacting with the antigen.

Antifungals: Chemical substances that are used to control fungal infections.

Antigen: A virus or other foreign substance in the body that triggers an immune response.

Antimicrobials: Chemical substances used to control infection from micro-organisms.

Antioxidants: Substances that prevent the oxidation of fats, which cause rancidity. For example, vitamin E is added to fishmeal to stop rancidity of the fat in the meal.

Anti stress factors: Substances that reduce the ill effects of stress in poultry birds.

Appetizers: Substances that stimulate feed intake in poultry birds.

Aspergillosis: Brooder pneumonia - a disease of lungs and air sacs caused by the fungus *Aspergillus*, especially in brooder chicks.

B

Backyard poultry: Traditional poultry keeping that supplies the family needs for eggs and meat, perhaps leaving a little surplus for sale. The flock size is usually small and the birds are kept in the backyard or in the homestead area.

Bacteria: Microscopic, unicellular organisms occurring everywhere in nature. They vary in size, shape, habits, habitats and growth requirements.

Balanced feed: The daily feed allowance of birds, which includes suitable proportions of nutrients required for normal growth, production and well-being.

Bio security: Pathogen-free development and maintenance of flocks. It provides the basis for major changes in the health and sanitation practices of the poultry management.

Bird: Any member of the class Aves of the phylum Vertebrata, the body of which is more or less covered with feathers. The term avian refers to birds in general.

Breed: A group of birds separated and maintained having a specific identity and a common origin and characteristics, which distinguish them from others within the same species. There may be varieties within a breed distinguished by differences of colour and markings.

Broilers: Fast-growing birds, which mature in 5 to 7 weeks for the table purpose and have tender meat with soft, pliable, smooth textured skin and flexible breastbone cartilage.

Brooding period: The time interval when the young chicks are still supplied with supplementary heat, lasting for two weeks in the tropics depending on the housing and weather conditions.



Caeca: Pair of closed branches at the junction of small and large intestines. Their main function is the fermentation and digestion of fibre, the undigested part of which is evacuated every eight hours or so as soft creamy droppings.

Calories: A term used as a measure of energy turnover in animals. It is the amount of heat required to raise the temperature of 1 kg of water from 15 0C to 16 0C.

Cannibalism: A vice that may occur in chickens of all ages. Feather picking and toe picking are simpler forms of cannibalism, which usually start under conditions of overcrowding at brooding. Cannibalism may develop into more serious forms of head, wing and vent picking. Overcrowding, over lighting, lack of exercise and an improper ration may be other causative factors. Even a low level of cannibalism reduces performance. Preventive measures are debeaking and dimmed lights.

Carcass: The dead body of an animal whether it is slaughtered or natural death.

Chick: A newly born baby bird of either sex.

Chilling: Young chicks exposed to cold suffer setback in growth as they do not eat or, drink properly. They crowd at the source of heat, which may cause trampling. Chicks are, therefore, protected from chill by being reared under an artificial brooder.

Chronic Respiratory Disease (CRD): Also known as air sac disease, caused primarily by *Mycoplasma gallisepticum* (MG).

Coccidiosis: A protozoan disease of birds and animals.

Coccidiostat: A drug used in feed at low levels and fed continuously to prevent coccidiosis.

Crop: The enlargement in the bird's gullet at the base of the neck in which food is temporarily stored before it passes to the gizzard.

Crude protein: The total protein content of the feed expressed in percentage.



Deep litter: The form of bedding material used in most housing systems where birds are kept on the floor. Saw dust is the most common form of litter used, although chopped straw, paddy husk, etc. have proved to be useful alternatives. The litter thickness should be 3–4 inches for broiler birds. For the litter

to breakdown and remain dry and friable, ventilation and avoiding water spillage are critical factors. Litter is replaced after each production cycle. The litter disposed of makes valuable manure.

Deworming: Administering suitable drugs to birds to either kill or expel the intestinal parasites.

Diagnosis: The interpretation of symptoms for determining the cause of a disease.

Diarrhoea: Scouring or watery droppings.

Dipping: The brief immersion of a chick's beak in a liquid solution, which may be of vaccines, medicines, etc.

Disease: The deviation from a normal state of health whereby the normal life process is disturbed.

Disinfectant: A product, which, at certain concentrations, will kill on contact a wide range of disease-causing organisms.

Drinker: A container used to provide water for the birds.

Droppings: Waste matter / faeces voided by the birds. The word also refers to poultry manure.



Egg yolk: The central yellow portion of a hen's egg, which contains the germ cell; a rich source of food material.

Enteritis: The inflammation of the lining of the intestine.

