Management in Small Poultry Farms

D P MATHUR AND V K GUPTA

The Book

During last few years, small commercial poultry farms were concerned over the bullish trend in feed prices, unfavourable egg feed-price ratio, choice of technology and lack of proper infra-structural facilities for egg production and marketing. This study highlights some of the important structural characteristics of small poultry farms and suggests ways and means of improving economics of these as well as areas of intervention by the Government.

MANAGEMENT IN SMALL POLTRY FARMS

MANAGEMENT IN SMALL POULTRY FARMS

A STUDY IN MAHARASHTRA AND GUJARAT REGIONS

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Foreword

Amongst off-farm economic activities which can provide reasonable and stable income to poor households of agricultural labour and small and marginal farmers, poultry keeping should rank quite high. While substantial improvement took place in the poultry industry in India over the last two decades, little seemed to have happened by way of small poultry for small people. Perhaps the usual story of agricultural development taking place for the rich farmers and the poor remaining outside the mainstream happened in the poultry also even though poultry keeping was traditionally a lowly job. Very large farms on the Poona-Bombay highway and at several other places are a living evidence of the above.

However, most of the development programmes for small farmers, marginal farmers etc. over time emphasised poultry as a method of ameliorating the conditions of poverty for the large majority. Such programmes in relation to poultry do not seem to have fared well in most states while in a few they had made quite a headway.

The study tries to probe the micro management factors which over time could make such programmes as mentioned earlier a success. It not only looks at the policy implications of the suggested changes but also suggests measures of operational significance. It is, therefore, a welcome addition to the list of monographs of the Centre for Management in Agriculture at the Institute.

I think that the book is not only useful for the policy makers, administrators of programmes for the rural poor, and financial institutions, but also for the managers of small poultry farms.

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Acknowledgements

Introduction

1.1 Importance of Poultry Products

Several studies have pointed out the lack of calorie-protein in Indians. Reportedly, on an average, an Indian daily diet contains 50 gms. of protein as against the minimum requirement of 70 gms. As against the recommended minimum of 22 gms. of animal protein per day, Indians consume only six gms. This inadequacy also causes rickety frames, stunted figures, mental retardation, and premature deaths among large members. The inadequate consumption of calorie-protein results from poor economic standards of the people, and social and religious taboos against consumption of non-vegetarian foods.

The United Nations International Children's Emergency Fund (UNICEF), appraising its supplementary feeding programme, collaborated with the Government of India and the Food and Agriculture Organization (FAO) to launch a nutrition education programme along with supplementary feeding through the Applied Nutrition Programme (ANP) in the early 1960s. Poultry, dairying, fisheries, kitchen garden etc. were encouraged on scientific lines. These efforts, however, had no appreciable effect on the problem of malnutrition. But they made the urban elites and rural masses aware of the importance of nutrition and the benefits from consuming poultry products.

Gradually religious prejudices against consuming non-vegetarian food were shed and today a vast section of the urban vegetarian population consumes eggs. Under this situation, egg

consumption can supplement nutritional deficiency in India.[1] Apart from meeting the nutrition requirement extensive poultry rearing can convert non-edible industrial and agricultural by-products into rich nutritive foods,[2] can provide rich poultry manure for plants,[33] and generate self-employment opportunities with quick returns due to a prolific output from a shorter lifecycle of birds.

1.2 Poultry Development in India

1.2.1 Quantitative and Qualitative Improvements

India was the original home of the famous jungle fowl from which most present-day breeds of the world are supposed to have descended. Until two decades ago, poultry farming was a backyard activity limited to rearing a few desi birds laying about 60 eggs per cycle. Intensive poultry farming on scientific lines began in the early 1960s, has since progressed significantly.

Between 1961 and 1974, poultry birds increased from 35 million to 97 million in India and egg production increased from 2,340 million to 7,740 million. Furthermore, about 74 per cent of egg production in 1976 was accounted for by 49 per cent of improved birds (Exhibit 1.1). This indicates quantitative and qualitative improvements, and sophistication attained by poultry farming during this period in the country. Thus, today India ranks among the world's 15 leading countries in egg production (Exhibit 1.2).

Qualitative improvements in poultry farming have been dealt with under the Five-Year Plans.

Second Five-Year Plan: 1956-60: A modest beginning in commercial poultry was made in the First Plan with the encour-agement of breeding, development of vaccines, and launching of

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[1] Egg is rich in protein, minerals, and essential aminoacids required for body growth. Two eggs can meet a large part of the daily require-ment of protein, minerals, and aminoacids. Poultry meat has low calorific value, low fat, and high protein content.

[2] A daily laying bird convert vegetable proteins into animal protein with an efficiency percentage of 10 dry matter to 39.7 protein which is highest among all domestic animals.

[3] Poultry manure contains dryweight per cent 1.46 nitrogen, 1.17 phosphorus, and 0.62 potash which is the highest nutrient level among all organic manures.

a pilot project in Orissa, which was widened into an all-India Poultry Development Programme during the Second Five-Year Plan. The introduction of exotic varieties, like white-leg Horn and Rode Island Reds and efforts to replace desi stock were made in a phased manner. Five regional poultry breeding farms were set up to introduce and acclimatize genetically superior stock imported in 1956 from USA.

Third Five-Year Plan: 1961-65: Governmental development programme improved the quality of birds. Chicks were imported from Australia in 1965 for government breeding farms. Poultry breeding farms were established by the government in different regions under the state directors of the Animal Husbandry Departments. The government also organized the Intensive Poultry Development Project (IPDP) in 92 areas (Exhibit 1.3) and Intensive Egg Production and Marketing Centres (IEPMC) in 77 areas in different states. To meet the growing needs, technological developments were made in the deep litter system of poultry keeping, production of balanced feed by encouraging poultry feed manufacturing units in co-operative and private sectors (30), establishment of commercial hatcheries (four), and multiplication of exotic, hybrid, and high yielding layers.

Fourth Five-Year Plan: 1969-74: With the sound infra-structure laid during the Third Plan, the Fourth Plan prioritized the breeding of better stocks and popularization of scientific practices in areas other than those covered under IPDP. All India Co-ordinated Research Projects (AICRP) were launched to develop suitable strains of poultry for eggs and poultry meat. Besides, the Central Training Institute for Poultry Production and Management (CTIPPM) was set up at Bangalore to offer courses in poultry science and undertake research on problems. Five hatcheries, each of 50,000 egg capacity, were set up at Bangalore, Bombay, Calcutta, Chandigarh and Delhi. Poultry equipment production made major advances, particularly in the manufacture of feed mixing plants, incubators, and cages,

1.2.2 Role of Financial and Development Agencies

The development programmes significantly effected quantita-tive and qualitative improvements in poultry husbandry in India through earmarked capital outlays during the Five-Year

Plans. Government investments on poultry development amounting to less than Rs. 30 million during the Second Plan increased to Rs. 115 million during the Fourth Plan. During the Fifth Plan, planners had ambitious plan for poultry development and recommended an investment of Rs. 175 million.

The sources for financing poultry farming increased. Commercial banks channelized their financial resources for poultry development at concessional rates of interest. The Agricultural Refinance Corporation assisted state co-operative banks and commercial banks in financing about 50 poultry development projects.

To help the economically weaker sections, the Small Farmers' Development Agency (SFDA) and Marginal Farmers' and Agricultural Labourers' Development Agency (MFAL) were fpemployment potential and income. These schemes, besides offering loans at concessional rates of interest for poultry farming, subsidized at 33 per cent of the total cost of land, building, purchase of equipments, and birds.

1.3 Regional Concentration of Poultry Population
1.3.1 State-wise Growth of Poultry Population

Poultry population increased by about 20 per cent in 1972 as compared to 1961 and per capita egg production increased from 8.4 in 1968-69 to 13.1 in 1974-75. Nine states in the South and East Zones accounted for 73 per cent of the total poultry population in 1972. Andhra Pradesh in the South Zone and West Bengal in the East Zone alone accounted for 25 per cent. Between 1961 and 1971, changes had occurred in the relative share of poultry population in India. Poultry population in the Central, West, and East Zones declined, while that in the North and South Zones, other smaller states, and union territories increased marginally. Poultry population doubled in Haryana, Punjab, and Himachal Pradesh in the North Zone. Kerala was the only state in the South Zone where poultry population increased by 34 percent in 1972 as compared to 1961. Significantly, the highest increase (of nearly four times) was observed in smaller states and union territories.

This phenomenal increase in the poultry population caused

a spurt in the per capita availability of eggs even comparatively in a shorter time (1968-69 to 1974-75). The number of states and union territories with per capita production of more than 12 eggs per year in 1968-69 increased to 11 in 1974-75. Assam, Orissa, and smaller states and union territories significantly improved their egg production. However, if the yearly requirement of 183 eggs per capita is considered (daily half egg per capita), even in 1974-75, four states in order of importance, viz., Karnataka (55 eggs), Jammu and Kashmir (41 eggs), Kerala (37 eggs), and Punjab and Haryana (18 eggs) could meet 10 to 30 per cent of the nutritional requirements.

1.3.2 Concentration of Commercial Poultry Farming

A large number of commercial poultry farms were concentrated in a few pockets. Estimates of various authorities and institutions showed the 30 most important commercial poultry farming areas (Exhibit 1.5). The highest concentration was in the North Zone (42 per cent), followed by Western Zone (31 per cent), South Zone (22 per cent) and East Zone (4 per cent). The biggest concentration of commercial poultry birds was near Ludhiana in Punjab (750 thousand). Most commercial poultry farms tended to be established near the urban centres to meet the relatively high demands of eggs and poultry products.

1.4 Rationale of the Study

The preceding sections revealed the pace of poultry development programmes in India. However, the Fifth Plan envisaged a growth rate of 10 per cent per annum to achieve the target of 1,24,440 million eggs in 1978-79 as against the minimum nutritional requirement of 1,20,000 million eggs. Furthermore, planners and policy makers have already indicated the utilization and development of local human and natural resources to generate employment and supplement incomes in the rural areas. However, to stimulate poultry development, it is necessary to assess various segments of the poultry industry to seek new perfections and directions for growth. The physical achievements of the poultry development programmes can be reflected only in the reciprocity and growth of participants. But during the past few years, commercial poultry units have expressed their concern over the bullish trend in feed prices, unfavour-

able egg-feed price ratio (EFP), limited demand from society due to social factors and fluctuations throughout the year, and lack of proper marketing facilities. Therefore, any pragmatic approach towards the development of poultry farming from the "take off" stage cannot ignore the problems of poultry farmers concerning managerial efficiency and management practices of production, storage, marketing, and availability of inputs. The present study attempts to highlight important structural characteristics and problems at the producers' level, especially in the areas of egg production and marketing.

1.5 Objectives

1. To identify the structural characteristics of commercial poultry entrepreneurs in relation to their socio-economic characteristics, managerial skills, farms' structure, and poultry farming practices;
2. To examine resource availability and its utilization in commercial poultry units;
3. To study the input structure of egg production and the relationship between input and output; and
4. To identify marketing channels and their effectiveness in relation to the structure of the units.

1.6 Methodology
1.6.1 Selection of Regions of the Study

It was observed that among four zones of India, the North and West Zones had a higher concentration of commercial poultry population than the South and East Zones. Therefore, it was considered desirable to study in depth a region with sufficient infra-structural facilities, such as IPDP Districts, IEPEMC, and veterinary schemes and where poultry development had gathered momentum (Exhibit 1.6).

The North and West Zones were such regions. However, the North Zone was excluded from the study as poultry development was almost self-sustained. Furthermore, two studies conducted by the Directorate of Economics and Statistics[4] in

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4. *Studies in the Economics of Poultry Farming* (New Delhi: Directorate of Economics and Statistics, Ministry of Agriculture, 1972).

Punjab and Haryana Agricultural University in Haryana[5] indi-
cate the structural details and problems of producers. Therefore,
the West Zone was selected.

1.6.2 Selection of Districts

In the West Zone, two areas were selected for representing
the highest and lowest concentration of commercial poultry
layers, viz., Surat-Bulsar districts in Gujarat with the highest
concentration and Sangli-Satara districts in Maharashtra with
the lowest concentration.

These districts had similar infra-structural facilities such as
IPDP, IEPMC, hatcheries and poultry breeding farms (Exhibit
1.7).

Small poultry units was another criterion in selecting these
districts to understand their economic viability and possibilities
of their further promotion as a change-agent in rural develop-
ment. Reportedly small poultry units were facing serious
problems concerning the availability of inputs and marketing of
output. Therefore, their representation was deemed desirable.