Environment: The sum total of all external conditions, which affect the life of the birds.

Enzymes: Proteinaceous substances that help in the chemical reactions that take place within the body, for example, the digestion of feed.

Epidemic: A widespread disease affecting birds on a large scale.

Essential Amino acids: Amino acids that the body cannot produce on its own in enough quantities to meet the requirement and, therefore, must be supplied in the diet. They are Arginine, Cystine Glycine, Histidine, Isoleucine, Lysine, Methionine, Phenylalanine, Threonine, Tryptophan and Valine.

Etiology: The term refers to the study of the causative agent of any disease process.



Feed: The food for animals.

Feed Conversion Ratio (FCR): An index of efficiency expressed in terms of kilograms of feed per kilogram weight gain in meat type birds.

Feed intake: The amount of feed consumed by a bird.

Feed supplement: Feed or feed mixture comparatively richer in particular nutrients such as vitamins, minerals, etc.

Feeders: Containers for providing feed for a flock.

Feeding: The practical application of nutrition, that is the consideration of economics, management, formulation, palatability, non-nutritive additives, etc.

Finisher feed: Feed that is used for fattening the broiler birds. It contains about 20 per cent crude protein and more than 3,200 cal energy per kg of feed.

Flock: A group of birds.

Floor space: The space provided to birds under an intensive or a semi-intensive housing system.

Fowl: Any bird, but commonly refers to the domestic birds.

Fumigation: Fumigant is a liquid or solid substance, which produces vapours that destroy pathogens, insects and rodents. The process is called fumigation. Formaldehyde is the gas given off during the fumigation of the shed or equipment. It is active against a wide range of pathogens and is produced by heating para formaldehyde crystals or adding formalin to potassium permanganate.

Fungus: One of the lowest forms of plant life that includes moulds and mushrooms.



Gasping: A condition of respiratory distress.

Gizzard: Part of the digestive system of the fowl between the stomach and intestine. Its muscular walls and a thick, horny lining help in the grinding of feed.

Gland: A tissue or organ that produces and releases useful chemical substances, which regulate the growth and development of the body.

Gram-negative bacteria: Those bacterial species, which are decolourised by acetone or alcohol.

Gram-positive bacteria: Those bacterial species, which retain a crystal violet colour even when exposed to alcohol or acetone.

Growth promoter: Feed agent that enhances growth rate or feed conversion in broiler birds.

Gumboro disease: Also known as Infectious Bursal Disease (IBD) caused by the IBD virus.



Hatchery: A set-up having all the facilities designed to hatch chicks. Modern hatcheries are usually equipped with large setters and hatchers, for incubation and hatching.

Hatching: It is the process by which the fully developed foetus (chick) leaves the protected environment of the egg and emerges out as a fully developed chick.

Hatching eggs: An egg of good form and quality produced by a breeding flock, which can be used for producing commercial broiler chicks.

Hen: A female fowl that lays eggs.

Hock: Joint of the thigh with the shank, sometimes called the knee or the elbow.

Hormones: A chemical secretion from ductless glands.

Humidity: The presence of water vapour or moisture content in the air.

Hybrid: The product of two or more pure lines, which tends to exhibit hybrid vigour and is superior to either of its parents.

I

Immune: Capable of resisting disease because of adequate antibodies.

Immunity: Resistance to infections.

Immuno stimulants: Substances that stimulate and enhance immunity.

Income elasticity: Income elasticity of demand is the percentage change in the quantity purchased of a commodity over a specific period of time divided by the percentage change in the consumer's income.

Incubation period: The period between the setting and hatching of eggs, being 21 days in chicken. In the context of poultry diseases, the incubation period means the period between the contact with the pathogen and appearance of the symptoms.

Indian Red Jungle Fowl: Wild jungle fowl (*Gallus gallus murghi*) found in northern and northeastern parts of India.

Indigenous bird: Local bird; not a pure breed, exhibit great variation in size, shape, colour and conformation. Best mother and ideal sitter, good forager, adaptable to village husbandry conditions.

Infection: The invasion of body by pathogenic organisms resulting in a disease.

Infectious Bronchitis (IB): An acute, contagious and rapidly spreading virus disease, characterised by gasping, coughing and crackling breathing sound, watery discharge from the nose, sometimes with a swelling of sinuses.

Inflammation: The reaction of body tissues to irritation characterised by swelling, heat, redness and pain.

K

Killing cone: A metal cone in which the birds are placed for immobilisation before slaughtering

Kilo calorie (kcal): A unit of energy, which equals thousand calories, used in poultry feed industry.

L

Layers: Poultry birds specifically meant for egg production.

Lesions: Visible changes in size, shape, colour or structure of an organ or tissue.

Litter: An absorbent material used for bedding and collecting the droppings in a poultry shed.

Live weight: A term associated with the meat birds to indicate its weight before slaughter.

Lux: A unit of measurement of light. One foot candle = 10.76 lux.

M

Maize: A cereal forming an important component of broiler feed. It has the highest energy of all cereals at 14.17 mega joules per kg and has 9 per cent protein.

Marek's disease: A disease that affects the nervous system, various visceral organs, eyes, skin and muscles. It is highly contagious with a high rate of mortality.

Mash: A form of complete feed that is finely ground and mixed in required proportions, so that birds can't easily separate out the ingredients and each mouthful provides a well-balanced diet. It is cheaper and economic but lesser growth rate and uneven growth are its limiting factors.

Mason: A man whose work entails building with stone, bricks or similar materials.

Maternal: From the mother's side.

Metabolizable Energy (ME): It is the amount of energy available to an animal for utilisation. It represents the portion of gross energy that is not lost through faeces, urine and gas. It accurately represents the useful energy in the feed. It is expressed in calories.

Micro-organisms: Organisms, such as bacteria, which are not visible to the naked eye.

Minerals: The ash portion of the feed nutrients, which are essential constituents of both plants and animals. They are used for bone and egg formation, digestion, and maintenance of body fluid balances and for many vital body functions.

Morbidity: Reduced performance due to sickness.

Mortality: Death rate, usually expressed in percentage.

Mortar: A mixture of sand, water and cement for holding bricks or stones together.

Mould: A term used to refer to any fungus, which normally forms visible mycelia growth.

Mycotoxin: 'Myco' means mould and 'toxin' means poison. Therefore, 'mycotoxin' means mould poison. Mycotoxins can be produced by a number of common moulds under certain growth conditions.

N

Navel: A remnant mark on the skin in the abdominal area where the chick had its attachment to the yolk sac before hatching.

Newcastle Disease (ND): Also known as ranikhet disease, highly fatal and contagious, which is caused by a virus of the paramyxo family.

Nutrients: The components of feed, which are utilised by the bird for maintenance and production purposes.

Nutrition: The sum total of processes, including digestion and assimilation, by which the bird absorbs and utilises food substances.

M

Ocular: Through eyes.

Oedema: Accumulation of fluids in the body causing swelling.

Omphalitis: Also known as navel infection. Caused by bacterial infection of the navel. Primarily a hatchery-borne disease.

Oral: Through mouth.

P

Paravet: A person trained in the basics of animal health care and management.

Parasitic infections: Related to the infestation of parasites.

Parent stock: Strains of bird, maintained for producing hatching eggs of commercial broiler chicks.

Pellets: Pellet feed is prepared by exposing the mash to heat treatment under pressure. The heat added cooks the feed for better digestibility and kills the germs and anti-nutritional factors present in the feed. The selective feeding and wastage of feed can be eliminated by the use of pellet feed. It provides better FCR but can lead to wet litter problem in flock and over consumption.

Plinth: A projecting part of a wall immediately above the ground.

Post-mortem: The examination of a dead bird usually to determine the cause of death.

Poultry: The species of fully domesticated birds that are of economic importance to man in terms of the eggs and meat for human consumption.

Poultry husbandry: The science and art of the production and distribution of poultry and poultry products, including breeding, incubation, brooding, rearing, housing, feeding, marketing and poultry farm management.

Poultry management: The organisation and operation of poultry farms to maximise and to get continuous profitable incomes. It considers the effectiveness of the different sizes of operating units and the combinations of productive resources, enterprises and practices for operating units.

Protozoan: Microscopic single-celled organisms.

Pullorum: A disease also known as bacillary white diarrhoea, fatal to young chicks caused by the bacteria *Salmonella pullorum*.

Pure Line (PL) : A strain, the individual members of which are genetically pure as a result of continued inbreeding.

R

Ranikhet disease: Also known as the New Castle disease. Infectious, contagious and highly fatal disease caused by a NDV virus. It affects birds of all ages.

Rickets: A disease caused due to vitamin D deficiency. It inhibits the normal growth of bones and the

normal assimilation of calcium and phosphorus, causing malformation of the bones. In younger birds it is called perosis or 'slipped tendon' disease.

Relative Humidity (RH): The ratio of the amount of water the air contains over that which it can contain when fully saturated, expressed in percentage.



Sanitation: The means and measures directed towards establishing and maintaining an environment in which it is safer for poultry to exist.

Starter feed: Feed used for the initial three weeks or up to 700 gm body weight in a broiler. It contains at least 22 per cent crude protein and 3,000 cal energy per kg of feed.