1.6.3 Scope of the Study

The study was restricted to units having 5,000 birds. It was
assumed that technology and level of sophistication of large
units considerably differed from moderately big and small
poultry farms. It was also envisaged to cover private, co-
operative, and government enterprises but units in the latter two
categories were not sufficient and too large in size to be
included. To trace the crests and troughs of the poultry produc-
tion cycle, one latest complete cycle for each unit from the
chick to the disposal stage was studied.

1.6.4 Sample Size

From the list supplied by the Directorates of Animal
Husbandry in Maharashtra and Gujarat, 120 units, 60 in each

[5] *Economic Aspects of Production and Marketing of Poultry Products in
Haryana* (Hissar: Department of Economics, Haryana Agricultural
University, 1976).

region, were originally fixed in proportion to the total number of units of different sizes. However, due to problems in data collection, such as the non-availability of records with units, closure of units, inconsistency in the size of the units, their scattered pattern and suspicious and non-co-operative attitude of farmers, only 30 units could be studied in the Sangli-Satara districts. Though such problems were of lesser magnitude in the Surat-Bulsar districts, to have an equal number, the sample size here was restricted to 30. The distribution of poultry farms and sample size in the selected districts is presented in Exhibit 1.8.

1.7 Framework of the Report

Chapter 2 deals with the socio-economic characteristics of the sample entrepreneurs, locational details, and the pattern of capital investment. Comprehensive details of poultry-rearing practices, mortality among birds, pattern of egg production, and marketing are discussed in Chapter 3. The cost structure and economic performance of the poultry units are dealt with in Chapter 4. Summary and conclusions are presented in Chapter 5.

Structural Characteristics of Sample Poultry Farms

2.1 Introduction

The study on the management of poultry has been preceded by discussing important socio-economic characteristics of the poultry entrepreneurs and the structure of their farms.

The study of the socio-economic characteristics has important implications for the growth of the poultry industry. The adoption of poultry enterprises as a principal vocation is still considered with indifference in the urban and rural areas due to caste and religious biases, low educational level and lack of knowledge of poultry technology particularly in rural areas. With the emphasis on rural development programmes and the development of infra-structural facilities for poultry farming, an understanding of present poultry entrepreneurs will provide guidelines for the development of the industry particularly in rural areas.

2.2 Socio-Economic Characteristics of Entrepreneurs

2.2.1 Occupational Distribution

Because various categories of entrepreneurs are involved in poultry farming, their occupational distribution was studied. Table 2.1 shows that about 73 per cent of the entrepreneurs had poultry as their main occupation in the Sangli-Satara

districts. Agricultural labour was the principal occupation and poultry rearing was the subsidiary occupation of about 67 per cent of the entrepreneurs in Surat-Bulsar districts. Although it is popularly believed that owner cultivators were more inclined towards livestock rearing to supplement income and use by-products of their farms, the sample indicated that even business-men and persons in service undertook poultry farming as a subsidiary occupation in the Sangli-Satara districts. Regional variations according to occupations indicated that rural com-munities were shedding traditional attitudes and taking to poultry farming to augment their income.

Table 2.1: Occupational Distribution of Sample Poultry Entrepreneurs

	Districts							
	Sangli-Satara				Surat-Bulsar			
Occupation	Farm Size				Farm Size			
	Small	Moderately Big	Big	Total	Small	Moderately Big	Big	Total
I. Main Occupation								
Farming	—	1	—	1	2	1	—	3
Poultry	9	9	4	22	—	—	—	—
Service	2	2	—	4	—	2	1	3
Business	2	1	—	3	—	1	3	4
Agri. Labour	—	—	—	—	20	—	—	20
II. Subsidiary Occupation								
Nil	3	6	3	12	—	—	—	—
Farming						1	—	1
Poultry	8	3	—	11	20	3	4	27
Farming and Poultry	—	1		1	—			
Poultry and Dairying	1		—	1	—	—		
Small	1	2	1	4		—	.	
Farming and Business		1		1				
Agri. Labour	—	—	—	—	2	—	—	2

2.2.2 Caste Composition

It is common knowledge that caste stratification particularly among rural areas has made higher caste Hindus indifferent to pursue livestock rearing as their principal occupation. However, the distribution of sample poultry entrepreneurs in different caste groups indicated that about one-third of the poultry entrepreneurs in the Sangli-Satara districts and about 17 per cent in the Surat-Bulsar districts were Brahmins. Furthermore despite social sanction against non-vegetarian food among Hindus in Gujarat, about one-third of the poultry entrepreneurs belonged to one particular Patel community in the Surat-Bulsar districts. However, among different caste groups, Brahmins were predominant in (37 per cent) Sangli-Satara districts and Advises (37 per cent) in Surat-Bulsar districts. Thus a change among different caste groups towards poultry farming indicated a change in values and realization that the poultry rearing can supplement income. The distribution of poultry entrepreneurs among different caste groups is shown in Table 2.2.

2.2.3 Educational Status

Both in the Sangli-Satara and Surat-Bulsar districts all entrepreneurs in moderately big and big farms had studied up to SSC. All entrepreneurs in small farms in the Sangli-Satara districts were educated up to matriculation whereas a majority of the small entrepreneurs were illiterates (59 per cent) in the Surat-Bulsar districts. The principal occupation of small entrepreneurs, who were Adivasis, in the Surat-Bulsar districts was agricultural labour. Thus poultry entrepreneurs with minimum educational qualifications entering the poultry trade was very encouraging as they could exercise a better judgement on the sensitive issues in poultry management. Even in the Surat-Bulsar districts, small entrepreneurs were covered under co-operative set up and had a secretary for their day-to-day activities. The educational level of sample entrepreneurs is presented in Table 2.3.

Table 2.2: Caste of Poultry Entrepreneurs

	Districts							
	Sangli-Satara				Surat-Bulsar			
Caste	Farm Size				Farm Size			
	Small	Modera-tely Big	Big	Total	Small	Moderately Big	Big	Total
Brahmin	5	5	1	11	—	2	3	5
Maratha	3	3	3	9	—	—	—	—
Lingayat	1	2	—	3	—	—	—	—
Muslim (Shiya	2	2	—	4	1	—	—	1
Suthar	1	—	—	1	—	—	—	—
Rajput	—	1	—	1	—	—	—	—
Scheduled Caste	1	—	—	1	—	—	—	—
Patel	—	—	—	—	7	2	1	10
Harijan	—	—	—	—	3	—	—	3
Adivasi	—	—	~	—	11	—	—	11

Table 2.3: Educational Level of Poultry Entrepreneurs

	Districts							
Educational Level	Sangli-				Surat-Bulsar			
	Farm Size				Farm Size			
	Small	Modera-tely Big	Big	Total	Small	Modera-tely Big	Big	Total
Illiterate	—	—	—	—	13	—	—	13
Primary	—	—	—	—	9	—	—	9
Middle School								
High	2	1	1	4	—	—	—	—
S.S.C.	8	4	1	13	—	—	—	—
College	3	8	2	13	—	4	4	8

2.2.4 Training in Poultry

The governmental poultry development programmes provid-ed training to existing and potential entrepreneurs on the technical aspects of poultry management. A larger proportion of poultry entrepreneurs (93 per cent) in Surat-Bulsar districts benefited by such training programmes than in the Sangli-Satara

districts (37 per cent). In fact, here about 63 per cent of the poultry entrepreneurs did not attend any formal training programme (Table 2.4). A significant proportion (73 per cent) of entrepreneurs attended training programmes of 25 days and above in the Surat-Bulsar districts. In the Sangli-Satara districts, majority (27 per cent) of entrepreneurs had attended programmes ranging only up to 15 days. Apparently poultry training programme organized by 1PDP officials in collaboration with the SFDA had favourable impact in the Surat-Bulsar districts. Inter-personal communication among poultry entrepreneurs was equally advantageous in the Sangli-Satara districts in the absence of training facilities not availed of by large number of poultry entrepreneurs.

Table 2.4: Training in Poultry Farming among Poultry Entrepreneurs

No. of of	Districts							
	Sangli-Satara Farm Size				Surat-Bulsar Farm Size			
	Small	Moderately Big	Big	Total	Small	Moderately Big	Big	Total
Nil	8	9	2	19	_	1	1	2
1-15	4	3	1	8	—	—		—
16-25	—	—	1	1	5	1	—	6
Above	1	1	—	2	17	2	3	22

2.2.5 Family Size

Table 2.5 shows marginal differences in the family size among sample entrepreneurs in the Sangli-Satara districts (6.23) and Surat-Bulsar districts (5.20). Family size in moderately big farms varied significantly. Similarly, families of less than six were in a larger proportion (53 per cent) in the Sangli-Satara districts than in the Surat-Bulsar districts (47 per cent).

The number of adults in the family is important in understanding the involvement of family members. Most families in the Sangli-Satara districts (53 per cent) had three to five adult members whereas most families in Surat-Bulsar districts (57 per cent) had less than three adult members. About 63 per cent of adults in the Sangli-Satara districts and about 83 per cent in

Table 2.5: Family Size of Poultry Entrepreneurs

Family Size	Districts							
	Sangli-Satara				Surat-Bulsar			
	Farm Size				Farm Size			
	Small	Moderately Big	Big	Total	Small	Moderately Big	Big	Total
I. Number of Families With members Below 6	6	7	3	*16*	11	1	2	14
6-9	6	5	1	12	11	2	2	15
Above 9	1	1	—	2	—	1	—	1
II. Number of Families With Adults Below 3	3	1	1	5	15	1	1	17
3-5	6	7	3	16	7	3	2	12
6-8	3	4	—	7	—	—	1	1
	1	1	—	2	—	—	—	—
III. Average Size	5.92	7.00	4.75	6.23	*5.68*	5.50	4.25	5.20
IV. Percentage of Adults involved in Poultry	63.8	76.6	50.0	63.4	96.1	74.4	52.9	83.1

the Surat-Bulsar districts were involved in poultry farming. Small poultry farms particularly in the Surat-Bulsar districts had the large number of adults involved in poultry farming. The involvement of adults in poultry farming in big units was less than in small and moderately big units. However, it may not be construed that high involvement of adults in poultry farming was due to lack of alternative employment opportunities. It was logical to expect a high involvement of adults whose primary occupation was poultry farming. But a higher involvement of small entrepreneurs whose primary occupation was agricultural labour in poultry in the Surat-Bulsar districts was probably because they wished to augment their family incomes. The poultry development activities initiated in

the districts might have influenced these entrepreneurs in the decision-making process towards poultry.

2.3 Structural Details of Poultry Farms

2.3.1 Rural-Urban Distribution

It was observed earlier that most of the poultry farms were located in rural areas in both the states. Therefore of the total number of sample poultry farms, 57 and 77 per cent were located respectively in the rural areas of Sangli-Satara and Surat-Bulsar districts. A majority of small farms were in rural areas both in the Sangli-Satara and Surat-Bulsar districts and a majority of moderately big farms were located in urban areas. The distribution of sample poultry units is given in Table 2.6.

Table 2.6: Rural-Urban Distribution

	Districts					
Farm Size	Sangli-Satara			Surat-Bulsar		
	Urban	Rural	Total	Urban	Rural	Total
Small	6	7	13		22	22
	(46.0)	(54.0)	(100.0)		(100.0)	(100.0)
Moderately Big	7	6	13	3	1	4
	(54.0)	(46.0)	(100.0)		(25.0)	(100.0)
Big		4	4	4	_	4
		(100.0)	(100.0)	(100.0)	1	(100.0)
Total	13	17	30	7	23	30
	(43.3)	(56.7)	(100.0)	(23.3;	(76.7)	(100.0)

2.3.2 Period of Operation

Though there was rapid growth of commercial poultry farms since 1961, in the initial years, poultry farms with larger number were preferred. About 20 per cent of the farms were established more than six years ago (from the year of survey) in the Sangli-Satara districts and 26 per cent in the Surat-Bulsar districts. In the Surat-Bulsar districts, moderately big and big poultry farms were established more than six years ago. The existence of a large number of small poultry units in Surat-Bulsar districts

operating for the last three years speak of the facilities provided for poultry development by the IPDP. The details of the period of operation of sample poultry farms are shown in Table 2.7.

Table 2.7: Period of Operation

	Districts							
Farm Size	Sangli-Satara No. of Years of Operation				Surat-Bulsar No. of Years of Operation			
	2 to 3	3 to 5	6 to 10	More than 10	2 to 3	3 to 5	6 to 10	More than 10
Small	4	6	3	—	22	—	—	—
Moderately Big	4	7	1	1	—	—	2	2
Big	1	2	—	1	—	—	—	4
Total	9	15	4	2	22	—	2	6

2.3.3   Locational Characteristics

Most of the sample farms (80 per cent) in the Sangli-Satara districts were located near the consuming urban centres. Rail facilities were available to most of the poultry farms within a radius of five kilometres. Most of them (57 per cent) had to travel beyond 25 kms. for veterinary services (Table 2.8). The nearest market for most of the farms (47 per cent) in the Surat-Bulsar districts was beyond 30 kms. But the nearest railway station for most of the units (53 per cent) was within five kms. Similarly, poultry farms in the Surat-Bulsar districts were favourably located than in the Sangli-Satara districts. Veterinary services to farms in the Surat-Bulsar districts were available within five kms.

2.3.4   Types of Rearing

Poultry stock can be reared in three ways: (1) range, (2) confinement, (3) a combination of the two. Under range rearing, poultry stock was reared in open fields. Commercial poultry farms preferred confinement rearing to protect birds against

Table 2.8 : Distance of Polutry Farms from Various Facilities

(Distance in Kms)

	Sangli-Satara									Surat-Balsar									
	Nearest Town				Distance From Nearest Railway Station		Nearest Veterinary Centre			Nearest Town				Distance From Nearest Railway Station			Nearest Veterinary Centre		
Farm Size	Within City Limits	1-5 kms	6-10 kms	Above 10 kms	1-5 kms	Above 5 kms	1-10 kms	11-25 kms	Above 25 kms	Within Town Limits	1-15 kms	16-30 kms	Above 30 kms	1-5 kms	6-10 kms	Above 10 kms	0-1 kms	2-5 kms	Above 5 kms
Small	6	3	2	2	11	2	3	3	7	—	3	5	14	8	10	4	3	14	5
Moderately Big	7	4	2	—	8	5	3	4	6	3	1	—	—	4	—	—	—	1	3
Big	—	4	—	—	4	—	—	—	4	4	—	—	—	4	—	—	—	2	2
Total	13	11	4	2	23	7	6	7	17	7	4	5	14	16	10	4	3	17	10

Districts

predators and infection in open fields. Two systems of confine-
ment rearing were prevalent: deep litter and cage. The cage
system was preferred over the deep litter system as it required
minimal space and resulted in less feed wastage, saved time and
labour costs, etc. About 63 per cent of the farms had deep
litter system in the Sangli-Satara districts as against 50 per cent
in the Surat-Bulsar districts. Among those who used the cage
system now, about 80 per cent in the Sangli-Satara districts and 53
per cent in the Surat-Bulsar districts switched over from the
deep litter system (Table 2.9). The economic implications of
these observations will be discussed later.

Table 2.9: Rearing of Poultry Stock

| Farm Size | Districts | | | | | |
| | Sangli-Satara | | | Surat-Bulsar | | |
	Deep Litter	Cage	No. of Units Changing from Deep Litter	Deep Litter	Cage	No. of Units Changing from Deep Litter
Small	10	3	1	15	7	—
Moderately Big	7	6	6	—	4	4
Big	2	2	2	—	4	4
Total	19	11	9	15	15	8

2.3.5 Capital Investment in Poultry Farms

Capital investment in poultry farms were studied under
land, buildings, electric fittings and other poultry equipments.
Expenditure on procurement of birds was not included in capital
investment. The values represented original cost when the unit
was established and additions that were made till the present
survey. Details of the capital investment among the sample
farms were worked out on the basis of 100 birds separately for
units in deep litter system and cage system (Tables 2.10 and
2.11).

The amount invested for 100 birds was Rs. 2,429 for deep
litter system and Rs. 2,522 for cage system in the Sangli-Satara
districts. It was Rs. 2,345 per 100 birds in the deep litter system

Table 2.10: Value of Capital Investment in Poultry Farming in Sangli-Satara Districts

(Value in Rs.)

Farm Size	Type of Rearing	Average Size of Farms (in Birds)	Value of Capital						Waterers	Fillers	Lighting Equipments	Brooders	Debeakers	Eggs Cabinet Trays, etc.	Municipal Water Supply	Sub-Total	Grand Total
			Land	Poultry Sheds	Cages	Sub-Total	Nests	Feeders									
Small	Deep Litter	365	885 (33.4)	1498 (56.4)	— —	2383 (89.8)	20 (0.8)	70 (2.6)	58 (2.2)	18 (0.7)	32 (1.2)	5 (0.2)	— —	9 (0.3)	59 (2.2)	271 (10.2)	2654 (100.0)
	Cage System	450	500 (19.0)	1289 (49.0)	727 (27.7)	2516 (95.7)	— —	— —	— —	— —	35 (1.3)	6 (0.2)	— —	6 (0.2)	65 (2.6)	112 (4.3)	2628 (100.0)
Moderately Big	Deep Litter	760	1083 (34.6)	1618 (51.7)	— —	2701 (86.3)	29 (0.9)	188 (6.0)	69 (2.2)	5 (0.2)	37 (1.2)	14 (0.4)	— —	49 (1.6)	38 (1.2)	429 (13.7)	3130 (100.0)
	Cage System	1186	809 (30.3)	1282 (43.8)	628 (21.4)	2799 (95.5)	— —	— —	— —	— —	64 (2.2)	2 (0.1)	— —	31 (1.0)	34 (1.2)	131 (4.5)	2930 (100.0)
Big	Deep Litter	1935	362 (23.5)	987 (83.9)	—	1349 (87.4)	50 (3.2)	42 (2.8)	26 (1.7)	—	55 (3.6)	2 (0.1)	10 (0.6)	2 (0.1)	7 (0.5)	194 (12.6)	1543 (100.0)
	Cage System	2200	359 (19.1)	918 (48.6)	545 (28.9)	1822 (96.6)	—	—	—	—	23 (1.1)	9 (0.5)	11 (0.6)	13 (0.7)	9 (0.5)	65 (3.4)	1887 (100.0)
Overall	Deep Litter	665	776 (32.0)	1368 (56.3)	— —	2144 (88.3)	34 (1.4)	90 (3.7)	48 (2.0)	8 (0.3)	44 (1.8)	5 (0.2)	2 (0.1)	23 (0.9)	31 (1.3)	285 (11.7)	2429 (100.0)
	Cage System	1053	583 (23.1)	1198 (47.5)	623 (24.7)	2403 (95.3)	— —	— —	— —	— —	47 (1.9)	5 (0.2)	11 (0.4)	25 (1.0)	30 (1.2)	118 (4.7)	2522 (100.0)

Investment Per 100 Birds in (columns: Waterers, Fillers, Lighting Equipments, Brooders, Debeakers, Eggs Cabinet Trays, etc., Municipal Water Supply, Sub-Total, Grand Total)

Figures in brackets indicate percentages.

Table 2.11: Value of Capital Investment in Poultry Farming in Surat-Bulsar Districts

(Value in Rs.)

Farm Size	Type of Rearing	Average Size of Farms (in Birds)	Land	Poultry House	Cages	Sub-Total	Nests	Feeders
Small	Deep Litter	157	512 (21.8)	1623 (69.2)	—	2135 (91.0)	16 (0.7)	58 (2.5)
	Cage System	160	502 (22.2)	638 (28.2)	1035 (45.9)	2175 (96.3)	—	—
Moderately Big	Deep Litter	—	—	—	—	—	—	—
	Cage System	1100	545 (16.6)	1539 (46.9)	710 (21.7)	2794 (85.2)	—	—
Big	Deep Litter	—	—	—	—	—	—	—
	Cage System	2492	427 (14.4)	1426 (48.1)	808 (27.2)	2661 (89.7)	—	—
Overall	Deep Litter	157	512 (21.8)	1623 (69.2)	—	2136 (91.0)	16 (0.7)	58 (2.5)
	Cage System	1250	491 (17.3)	1333 (47.0)	719 (25.4)	2543 (89.7)	—	—

Investment Per 100 Birds in

Waterers	Fillers	Lighting Equipments	Brooders	Debeakers	Eggs Cabinet, Trays, etc.	Others	Sub-Total	Grand Total
49 (2.1)	16 (0.7)	27 (1.1)	2 (0.1)	—	2 (0.1)	40 (1.7)	210 (9.0)	2345 (100.0)
—	—	30 (1.3)	4 (0.2)	—	5 (0.2)	45 (2.0)	84 (3.7)	2259 (100.0)
—	—	—	—	—	—	—	—	—
—	—	62 (1.9)	16 (0.5)	—	45 (1.4)	362 (11.0)	485 (14.8)	3279 (100.0)
—	—	—	—	—	—	—	—	—
—	—	83 (2.8)	22 (0.7)	16 (0.5)	62 (2.1)	123 (4.2)	306 (10.3)	2967 (100.0)
49 (2.1)	16 (0.7)	27 (1.1)	2 (0.1)	—	2 (0.1)	40 (1.7)	210 (9.0)	2345 (100.0)
—	—	58 (2.1)	14 (0.5)	5 (0.2)	37 (1.3)	177 (6.2)	291 (10.3)	2834 (100.0)

Figures in brackets indicate percentages.

and Rs. 2,834 in the cage system in the Surat-Bulsar districts. The significant differences in the capital investment in deep litter and cage systems in Surat-Bulsar districts were due to investments in water supplying equipments by moderately big and big farms.

Land, buildings, and fencing were the main items in capital investment. Although the proportion of investment in these items was between 88 to 95 per cent for deep litter and cage systems respectively in the Sangli-Satara districts, no significant variations was observed in the Surat-Bulsar districts. Among different sizes, the proportion of investment in land, building and fencing to the total in the deep litter system varied between 86 to 90 per cent and 95 to 96 per cent in the cage system in the Sangli-Satara districts. In the Surat-Bulsar districts, the proportion of capital investment in land and buildings constituted about 91 per cent of the total in the deep litter system. Since the sample had no moderately big and big units intra-farm comparison was not possible. However, in the cage system, the proportion of capital investment in land and buildings varied from 85 to 96 per cent in different units and declined with an increase in the size of the unit. The total investment per 100 birds was highest among moderately big units and lowest in big units with the cage and deep litter systems both in the Sangli-Satara and Surat-Bulsar districts. Therefore, units having 500 to 1499 birds were uneconomical from the point of capital investment, and big units having more than 1500 birds were favourably placed among different sizes. Cost analysis attempted later might also exhibit the economic implications of such a phenomenon.

2.3.6 Sources of Finance and Borrowing

Borrowings for capital investment did not include amount utilized for purchasing birds and maintaining them till the laying stage. A subsidy of 33 per cent of the total investment comprising costs of land, building, fencing, equipments, cost of birds, and expenditure on feed and medicines till the laying stage was provided to small and marginal farmers through the SFDA both in the Sangli-Satara and Surat-Bulsar districts. Table 2.12 shows the amount of borrowed capital and the sources of finance of the units.

Table 2.12 : Sources of Funds for Capital Investments Per Poultry Farm according to Size

Farm Size	Districts									
	Sangli-Satara Sources of Finance					Surat-Bulsar Sources of Finance				
	Self	Banks	Govt. Agency	Friends and Relatives	Total	Self	Banks	Govt. Agency	Friends and Relatives	Total
Small	6055	2478	—	2242	10775	—	2313	1324	—	3637
	*(56.2)	(23.0)		(20.8)	(100.0)		(63.6)	(36.4)		(100.0)
Moderately Big	6509	26036	1451	5216	39212	10146	34117	—	8306	52569
	(16.6)	(66.4)	(3.7)	(13.3)	(100.0)	(19.3)	(64.9)		(15.8)	(100.0)
Big	24202	4707	—	4473	33382	56267	7985	—	9686	73938
	(72.5)	(14.1)		(13.4)	(100.0)	(76.1)	(10.8)		(13.1)	(100.0)
Overall	7594	9375	430	3074	20470	9014	7610	971	2399	19994
	(37.1)	(45.8)	(2.1)	(15.0)	(100.0)	(45.1)	(38.1)	(12.0)	(12.0)	(100.0)

*percentages

Own funds and borrowing from friends and relatives cons-
tituted a major share in the total capital investment both in
the Sangli-Satara (52.1 per cent) and Surat-Bulsar (57.1 per
cent) districts. Commercial banks could meet 46 per cent of the
capital requirements in the Sangli-Satara and about 38 per cent
in the Surat-Bulsar districts.