'Stree Dhan': A concept in Hindu society where cash/savings are set apart exclusively as a security to women to meet any exigencies.

Strain: Group of fowls within a variety.

Stress: External forces producing behavioural disturbances, which generally reduce the immunity of birds to diseases.

Swine: Hogs or pigs.

Syndrome: A group of symptoms characteristic of a disease.



Toxin: Poison produced by bacteria, fungus or a chemical, which is poisonous.

Turkey: A large wild or domesticated bird with small naked head, strong legs and wings and a spreading tail, native to America, raised for its delicious meat.



Unabsorbed yolk: In hen's egg the remaining yolk sac is withdrawn into the body cavity on the 19th day. It is connected directly to the intestine and the remaining yolk is absorbed rapidly after hatching.

Udyogmunshi: A software specially designed for the smallholder poultry programme, which is in use in PRADAN's livelihood projects.

Unidentified Growth Factors (UGF): Not all the nutrients in feed raw materials have been identified. Thus, there are UGFs said to be present in fishmeal, grass meal, etc.



Vaccination: A practice of artificially building up body's immunity against specific infectious diseases through inoculation with a specific antigen (vaccine).

Vaccine: Preparations of dead or weakened disease-causing viruses for immunisation against those diseases. Some bacterial vaccines are also used but diseases caused by bacteria are more readily controlled by antibiotics and disinfectants. All commercial stock is given routine vaccination via water, spray, eyedrop or injection against major diseases.

Vent: The anus; cloacal or anal aperture in birds. Through this opening birds lay eggs, pass faeces and urine.

Ventilation: The free flow of air that helps in the replacement of foul, moist air with fresh air in poultry houses. Care should be taken to avoid direct draft and cold air, which are harmful to birds.

Virus: The smallest type of micro-organism, which cannot reproduce outside a living cell. It is the cause of many major diseases.

Viscera: The soft internal organs of the body especially of the abdominal cavity.

Vitamins: A fat or water-soluble substance necessary in vary small quantities, for normal healthy growth, development and reproduction.



Water sanitiser: Chemical agents used to make water free from common microbes.

Abbreviations

AIA	Acid Insoluble Ash	NSD	Non-Specific Diarrhoea
BMR	Basic Metabolic Rate	OD	Over Draft
BTU	British Thermal Units	PAN	Personal Access Number
CC	Cash Credit	PAT	Profit After Tax
CEO	Chief Executive Officer	PBT	Profit Before Tax
CMI	Cell-Mediated Immunity	PBIT	Profit Before Interest and Tax
CP	Crude Protein	pH	Symbol to represent Hydrogen ion concentration - indicates acidity or alkalinity
CRD	Chronic Respiratory Disease	PRADAN	Professional Assistance for Development Action
DAH	Department of Animal Husbandry	RDVF	Ranikhet Disease Vaccine - Fuller's
DCP	Dicalcium Phosphate	RDVL	Ranikhet Disease Vaccine - Lasota
DD	Demand Draft	RH	Relative Humidity
DM	Dry Matter	ROI	Rate of Interest
DOC	Day-Old Chick	RPD	Return Per Day
DSCR	Debt Service Coverage Ratio	SDS	Sudden Death Syndrome
EBIDT	Earnings Before Interest Depreciation and Tax	SHG	Self-Help Group
ECM	Early Chick Mortality	ST	Sales Tax
EE	Ether Extract	TDS	Tax Deduction at Source
FAO	Food and Agriculture Organization	TGPCS	Torpa Grameen Poultry Cooperative Society
FCR	Feed Conversion Ratio	TLC	Tender Love and Care
IBD	Infectious Bursal Disease	USA	United States of America
IB	Infectious Bronchitis	USAID	United States Agency for International Development
ICMR	Indian Council for Medical Research		
IRDP	Integrated Rural Development Programme		
IRR	Internal Rate of Return		
IT	Income Tax		
IU	International Units		
Kcal	Kilo calories		
KPS	Kesla Poultry Society		
KVIB	Khadi and Village Industrial Board		
KVIC	Khadi and Village Industrial Commission		
KW	Kilo watt		
LPG	Liquefied Petroleum Gas		
LSP	Lime Stone Powder		
MD	Managing Director		
ME	Metabolisable Energy		
Mg	Magnesium		
MIS	Management Information System		
MP	Madhya Pradesh		
M RTP	Monopolistic and Restrictive Trade Practices		
NABARD	National Bank for Agriculture and Rural Development		
NaCl	Sodium Chloride		
NFE	Nitrogen-Free Extract		