Significantly, the state government in the Surat-Bulsar
districts had played an important role in financing about five
per cent of the capital investment as compared to about two per
cent in Sangli-Satara districts. This resulted from the govern-
ment's support for poultry development through SFDA special-
ly formulated for small and marginal farmers.

Intra-farm variations in the sources of finance presented an in-
teresting phenomenon. Commercial banks were selective in finance-
ing poultry farming as the proportion of finance from banks cons-
tituted about 66 per cent in the Sangli-Satara districts and about
65 per cent in the Surat-Bulsar districts in moderately big poultry
units. On the other hand, big units had largely invested their
own funds for the capital investment both in the Sangli-Satara
and Surat-Bulsar districts. Entrepreneurs in big units drawn
from business and service class diverted funds from their primary
source of income in setting up poultry farms. Relatively, own
funds formed a major share of the capital investment of small
farms in the Sangli-Satara districts. In the Surat-Bulsar districts,
commercial banks contributed about 64 per cent of the total
capital requirements of small units. Financial institutions can
play a significant role in expanding existing units and assisting
the rural unemployed to set up new units.

3

Processes and Pattern of Egg Production and Marketing

3.1 Introduction

Though production economics usually favoured large units in the manufacturing sector, it was presumed that poultry rearing with relatively greater risks and uncertainty in the processes might focus distinct phenomenon. However, it appears that larger poultry farms had more scope for introducing sophisticated techniques and package of improved practices than small units. Furthermore, large units with higher production efficiency might have greater control over the market in view of their efficiency in the marketing. Therefore, an attempt has been made in this chapter to focus on the rearing practices involved in the growth of poultry birds from chicks to the stage of disposal of layers, and variations in the egg production and marketing. It is relevant to point out that discussion pertains *to* one cycle of birds in different farm sizes in the sample and did not encompass the activities of the whole farm.

3.2 Preparatory Background for Egg Production Among Sample Farms

3.2.1 Place of Birds' Purchase

Although the government attempted through IPDPs to make birds easily available for commercial rearing, about 53 per cent of the entrepreneurs procured poultry birds from hatcheries as far as 226 to 300 kms. from their farms in the Sangli-Satara districts

(Table 3.1) despite there being hatcheries near their farms. Big farms had procured birds in greater proportion (75 per cent) from longer distances than moderately big farms (69 per cent). Only a small proportion of entrepreneurs (27 per cent) procured

Table 3.1: Distribution of Farmers According to Distance Between Farm and Place of Birds' Purchase in Sangli-Satara Districts

(Distance in Kms.)

Farm Size	Type of Rearing	Distance						
		Less Than 25	25-75	76-50	151-225	226-300	Above 300	Total
Small	Deep Litter	3	—	2	1	4	—	10
	Cage System	2	—	—	—	4	—	3
Modera-tely Big	Deep Litter	2	—	2	—	3	—	7
	Cage System	—	—	—	—	5	1	6
Big	Deep Litter	1	—	—	—	1	—	2
	Cage System	—	—	—	—	2	—	2
Total	Deep Litter	6	—	4	1	8	—	19
	Cage System	2	—	—	—	8	1	11

birds from the longest distance in the Surat-Bulsar districts (Table 3.2). A majority of entrepreneurs (37 per cent) had procured birds from hatcheries about 20 to 30 kms. from their farms. Long distances in these districts varied from 41 to 50 kms, as against 226 to 330 kms. in Sangli-Satara districts. It appears that poultry entrepreneurs had developed preferences for the strains of a particular breed, and established rapport with the birds suppliers over the period of their operation.

3.2.2 Preferences in Procuring Birds of Different Ages

Two alternatives available in procuring birds for commercial rearing were predominant: (1) a day old chicks and (2) 20 weeks old birds before the laying stage. About two-thirds (67 per cent) of the sample entrepreneurs had purchased day old chicks and about seven per cent preferred to buy birds about four weeks before the laying stage in the Sangli-Satara districts (Table 3.3).

Table 3.2: Distribution of Farmers According to Distance Between Farm and Place of Birds' Purchase in Surat-Bulsar Districts

(Distance in Kms.)

Farm Size (in Birds)	Type of Rearing	Distance				
		Less than 20	20-30	31-40	41-50	Total
Small	Deep Litter	3	8	4	—	15
	Cage System	—	—	—	7	7
Moderately Big	Deep Litter	—	—	—	—	—
	Cage System	—	3	—	1	4
Big	Deep Litter	—	—	—	—	—
	Cage System	—	—	4	—	4
Total	Deep Litter	3	8	4	—	15
	Cage System	—	3	4	8	15

Table 3.3: Number of Farmers Purchasing Birds of Different Ages in Sangli-Satara Districts

Size of Poultry Farm	Type of Rearing	Number of Farmers Purchasing Birds According to the Age of the Bird					
		One day old chicks	Less than 5 weeks old	5 weeks to 10 weeks	11 weeks to 15 weeks	16 weeks to 20 weeks	Total
Small	Deep Litter	5	1	2	2	—	10
	Cage System	—	1	1	—	1	3
Moderately Big	Deep Litter	6	—	—	—	1	7
	Cage System	5	—	1	—	—	6
Big	Deep Litter	2	—	—	—	—	2
	Cage System	2	—	—	—	—	2
Total	Deep Litter	13	1	2	2	1	19
	Cage System	7	1	2	—	1	11

About 27 per cent also procured birds from two days to 15 weeks old.

Table 3.4: Number of Farmers Purchasing Different Age Birds in Surat-Bulsar Districts

Farm Size	Type of Rearing	Number of Farmers Making Purchases					
		Age					
		1 day	Less than 5 weeks	5 to 10 weeks	11 to 15 weeks	16 to 20 weeks	Total
Small	Deep Litter	15	—	—	—	—	15
	Cage System	7	—	—	—	—	7
Modera-Tely Big	Deep Litter	—	—	—	—	—	—
	Cage System	2	—	—	1	1	4
Big	Deep Litter	—	—	—	—	—	—
	Cage System	2	—	—	—	2	4
Total	Deep Litter	15	—	—	—	—	15
	Cage System	11	—	—	1	3	15

In the Surat-Bulsar districts about three per cent purchased birds between 11 and 15 weeks and the remaining preferred to buy birds within these two extremes. About 87 per cent of entrepreneurs in the Surat-Bulsar districts preferred to buy one day old chicks (Table 3.4). Significantly the type of rearing i.e., the deep litter and cage systems did not influence the decision of majority of the entrepreneurs towards buying day old chicks both in the Sangli-Satara and Surat-Bulsar districts. But entrepreneurs seem to be changing the buying practices as about 50 per cent in the small farms particularly those using the deep litter system preferred buying birds up to 15 weeks old in the farms of Sangli-Satara districts. Moderately big and big farms in Surat-Bulsar districts using cage system tended to buy older birds because of problems like qualitative standards of the hatcheries, admixture of unsexed chicks at the time of sale of birds, transportation and rearing chicks on the farms.

Table 3.5 : Composition of Poultry Strains Reared by Farmers in Sangli-Satara Districts

Farm Size	Type of Rearing	Babcock	Hyline	P. Pearl	Keystone	Arberacre	Rani shever	Green Hills	Total
Small	Deep Litter	58.8	35.0	4.2	—	2.0	—	—	100.0
	Cage System	24.3	75.7	—	—	—	—	—	100.0
Moderately Big	Deep Litter	64.2	19.9	9.2	2.6	—	4.1	—	100.0
	Cage System	73.9	16.7	—	—	—	—	9.4	100.0
Big	Deep Litter	63.5	23.8	12.7	—	—	—	—	100.0
	Cage System	80.4	10.9	8.7	—	—	—	—	100.0
Overall	Deep Litter	63.1	23.8	9.9	1.1	0.3	1.8	—	100.0
	Cage System	68.9	23.3	2.9	—	—	—	4.9	100.0
	Overall	64.7	23.6	8.0	0.8	0.2	1.4	1.3	100.0

Strains (in percentage)

3.2.3 Preference Towards Poultry Strains

The Babcock strain alone accounted for about 65 per cent of the total birds in the Sangli-Satara districts and about 74 per cent in the Surat-Bulsar districts (Tables 3.5 and 3.6).

Differences in the number of different strains reared by entrepreneurs in the Sangli-Satara and Surat-Bulsar districts were marked. In the Sangli-Satara districts besides the Babcock strain there were six others reared by the entrepreneurs: Hyline (24 per cent), Poona Pearls (8 per cent), Rani shevers (1.4 per cent), Green hills (1.3 per cent), Keystone (0.8 per cent) and Arberacre (0.2 per cent). In Surat-Bulsar districts sample entrepreneurs had only two poultry strains besides Babcock viz., Hyline (18 per cent) and Arberacre (8 per cent). Small farms using the cage system preferred to rear Hyline to Babcock in the Sangli-Satara region. The awareness among sample entrepreneurs of the qualitative standards of different poultry breeds and their economic implications is an encouraging trend for the growth of the poultry industry.

Table 3.6: Composition of Poultry Strains Reared by Farmers in Surat-Bulsar Districts

(in percentages)

Farm Size	Type of Rearing	Strains			
		Babcock	Hyline	Arberacre	Total
Small	Deep Litter	78.9	21.1	—	100.0
	Cage	72.5	27.5	—	100.0
Moderately Big	Deep Litter	—	—	—	—
	Cage	64.8	10.7	24.5	100.0
Big	Deep Litter	—	—	—	—
	Cage	79.3	20.7	—	100.0
Overall	Deep Litter	78.9	21.1	—	100.0
	Cage	73.1	17.5	9.4	100.0
	Overall	74.0	18.1	7.9	100.0

3.3 Intermediate Stage Before Egg Production

3.3.1 Housing of Poultry

Poultry birds needed comfortable accommodation and protection from weather for efficient egg production and convenient

management. The size of the house determined the amount of floor space per bird. Generally three square feet per bird for light breeds and four square feet for general purpose breed was desirable. The floor space per bird among the sample farms is shown in Table 3.7.

Table 3.7: Floor Space Per Bird

(in sq. ft.)

Farm Size	Districts			
	Sangli-Satara		Surat-Bulsar	
	Deep Litter System	Cage System	Deep Litter System	Cage System
Small	2.47	1.60	2.29	2.25
Moderately Big	2 10	1.36	—	1.42
Big	1.33	1.16	—	1.40
Overall	1.96	1.48	2.29	1.53

As against scientific norms, sample farms using the deep litter system provided less floor space to the birds. In the Sangli-Satara districts, floor space averaged 1.96 sq. ft. per bird and fell short of the desired measure by about 35 per cent. Similarly 2.29 sq. ft. per bird in farms using the deep litter system in the Surat-Bulsar districts fell short by 24 per cent. Recent developments, e.g., in the California Cage System substantially, reduced the floor space. About 1.5 sq. ft. of floor space was provided in farms using the cage system. Manufacturers in India have indicated that the California Cage System affords scope for reducing the floor space. For instance, Quality Fabricators in Billimora (Gujarat) have devised an efficient cage system, and floor space requirement varied from 0.44 sq. ft. to 0.75 sq. ft.

3.3.2 Poultry Rearing Practices

(a) Procurement of chicks: Hatcheries supplying birds to the sample entrepreneurs separated birds of the two sexes to prevent cockerels from harassing the pullets. Since straight-run chicks were almost in equal proportion to pullets and cockerels, pullets were available to entrepreneurs at twice the price of "straight-run-chicks". However, entrepreneurs had problems in getting chicks in time due to the limited capacity of hatcheries in the

district and lack of transportation facilities. The existing hatcheries booked their orders in advance against 50 per cent earnest money and promised to supply chicks at the appointed dates which they rarely maintained.

(b) Brooding: Brooding of chicks was done by the farmers both in natural and artificial ways. The cage system had separate brooders and electric fittings in the cage. Various types of brooders were used by the entrepreneurs. Indigenous brooders were made of wooden boxes, 3" high with ventilation on all sides at the base. Boxes were generally 6' x 4' and four to five electric bulbs of 60 watts could be fixed on their ceiling. The number of bulbs that could be switched depended upon the temperature to be maintained in the chamber. To provide warmth and regulate temperature lanterns were used during electricity failures.

(c) Rearing of growers and layers: Sample farms maintained separately grower and layer houses in the deep litter system whereas in the cage system, birds were shifted from the brooder house to different compartments in cages to grow as layers. However, entrepreneurs reported that the cage system ensured more careful supervision, constant and accurate checks on all chicks, prevention of losses from preys, prevention of mingling of birds of all ages, sanitation and losses through diseases. In the deep litter system also, poultry houses were properly ventilated to remove moisture, foul air, and odours. Hessian cloth curtains were hung to avoid drafts of air which caused colds, roup, and bronchitis. In winter, moderate temperature of 50° F to 70° F was maintained and charcoal ovens were used at night. In summer *khus khus* mesh was used to cool the place.

(d) Culling in flock: Birds were culled meticulously according to their physical characteristics. Culling was on right from the fourth week until birds had finished laying eggs. Growers and layers showing weakness or symptoms of disease were removed from the flock and disposed for meat. Non-layers were also detected by observing the comb and wattles, the vent, the pubic bones etc.

(e) Medical treatment: Since poultry birds were easily susceptible to diseases, farms provided standard poultry feeds to develop resistance. Special attention was paid to protect the flock from ranikhet, fowl pox, coccidiosis, and marex. Birds between six to eight weeks old were vaccinated and revaccinated in some cases,

after six months. Tonics were not provided for birds by all farms in the Sangli-Satara districts. New tonic egg formula was given by six entrepreneurs in the Sangli-Satara districts and by four in the Surat-Bulsar districts. In the Sangii-Satara and Surat-Bulsar districts, veterinary doctors attached to IPDPs, the Departments of Animal Husbandry and SFDA administered vaccination and treated major ailments.

3.3.3 Mortality and Diseases

(a) Mortality: The mortality rate in the Sangli-Satara districts was higher than in the Surat-Bulsar districts irrespective of the rearing facilities (Table 3.8). Both in the Sangli-Satara and in the Surat-Bulsar districts, mortality rate was higher in the deep litter system. Among different farm sizes particularly in the Sangli-Satara districts, mortality rate was lower in the cage system barring small farms. However, small farms did not rear chicks, mortality was high in the grower stage. Mortality rate was lower in the cage system in the Surat-Bulsar districts. Big farms managed better than moderately big and small ones. Mortality rate was highest among chicks. In the cage system it was three times more of birds in the laying stage in Sangli-Satara districts and six times more in Surat-Bulsar districts.

(b) Causes of mortality: The causes of mortality were: (1) excessive heat, (2) excessive cold, (3) predators, (4) diseases, (5) internal parasites, (6) effect of vaccination, (7) pilling of birds, and (8) others.

Diseases and internal parasites alone accounted for about 62 per cent of deaths in the deep litter system and about 66 per cent in cage system (Table 3.9). In the Surat-Bulsar districts, diseases and internal parasites accounted for about 57 per cent of deaths in the deep litter system and about 58 per cent in cage system (Table 3.10). Excessive heat and cold accounted for about 28 per cent in the Sangli-Satara districts and 35 per cent in the Surat-Bulsar districts. Predators accounted for about one per cent in each of the districts. The cage system allowed no predators except in large farms in the Surat-Bulsar districts. Mortality caused by injections or vaccinations, pilling, debeaking, and lack of proper facilities in transporting chicks was about eight per cent in the Sangli-Satara districts and about 6 per cent in the

Table 3.8:Average Mortallity Rate PerMonth Per 100 Birds

Farm Size	Type of Rearing	Districts							
		Sangli-Satara				Surat-Bulsar			
		Chicks	Growers	Layers	Overall	Chicks	Growers	Layers	Overall
Small	Deep Litter	1.42	0.66	1.76	1.44	3.12	0.81	0.79	0.85
	Cage System	—	2.91	1.08	1.66	2.46	0.59	0.69	0.81
Moderately Big	Deep Litter	3.76	0.80	1.56	1.41	—	—	—	—
	Cage System	2.10	0.64	0.72	0.77	2.40	0.48	0.40	0.51
Big	Deep Litter	3.55	0.95	0.85	0.96	—	—	—	—
	Cage System	1.52	0.33	0.23	0.31	1.19	0.32	0.15	0.24
Overall	Deep Litter	2.72	0.93	1.19	1.20	2.46	0.59	0.79	0.81
	Cage System	2.55	0.58	0.81	0.95	2.11	0.43	0.34	0.44

Table 3.9:Incidence of Mortality in Different Size Groups and Relation Beetween Rearing and Causes of Death in Sangli-Satara District

(in percentages)

Causes of Death	Small		Moderately Big		Big		Overall	
	Deep Litter	Cage System	Deep Litter	Cage System	Deep Litter	Cage System	Deep Litter	Cage System
Excessive Heat	19.8	17.9	18.8	11.5	10.7	9.1	18.2	11.2
Excessive Cold	13.1	7.5	7.7	13.6	12.4	18.8	9.7	15.1
Predators	1.3	—	2.1	—	—	—	1.6	—
Diseases	38.6	44.8	38.2	55.3	56.5	43.2	40.3	48.6
Internal Parasites	20.2	29.8	23.1	16.2	15.0	14.5	21.5	17.1
Pilling	0.4	—	2.2	0.8	2.7	4.1	1.8	
Effect of Injections Or Vaccines	—	—	0.2	1.3	2.7	4.1	0.4	2.4
Transport, Debeaking,etc	6.6	—	7.7	1.3	—	6.2	6.5	3.4
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 3.10: Incidence of Mortality in Different Size Groups and Relation Between Rearing and Causes of Death in Surat-Bulsar Districts

(in percentages)

Causes of Death	Small		Moderately Big	Big	Overall	
	Deep Litter	Cage System	Cage System	Cage System	Deep Litter	Cage System
Excessive Heat	20.2	8.5	21.9	20.4	20.2	19.4
Excessive Cold	18.4	10.4	15.3	16.0	18.4	14.7
Predators	1.2	—	—	3.3	1.2	0.9
Diseases	47.6	73.2	41.9	31.2	47.6	44.0
Internal Parasites	8.9	2.4	15.6	18.2	8.9	14.2
Effect of Injections or Vaccines	—	—	1.7	5.1	—	2.3
Pilling	0.3	—	1.2	2.9	0.3	1.5
Transport, Debeaking, etc,	3.4	5.5	2.4	2.9	3.4	3.0
Total	100.0	100.0	100.0	100.0	100.0	100.0

Surat-Bulsar districts. Variation in causes of mortality among different sizes of farms indicated that large units protected their birds more from heat and cold than moderately big and small units and the cage system provided better safeguards. However, small units protected their birds more against diseases and internal parasites. The cage system had no safeguards against these.

Mortality in chicks owing to excessive heat or cold was about 33 per cent in the Surat-Bulsar districts against 21 per cent in the Sangli-Satara districts. Mortality was lesser in the cage system than in the deep litter system. Diseases and internal parasites accounted for 53 per cent of the mortality in the Surat-Bulsar districts as against 60 per cent in the Sangli-Satara districts. Cage rearing accounted for less mortality. Mortality was higher (19 per cent) in Sangli-Satara districts than in Surat-Bulsar districts (13 per cent) because of transportation, pilling, and effect of vaccination or injections (Tables 3.11 and 3.12).

Diseases and internal parasites accounted for a significant proportion of mortality among growers. Mortality was higher (54 per cent) in the Sangli-Satara districts than in the Surat-Bulsar districts (41 per cent). Excessive heat or cold resulted in a higher mortality in the Surat-Bulsar districts (51 per cent)

Table 3.11: Incidence of Mortality Among Chicks in Sangli-Satara Districts

(in percentage)

Causes of Death	Small		Moderatly Big		Big		Overall		Overall
	Deep Litter	Cage System	Deep Litter	Cage System	Deep Litter	Cage System	Deep Litter	Cage System	
Excessive Heat	12.9	–	9.2	–	–	–	8.0	–	5.7
Excessive Cold	16.1	–	12.6	18.6	17.4	22.2	13.9	20.6	15.8
Predators	–	–	–	–	–	–	–	–	–
Diseases	64.5	–	58.6	58.2	54.3	40.7	58.6	48.5	55.7
Internal Paracites	–	–	2.9	4.6	6.5	9.3	3.2	7.2	4.3
Effect of Injection or Vaccines	–	–	1.1	7.0	10.9	9.3	2.8	8.2	4.3
Pilling	6.5	–	9.8	4.6	10.9	18.5	9.5	12.4	10.5
Transport	–	–	5.8	7.0	–	–	4.0	3.1	3.7
Miscellaneous	–	–	–	–	–	–	–	–	–
Total	100.0	–	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 3.12: Incidence of Mortality Among Chicks in Surat-Bulsar Districts

(in percentage)

Causes of Death	Small		Moderately Big	Big	Overall		Overall
	Deep Litter	Cage System	Deep Litter	Cage System	Deep Litter	Cage System	
Excessive Heat	7.3	–	22.8	12.5	7.3	16.6	14.9
Excessive Cold	30.9	–	21.4	11.1	30.9	15.4	18.2
Predators	–	–	–	–	–	–	–
Diseases	43.6	74.3	48.6	48.6	43.6	52.3	50.7
Internal Paracites	–	–	2.1	5.6	–	2.8	2.3
Effect of Injections or Vaccines	–	–	1.5	4.2	–	2.0	1.7
Pilling	1.8	–	3.6	6.9	1.8	4.0	3.6
Transport	16.4	25.7	–	11.1	16.4	6.9	8.6
Miscellaneous	–	–	–	–	–	–	–
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

than in the Sangli-Satara districts (43 per cent). The deep litter system caused lesser mortality than the cage system (Tables 3.13 and 3.14).

Diseases and internal parasites caused about 65 per cent of the total mortality among layers in the farms in each of the districts. Excessive heat and cold among layers caused higher mortality in the Surat-Bulsar districts (31 per cent) than in the Sangli-Satara districts (26 per cent). Atmospheric adversities caused less mortality among layers in the cage system where diseases and parasites alone accounted for mortality (Tables 3.15 and 3.16). Big farms again reared birds better than moderately big and small ones.

3.3.4 Quantitative Consumption of Feed

Entrepreneurs in all districts used purchased balanced poultry feed for raising their stock. Brand names had some influence. In the Sangli-Satara districts, poultry units changed from feed manufactured by Hindustan Lever Ltd., to locally manufactured ones. In the Surat-Bulsar districts, poultry entrepreneurs preferred feed manufactured by a local co-operative unit and Subrus Feeds, Bombay. Tables 3.17 and 3.18 give variations in feed use among different farm sizes.

On an average, about 53 kgs. of balanced feed was consumed per bird during the stages of its growth, among the sample farms in all districts. Further, it is generally argued that feed consumption per bird was significantly influenced by the type of rearing, feeding practices, and the duration of rearing of the birds in the cycle. Marked intra-regional and intra-farm variations were observed in the feed consumption of birds in the two rearing systems in their growth. The cage system caused less wastage of feed. Feed consumption during the growth of poultry birds was about 56 kgs. per bird in the deep litter system as against 48 kgs. in the cage system in the Sangli-Satara districts. This difference narrowed to about 3 kgs. in the Surat-Bulsar districts in favour of cage system. Feed consumption per bird till the disposal of layers varied between 44.2 kgs. to 63.9 kgs. In different farm sizes in the Sangli-Satara districts and 48.3 kgs. to 57.7 kgs. in the Surat-Bulsar districts. Total feed consumption varied according to variations in the duration of rearing. The

Table 3.13: Incidence of Mortality Among Youngstock (Grower) in Different Size Groups and Relation Between Rearing and Causes Death in Sangli-Satara Districts

(in percentage)

Causes of Death	Small		Moderatly Big		Big		Overall		Overall
	Deep Litter	Cage System	Deep Litter	Cage System	Deep Litter	Cage System	Deep Litter	Cage System	
Excessive Heat	19.3	34.3	2.4	13.7	–	–	6.3	13.4	9.1
Excessive Cold	42.1	14.3	32.3	43.1	37.5	32.2	35.7	31.7	34.2
Predators	–	–	4.8	–	–	–	2.7	–	1.6
Diseases	10.5	22.8	24.2	31.4	50.0	50.0	25.3	36.6	29.7
Internal Paracites	28.1	28.6	36.3	11.8	12.5	8.9	30.0	14.8	24.6
Effect of Injection or Vaccines	–	–	–	–	–	8.9	–	3.5	1.4
Pilling	–	–	–	–	–	–	–	–	–
Miscellaneous	–	–	–	–	–	–	–	–	–
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 3.14: Incidence of Mortality Among Youngstock (Grower) in Different size Grouped and Relation Between Rearing and Causes of Death in Surat-Bulsar Districts

(in percentage)

Causes of Death	Small		Moderately Big	Big	Overall		Overall
	Deep Litter	Cage System	Deep Litter	Cage System	Deep Litter	Cage System	
Excessive Heat	46.2	8.6	28.9	28.6	46.2	25.1	29.6
Excessive Cold	–	–	32.6	32.5	–	26.7	21.1
Predators	–	–	–	7.8	–	3.1	2.4
Diseases	53.8	91.4	16.9	10.3	53.8	27.7	33.1
Internal Paracites	–	–	10.8	13.0	–	9.7	7.7
Effect of Injections or Vaccines	–	–	10.8	7.8	–	7.7	6.1
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 3.15: Incidence of Mortality Among Layers in Sangli-Satara Districts

(in percentage)

Causes of Death	Small		Moderatly Big		Big		Overall		Overall
	Deep Litter	Cage System	Deep Litter	Cage System	Deep Litter	Cage System	Deep Litter	Cage System	
Excessive Heat	20.5	–	23.7	14.2	20.2	16.8	22.4	13.8	20.7
Excessive Cold	8.5	–	3.8	1.4	–	11.4	5.0	5.6	5.1
Predators	1.5	–	1.6	–	–	–	1.5	–	1.2
Diseases	40.7	68.7	35.8	63.1	60.0	41.2	39.3	54.3	42.2
Internal Paracites	20.7	31.3	25.6	21.3	20.0	19.1	23.6	21.4	23.3
Effect of Injection or Vaccines	–	–	–	–	–	–	–	–	–
Miscellaneous	8.1	–	9.5	–	–	11.5	8.2	4.9	7.5
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 3.12: Incidence of Mortality Among Layers in Surat-Bulsar Districts

(in percentage)

Causes of Death	Small		Moderately Big	Big	Overall		Overall
	Deep Litter	Cage System	Deep Litter	Cage System	Deep Litter	Cage System	
Excessive Heat	17.4	11.7	20.0	19.8	17.4	18.6	18.3
Excessive Cold	19.6	18.1	8.9	8.7	19.6	10.3	12.9
Predators	1.8	–	–	2.4	1.8	0.6	0.9
Diseases	47.0	66.0	45.0	34.2	47.0	46.0	46.3
Internal Paracites	13.3	4.2	22.2	28.6	13.3	20.7	18.6
Effect of Injections or Vaccines	–	–	–	–	–	–	–
Miscellaneous	0.9	–	3.9	6.3	0.9	3.8	3.0
Total	100.0	100.0	100.0	100.0	100.0	100.0	100.0

Table 3.17: Feed Consumption by Poultry Birds According to Farm Size in Sangli-Satara Districts

(in Gms.)

Farm Size	Type of Rearing	Average Duration of Birds Rearing (days)	Quantity Consumed						Total
			Chick stage (up to 4 weeks)		Grower stage (5 to 19 weeks)		Layer stage (Above 20 weeks)		
			Feed Consumed Per Bird	Feed Consumed Per Bird Per Day	Feed Consumed Per Bird	Feed Consumed Per Bird Per Day	Feed Consumed Per Bird	Feed Consumed Per Bird Per Day	Feed Consumed Per Bird
Small	Deep Litter	449	1015	36	7246	69	42975	136	51236
	Cage System	421	–	–	6616	63	38047	132	44163
Moderately Big	Deep Litter	464	928	33	6931	66	44330	134	52189
	Cage System	433	923	32	6303	60	38633	129	45859
Big	Deep Litter	566	897	32	6615	63	56320	130	63882
	Cage System	476	870	31	6195	59	43961	128	51026
Overall	Deep Litter	493	931	33	6903	66	47807	133	55641
	Cage System	443	899	32	6290	60	40629	130	47818
	Overall	483	922	33	6728	64	45784	131	53434

Table 3.18: Feed Consumption by Poultry Birds According to Farm Size in Surat-Bulsar Districts

(in Gms.)

Farm Size	Type of Rearing	Average Duration of Birds Rearing (days)	Chick stage (up to 4 weeks)		Grower stage (5 to 19 weeks)		Layer stage (Above 20 weeks)		Total
			Feed Consumed Per Bird	Feed Consumed Per Bird Per Day	Feed Consumed Per Bird	Feed Consumed Per Bird Per Day	Feed Consumed Per Bird	Feed Consumed Per Bird Per Day	Feed Consumed Per Bird
Small	Deep Litter	501	953	34	8295	79	46368	126	55616
	Cage System	529	897	32	8085	77	48708	123	57690
Moderately Big	Deep Litter	–	–	–	–	–	–	–	–
	Cage System	535	840	30	7875	75	48642	121	57357
Big	Deep Litter	–	–	–	–	–	–	–	–
	Cage System	469	784	28	7665	73	39812	118	48261
Overall	Deep Litter	401	953	34	8295	79	46368	126	55616
	Cage System	511	816	29	7785	74	43995	120	52596
	Overall	506	838	30	7867	75	44373	121	53078

duration of rearing of birds varied from 421 days to 566 days in the Sangli-Satara districts as against 469 days to 535 days in the Surat-Bulsar districts. Apparently poultry units in the Surat-Bulsar districts had better utilization of poultry teed than in the Sangli-Satara districts. In 483 days of rearing, about 53.4 kgs. of feed was consumed in the Sangli-Satara districts as against 53 kgs. in 506 days in the Surat-Bulsar districts.

(a) Feed consumption among chicks: Entrepreneurs provided about 33 grams of feed per bird (up to four weeks) per day in the Sangli-Satara districts as against 30 grams in the Surat-Bulsar districts. Feed consumption was higher in small farms using the deep litter and cage systems and lowest in big farms. Feed consumption was less in the cage system than in the deep litter system.

(b) Feed consumption among growers: Each grower bird consumed about 64 grams of feed a day in the Sangli-Satara districts as against 75 grams in the Surat-Bulsar districts, indicating a changing pattern of feed consumption in the districts. The big units under cage system provided lowest quality of feed among all farms.

(c) Feed consumption among layers: Feed consumption by birds before the laying stage was higher in the Surat-Bulsar districts (8.7 kgs. per bird) than in the Sangli-Satara districts (7.6 kgs. per bird) because of higher quantity provided during the grower stage. This phenomenon was also observed in different farms. Consumption among layers was 131 grams per bird per day in the Sangli-Satara districts and 121 grams in the Surat-Bulsar districts for all farm sizes.

Small farms had provided the largest quantity of feed to the birds and big farms the least, for chicks, growers and layers. Big farms had the lowest utilization of feed for birds than moderately big and small ones.

Researches have revealed that chicken reared in confinement grow faster and consume more than those reared in range The growth of the birds is influenced by: (1) the amount of feed consumed, (2) the size of the bird, (3) nutritional adequacy, and (4) rearing type. Jule[1] estimated the feed requirements in different periods of growth of bird in confinement.

[1] M.A. Jule, *Poultry Husbandry* (Bombay: Tata-McGraw-Hill Publishing Co. Ltd.), p. 337.

The extent of variation between feed requirements and consumption by birds of the sample farms is shown in Tables 3.19 and 3.20. As against the prescribed minimum quantity, sample entrepreneurs provided more feed to chicks both in the Sangli-Satara districts and Surat-Bulsar districts. In deep litter system, it exceeded the prescribed quantity by about 88 per cent in the Sangli-Satara districts and by about 93 per cent in the Surat-Bulsar districts, and in the cage system it exceeded by about 82 per cent in the Sangli-Satara districts and by about 65 per cent in the Surat-Bulsar districts. Feed consumption by chicks in the deep litter system exceeded the prescribed maximum quantity by 48 per cent in the Sangli-Satara districts and about 51 per cent in the Surat-Bulsar districts.

Among different farm sizes, small farms provided the highest excess feed to chicks in the deep litter and cage systems and big farms the lowest in both rearing systems.

The consumption of feed of birds in the grower stage was lower than the prescribed maximum and minimum in the Sangli-Satara districts. In the Surat-Bulsar districts, feed consumption of birds in grower stage was higher than the prescribed minimum in both rearing systems and substantially lower than the prescribed maximum. Small farms using deep litter and cage systems provided more excess feed to birds in grower stage than moderately big and big farms.

To observe variations in the quantity of feed consumption of birds in the laying stage, random sample laying tests for egg production carried out by the Central Poultry Breeding Farm, Bangalore, were used.[2] Among the four random sample laying tests for four years (1970-71 to 1973-74), the minimum and maximum feed consumption per bird per day of the best two lots[3] was considered for comparison.

The quantity of excess feed to birds in laying stage in the two systems varied between 26 to 28 per cent in the Sangli-Satara districts as compared to 12 to 21 per cent in the Surat-Bulsar districts. The quantity of feed in the sample farms was

[2] *Indian Poultry Year Book: 1975-76* (New Delhi: ShakuntaJa P. Gupta, 1976), p. 28.

[3] Best performance was judged by the difference between total expenditure and income per bird over 11 months.

Table 3.19: Percentage Variation in Feed Consumption Per Bird During Different Stage in Two Rearing System in Sangli-Satara Districts

Farm Size	Type of Rearing	Percentage Variation in Feed Consumption							
		Up to 4 weeks		Up to 19 weeks		20weeks on		Overall	
		Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
Small	Deep Litter	+105.1	+61.1	-2.4	-17.3	+3.8	+11.5	+26.2	+6.8
	Cage System	–	–	-10.9	-24.6	+27.0	+8.3	+19.5	+1.7
Moderately Big	Deep Litter	+87.5	+47.3	-6.7	-21.0	+28.8	+9.2	+23.3	+4.8
	Cage System	+86.5	+46.5	-15.1	-28.2	+12.6	-4.1	-8.6	-7.7
Big	Deep Litter	+81.2	+42.4	-11.9	-24.6	+21.1	-6.6	+20.6	+2.7
	Cage System	+75.8	+38.1	-16.6	-29.4	+23.2	+5.1	+17.1	-0.4
Overall	Deep Litter	+88.1	+47.8	-7.0	-21.4	+27.7	+8.8	+22.7	+4.3
	Cage System	+81.6	+42.7	-15.3	-29.3	+26.0	+7.4	+19.1	+1.3
Standard Norms of Feed Consumption as Suggested By M.A. Jule (in gms.)			495	630	7425	8775	104*	122*	

*Figures are based on the date on random sample test on one bird every day.

Table 3.20: Percentage Variation in Feed Consumption Per Bird During Different Stage in Two Rearing System in Surat-Bulsar Districts

Farm Size	Type of Rearing	Percentage Variation in Feed Consumption							
		Up to 4 weeks		Up to 19 weeks		20 weeks on		Overall	
		Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
Small	Deep Litter	+92.5	+51.3	+11.7	-5.5	+21.2	+3.3	+20.4	+2.4
	Cage System	+81.2	+42.4	+8.9	-7.9	+18.3	+0.8	+17.5	-0.1
Moderately Big	Deep Litter	–	–	–	–	–	–	–	–
	Cage System	+69.7	+33.3	+6.1	-10.3	+16.3	-0.8	+15.3	-1.9
Big	Deep Litter	–	+24.4	–	–	–	–	–	–
	Cage System	+58.4	+24.4	+3.2	-12.7	+13.9	-2.9	+12.6	-4.2
Overall	Deep Litter	+92.5	+51.3	+11.7	-5.5	+21.2	+3.3	+20.4	+2.4
	Cage System	+64.9	+29.5	+4.9	-11.3	-11.9	-4.6	+11.4	-5.3
Standard Norms of Feed Consumption as Suggested By M.A. Jule (in gms.)		495	630	7425	8775	104*	122*		

*Figures are based on the date on random sample test on one bird every day.

also higher than the maximum consumption in the random sample tests by seven to nine per cent in the Sangli-Satara districts. In the Surat-Bulsar districts, the quantity in excess of the maximum consumption in the random sample tests was about three per cent among small farms.

The quantity of feed to layers exceeding the minimum and maximum consumption in the random sample tests declined with an increase in the farm size, implying that big farms were more efficient in the utilization of feed than moderately big and small ones. In the cage system, the proportion of excess quantity of feed over the minimum and maximum consumption under the random sample tests was lower than in the deep litter system for all farm sizes.

In the Sangli-Satara districts, farms with deep litter system exceeded the prescribed minimum by about 23 per cent in the complete cycle of birds and those with the cage system exceeded by about 19 per cent. Comparable figures for the Surat-Bulsar districts were about 20 per cent (deep litter) and about 11 per cent (cage). Farms with the deep litter system in the Sangli-Satara districts exceeded the prescribed maximum by about four per cent and those with the cage system exceeded by about one per cent. Comparable figures for the Surat-Bulsar districts were about two per cent (deep litter) and four per cent less in the cage system. Thus sufficient scope for economy in the utilization of feed in both the rearing systems in the Sangli-Satara districts exists.

Farms in the Sangli-Satara districts with the deep litter system could have saved Rs. 295 to Rs. 1299 per 100 birds in one cycle by utilization of feed according to the prescribed quantity (Tables 3.21 and 3.22), and farms with the cage system could have saved between Rs. 78 to Rs. 969 per 100 birds in the cycle. In the Surat-Bulsar districts, farms using the deep litter system could save Rs. 123 to Rs. 879 per 100 birds in the cycle as compared to the maximum of Rs. 500 in the cage system.

Small farms using the deep litter system will obtain greater benefits. In the Sangli-Satara districts, small farms using the deep litter system can gain a minimum of Rs. 416 per 100 birds compared to Rs. 306 in moderately big and Rs. 204 in big farms in a cycle. Small farms using the cage system can gain minimum

Table 3.21 Value of Excess or Less Feed Quantity Per Hundred Birds Against Standard Norms of Feed Consumption in Sangli-Satara Districts

(in Rs.)

Farm Size	Type of Rearing	Value of Excess or Less Feed Quantity Given							
		Up to 4 weeks		Up to 19 weeks		20weeks on		Total	
		Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
Small	Deep Litter	71	52	-23	-193	1297	557	1345	416
	Cage System	–	–	-102	-272	1020	367	918	95
Moderately	Deep Litter	59	41	62	-232	1248	497	245	306
	Cage System	58	48	-141	-311	543	-203	460	-476
Big	Deep Litter	55	36	-102	-272	1424	440	1377	204
	Cage System	51	33	-155	-325	1044	266	940	-26
Overall	Deep Litter	59	41	-66	-236	1306	490	1299	295
	Cage System	55	37	-143	-313	1057	354	969	78

Table 3.22 Value of Excess or Less Feed Quantity Per Hundred Birds Against Standard Norms of Feed Consumption in Surat-Bulsar Districts

(in Rs.)

Farm Size	Type of Rearing	Value of Excess or Less Feed Quantity Given							
		Up to 4 weeks		Up to 19 weeks		20 weeks on		Total	
		Minimum	Maximum	Minimum	Maximum	Minimum	Maximum	Minimum	Maximum
Small	Deep Litter	44	31	81	-15	753	137	878	123
	Cage System	39	26	61	-64	700	37	800	-1
Moderately	Deep Litter	–	–	–	–	–	–	–	–
	Cage System	33	20	42	-64	636	-37	711	-101
Big	Deep Litter	–	–	–	–	–	–	–	–
	Cage System	28	15	22	-103	453	-109	503	-197
Overall	Deep Litter	44	31	81	45	753	137	878	123
	Cage System	31	18	33	32	436	-197	500	-271

Rs. 95 per 100 birds in a cycle. In the Surat-Bulsar districts, small farms using the deep litter system can gain a minimum of Rs. 123 per 100 birds in a cycle.

Thus poultry entrepreneurs were not fully conversant with the prescribed quantities of feed vis-a-vis the weight of birds in different stages of growth and climatic conditions. This adversely affected the financial position of small farms particularly those using deep litter system. Regional variations demanded more efforts by the poultry extension agencies to educate and train poultry entrepreneurs particularly in the Sangli-Satara districts.

3.4 Pattern of Egg Production

The pattern of egg production can speak of the management of poultry stock. Production efficiency in the sample units was assessed in two ways: the laying percentage of the flock maintained at the farm, and egg production per bird in the cycle.

3.4.1 Laying Percentage of Flock

Both in the Sangli-Satara and Surat-Bulsar districts, birds reared in the cage system performed better than those reared in the deep litter system (Table 3.23). In the Sangli-Satara districts, laying percentage in the cycle was about 56 per cent in the deep litter system as against 65 per cent in the cage system. In the Surat-Bulsar districts in small farms (for which alone comparable data was available), the laying percentage in the cage system was higher (55.8 per cent) than in the deep litter system (50.8 per cent). Even within the cage system, the laying percentage was higher in the Sangli-Satara districts (65.3 per cent) than in the Surat-Bulsar districts (59.2 per cent).

In the Sangli-Satara districts the laying percentage of birds was highest (69.2 per cent) in small farms with the cage system than in moderately big (59 per cent) and big (68 per cent) farms.
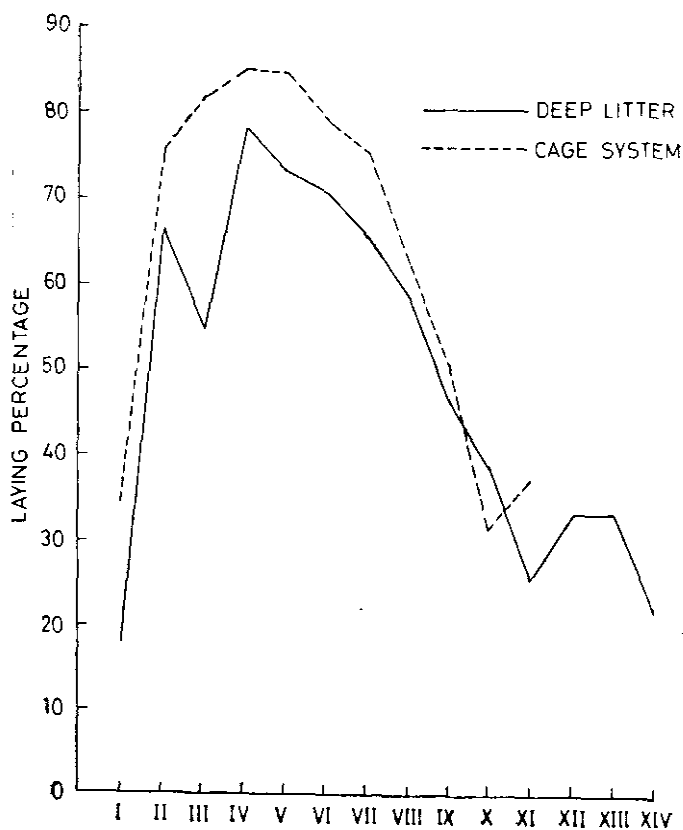
The cage system was more conducive to laying than deep litter system. The highest laying of the flock in the cycle in cage system accounted for 85 per cent as against 78 per cent in deep litter system in the Sangli-Satara districts. As moderate-

Table 3.23: Laying Percentage of Poultry Birds During Laying Period

Month of Laying	Districts															
	Sangli-Satara								Surat-Bulsar							
	Deep Litter				Cage System				Deep Litter				Cage System			
	Small	Moderately Big	Big	Total	Small	Moderately Big	Big	Total	Small	Moderately Big	Big	Total	Small	Moderately Big	Big	Total
I	21.0	21.0	12.1	18.0	58.2	23.3	21.0	34.2	20.6	–	–	20.6	53.8	18.9	9.4	37.6
II	63.8	65.3	70.1	66.4	86.0	70.3	70.3	75.5	55.1	–	–	55.1	74.7	50.1	68.3	70.5
III	71.7	75.6	16.1	54.5	85.5	79.5	79.1	81.4	62.9	–	–	62.9	72.7	61.0	70.0	70.8
IV	72.4	82.6	79.3	78.1	82.2	75.7	96.8	84.9	63.2	–	–	63.2	68.9	61.8	68.5	66.4
V	73.3	79.0	67.5	73.3	82.7	78.2	92.7	84.5	51.7	–	–	51.7	61.7	61.9	61.1	61.6
VI	66.3	77.9	67.5	70.6	78.6	74.2,	84.1	78.9	52.7	–	–	53.7	62.4	59.2	68.8	63.5
VII	58.1	71.5	70.1	65.6	74.8	71.0	79.0	74.9	52.9	–	–	52.9	58.3	55.7	70.9	61.7
VIII	55.1	58.6	61.0	58.2	57.3	61.6	70.9	63.3	57.4	–	–	57.4	59.4	55.4	69.3	61.4
IX	38.6	52.8	46.9	46.1	43.4	36.1	69.3	49.6	63.1	–	–	63.1	55.8	61.9	67.3	59.5
X	30.5	37.6	46.9	38.3	31.3	16.0	46.8	31.4	62.5	–	–	62.5	56.6	67.5	66.9	59.9
XI	21.1	20.0	36.9	26.0	–	–	37.4	37.4	55.4	–	–	55.4	51.5	62.8	57.7	53.7
XII	–	–	33.2	33.2	–	–	–	–	39.9	–	–	39.9	34.5	50.8	36.3	35.8
XIII	–	–	33.2	33.2	–	–	–	–	16.6	–	–	16.6	37.4	24.2	–	30.8
XIV	–	–	21.0	21.0	–	–	–	–	–	–	–	–	27.3	10.0	–	18.7
Total	53.2	59.3	54.1	55.5	69.2	58.8	67.9	65.3	50.8	–	–	50.8	55.4	62.2	60.0	59.2

ly big and big farms in the Surat-Bulsar districts did not use the deep litter system, a comparison of small units using the deep litter and cage systems revealed that highest proportion of laying (75 per cent) was in the latter. The peak laying period was achieved earlier in the cycle in the cage system. The behaviour of the laying percentage curves in both rearing systems showed better performance of birds in the Surat-Bulsar districts than in the Sangli-Satara districts, because near-peak production was maintained longer in the former (Figures I and II).

MONTH-WISE LAYING PERCENTAGE OF EGGS IN **SANGLI-SATARA** DISTRICTS

MONTH-WISE LAYING PERCENTAGE 0F EGGS
IN SURAT-BULSAR DISTRICTS
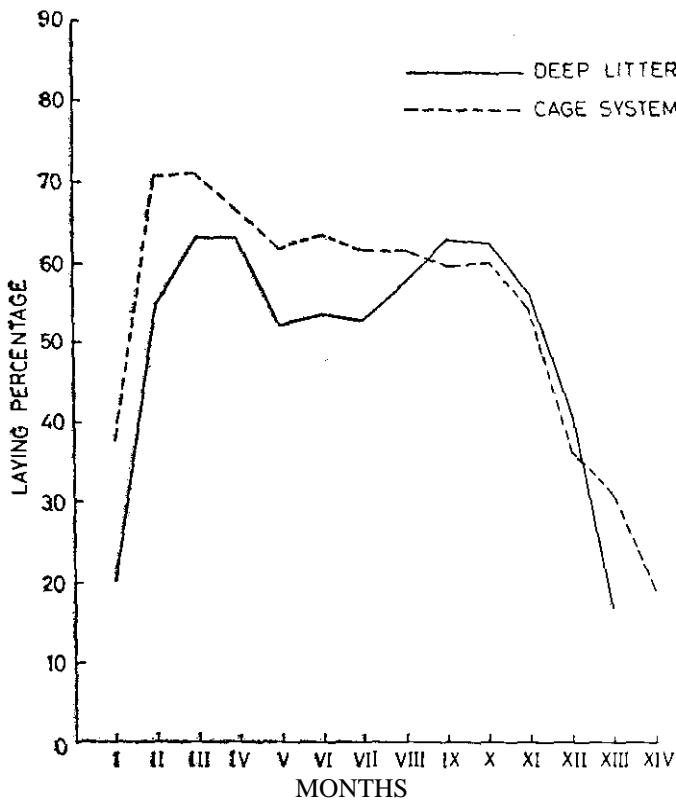
Tig. 11

3.4.2 Egg Production Per Bird

Egg production per bird during the cycle speaks of the quality of the poultry birds and the overall management of the farms. Egg production per bird also depends on the duration of rearing. Table 3.24 shows that production per bird was higher in the cage system than in the deep litter system both in the Sangli-Satara and Surat-Bulsar districts. Egg production per bird of 201 in the cycle in the cage system as against 194 per bird in the deep litter system in the Sangli-Satara districts

Table 3.24: House Eggs Production Per Month in Laying Period

Month Of Laying	Districts															
	Sangli-Satara								Surat Balsar							
	Deep Litter				Case System				Deep Litter				Case System			
	Small	Moderately Big	Big	Total	Small	Moderately Big	Big	Total	Small	Moderately Big	Big	Total	Small	Moderately Big	Big	Total
I	6	6	4	5	7	6	10	17	6	–	–	6	16	6	3	11
II	19	2	21	20	21	21	23	26	17	–	–	17	22	15	20	21
III	22	2	26	24	24	24	25	26	19	–	–	19	22	18	21	21
IV	22	2	24	23	23	29	26	25	19	–	–	19	21	18	21	20
V	22	2	20	22	23	28	25	25	16	–	–	16	18	18	18	18
VI	20	2	20	21	22	25	24	24	16	–	–	16	19	17	21	19
VII	17	2	21	20	21	24	22	22	16	–	–	16	18	16	21	18
VIII	17	1	18	17	18	22	19	17	17	–	–	17	18	16	21	18
IX	12	1	13	14	11	20	15	13	19	–	–	19	17	18	20	18
X	9	1	13	11	5	13	9	9	19	–	–	19	17	20	20	18
XI	6	6	11	8	–	11	11	–	17	–	–	17	15	19	17	16
XII	–	–	10	10	–	–	–	–	12	–	–	12	10	15	11	11
XIII	–	–	10	10	–	–	–	–	5	–	–	5	11	9	0	10
XIV	–	–	6	6	–	–	–	–	–	–	–	–	8	5	–	7
Total	172	1	217	204	175	223	201	204	198	–	–	198	232	210	214	226

was about three per cent higher. Egg production in the cage system (232 per bird) was higher by about 15 per cent of the egg production in the deep litter system (198 per bird) in small farms in the Surat-Bulsar districts.

Production was higher in big farms using both rearing systems, particularly in the Sangli-Satara districts where egg production per bird was 172 in small farms and 217 in big farms using the deep litter system. Egg production per bird was 204 m small farms and 223 in big farms using the cage system. In the Surat-Bulsar districts, egg production per bird was considerably higher in small farms (232) than moderately big (210) and big farms (214). Production per bird was higher in the cage system than in the deep litter system by 16 per cent in small farms and three per cent in big farms in the Sangli-Satara districts. In moderately big farms, egg production per bird in the cage system fell short by nine per cent. In the Surat-Bulsar districts, the productivity per bird in small farms was about 15 per cent higher using the cage system.

The performance of moderately big farms in production per bird was not comparable even to small farms, except the moderately big farms using the deep litter system in the Sangli-Satara districts.

Another significant feature was that egg production in the cycle touched its peak in third and fourth months from the start of laying period. Farms using the cage system both in the Sangli-Satara and Surat-Bulsar districts achieved peak in period of egg production earlier than in deep litter system.

3.5 Structure and Pattern for Marketing of Eggs
3.5.1 Region of Sales

Six factors influence the decision of a producer in marketing perishable commodities: (1) demand in the area of production, (2) the price prevailing in the area of production, (3) demand and supply in outside areas, (4) price likely to be offered outside, (5) net margin in selling outside, and (6) assurance from regions to take stocks.

The sample farms revealed regional and intra-farm variations. About 74 per cent of the sales of eggs were within

Sangli-Satara districts as against 24 per cent in the Surat-Bulsar districts (Table 3.25).

Table 3.25: Sale of Eggs

(in percentages)

| Farm Size | District | | | | | |
| | Sangli-Satara | | | Surat-Bulsar | | |
	Within	Outside	Total	Within	Outsid	Total
Small	93.8	6.2	100.0	100.0	—	100.0
Moderately						
Big	70.2	29. S	100.0	25.0	75.0	100.0
Big	70.4	29.6	100.0	22.1	77.9	100.0
Overall	73.8	26.2	100.0	41.6	58.4	100.0

This sales pattern indicates that the marketing infra-structure in the Surat-Bulsar districts was less developed to induce competition. Also internal demand of eggs was less than the supply in the Surat-Bulsar districts due to social taboos. The highest proportion of sales of small farms was within the districts. Only big farms had achieved their highest sales outside the districts. Moderately big and big farms in the Surat-Bulsar districts had higher sales outside their districts than farms in the Sangli-Satara districts. Bombay was the principal market for both Sangli-Satara and Surat-Bulsar districts.

3.5.2 Sales Agency

Sales through agencies further highlights the inadequacy of a marketing infra-structure (Tables 3.26 and 3.27). Sales made to wholesalers within and outside the Sangli-Satara districts was only 13 percent. Most of the sales were made through commission agents (57.2 per cent). The Surat-Bulsar districts had practically no wholesaler of eggs. Most of the sales were made to commission agents outside the districts. About 38 per cent of the sales were made to cooperatives by the sample units within the Surat-Bulsar districts.

Big farms in the Sangli-Satara districts preferred commission agents in the districts and wholesalers outside the districts by disposing about 87 per cent of the production as compared to

Table 3.26: Percentage Sale Eggs Within and Outside Region In Sangli-SantaraDisticts

Farm size	Percentage Sales to Regional Agencey of						Percentage Sales to Out side Agency of			Total
	Whole-Salers	Commission Agents	Retailer Connsumers	On farm to Connsumers	Self	Sub Total	Whole-Saller	Commission Agents	Sub-Total	
Small	1.9	28.6	61.3	2.0	–	93.8	–	6.2	6.2	100.0
Moderately Big	4.1	35.7	24.4	5.1	3.9	70.2	–	29.8	29.8	100.0
Big	–	57.0	10.0	3.4	–	70.4	29.6	–	29.6	100.0
Overall	2.2	42.5	23.8	3.9	1.8	74.2	11.1	14.7	25.8	100.0

Table 3.27: Percentage Sale Eggs Within and Outside Region In Sangli-SantaraDisticts

Farm Size	Percentage Sales to Regional Agencey of						Percentage Sales to Out side Agency of			Total
	Whole-Salers	Commission Agent	Retailer Connsu	On farm to Socities	Ccrp Socities	Sub Total	Whole-Saller	Commission Agents	Sub-Total	
Small	–	–	–	–	100.0	100.0	–	–	–	100.0
Moderately Big	–	–	9.0	1.0	15.0	25.0	75.0	–	75.0	100.0
Big	–	–	8.6	1.6	12.0	22.1	77.9	–	77.9	100.0
Overall	–	–	6.5	1.0	34.7	42.2	57.8	–	57.8	100.0

about 66 per cent by moderately big farms and about 35 per cent by small ones. Small units made major proportion of their sales to retailers in the districts.

Moderately big and big farms in the Surat-Bulsar districts made most of their sales through commission agents outside the districts. Fifteen and 12 per cent of the sales of moderately big and big farms respectively were through co-operatives. Small farms channelized all sales through co-operatives.

3.5.3 Pricing Pattern

The realization of the price of eggs through different marketing channels constituted the important aspect in the marketing pattern. In this context, it would be desirable to observe variations in different months of the cycle. Since the principal focus of the study was the cycle of birds reared at farm level, it was not possible to observe variations among sample units in the different marketing months due to varying periods of marketing by the units. Therefore, the discussion has been restricted to the realization of the net prices in different sizes of the poultry units, prices realized through sales to different agencies and the variations in the seasonal prices at the Bombay market.

Differences in the realization of prices by farms both in Sangli-Satara and Surat-Bulsar districts were marginal. The average net price realized by farms in the Sangli-Satara districts was Rs. 33.17 per 100 eggs as against Rs. 32.85 in the Surat-Bulsar districts (Table 3.28).

Table 3.28: Average Prices Realized Per 100 Eggs

Farm Size	District	
	Sangli-Satara	Surat-Bulsar
Small	31.99	31.43
Moderately Big	33.26	33.31
Big	34.24	33.82
Overall	33.17	32.85

Small farmers were at a disadvantage as compared to big and moderately big ones both in the Sangli-Satara and Surat-

Bulsar districts. The price realized by moderately big and big farms was four per cent and seven per cent more respectively than small farms in the Sangli-Satara districts. In the Surat-Bulsar districts moderately big farms realized about six per cent more and big farms $7\frac{1}{2}$ per cent more than small farms.

The realization of the average price per 100 eggs in the districts is given in Table 3.29.

Table 3.29: Average Price Per 100 Eggs Realized Through Sales to Different Agencies

	Districts	
Sales Agency	Sangli-Satara	Surat-Bulsar
Regional Agency		
Wholesalers	33.26	—
Commission agents	31.96	33.31
Retailers	30.91	31.96
Co-operative societies	—	31.43
Outside Agency		
Wholesalers	33.64	—
Commission agents	34.25	33.82

In the Sangli-Satara districts, farms realized a higher price by selling eggs to wholesalers. As against the average price of Rs. 33.26 per 100 eggs realized by sales to wholesalers within the districts, the average price realized by sales to commission agents and retailers was Rs. 31.96 and Rs. 30.91 respectively. Farms obtained no significant advantage in selling eggs to wholesalers outside the districts (Rs. 33.64) as compared to commission agents (Rs. 34.25). However, sales to wholesalers were only 13 per cent of the total sales. This situation highlights the importance of commission agents and retailers in the region. Though farms realized the lowest price by sales to retailers, about 24 per cent of the sales were channelized through them.

In the Surat-Bulsar districts, farms realized higher prices through sales to commission agents in the districts (Rs. 33.31) and outside (Rs. 33.82) than sales to retailers (Rs. 31.96) and co-operatives (Rs. 31.43). A commission of Rs. 2.50 per 100 eggs provided by the society to wholesalers in Bombay and the transportation expenses incurred by co-operatives were the major causes of low realization through co-operatives.

To observe monthly variations in the egg prices, data for 10 years was collected from the Bombay market (Table 3.30). Prices of eggs were high in November, December, June and July. This trend should guide poultry entrepreneurs to choose the cycles of egg production by taking advantage of peak prices in these months to maximise returns.

Table 3.30: Monday Variations in Wholesale Price of Eggs in Bombay Market 1967-76

Month	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	Average
January	23.87	28.03	25.45	26.53	24.22	23.20	29.02	33.55	37.79	31.42	28.31
February	21.37	25.58	21.82	22.30	22.10	23.40	27.10	30.26	27.22	33.94	25.51
March	20.84	18.98	21.30	22.20	20.00	21.25	25.43	31.39	30.45	29.10	24.09
April	22.23	24.41	25.73	22.35	19.79	22.25	27.35	32.89	28.39	30.68	25.61
May	24.00	23.02	27.40	26.36	21.86	22.90	33.27	38.03	34.77	36.90	28.84
June	26.02	26.39	27.01	26.80	24.50	26.85	33.60	37.20	40.55	38.50	30.74
July	27.08	24.51	27.59	28.20	24.53	28.85	36.43	40.00	37.92	35.00	31.01
August	27.78	23.65	28.60.	25.75	23.80	25.00	34.80	35.20	33.50	32.25	29.24
September	25.45	25.47	24.20	26.91	26.03	24.50	36.56	35.25	34.50	35.00	29.21
October	24.61	27.00	23.98	24.00	26.00	25.00	33.91	33.09	33.25	35.00	28.43
November	26.93	28.70	26.00	28.00	26.96	28.85	38.86	39.52	38.39	39.00	31.95
December	26.30	25.12	30.93	30.15	27.98	31.10	38.00	40.30	40.63	43.00	33.71
Yearly Average	2496		25.83	25.80	23.98	25.26	32.83	35.63	34.73	34.97	28.90

*Source:*Records of Latif Bros.,Bombay.

4

Economic Performance

4.1 Introduction

A study of costs and returns in different farm sizes using different types of rearing will strengthen the decision making process of the potential entrepreneurs in choosing the appropriate size and technology. This chapter discusses the components of costs and output, and the comparative use of capital resources and financial ratios to indicate the financial efficiency of different sizes using different technologies.

4.2 Analytical Concepts

4.2.1 Definitional Approach to Costs

The various items of costs in the cost analysis pertain to one complete cycle. Cost components were divided into cost of rearing birds "till the laying stage" and cost of rearing "during laying". Since birds start laying eggs between 20-24 weeks, time upto 20 weeks was considered as period till the laying stage in the analysis.

The items of costs of rearing birds "till the laying stage" included purchase price of birds, expenses on litter, hired labour, feed, medicines, mortality of birds during chick and grower stage, electricity, fuel, interest on working capital, depreciation charges, interest on fixed capital etc. The items of costs "during laying" included litter, hired labour, feed, medicines, electricity, fuel, interest on working capital, expenses on marketing, depreciation on fixed capital, and interest on fixed capital.

4.2.2 Method and Criterion for Cost Calculation

Depreciation of fixed assets: Most farms were set up in courtyards of houses or on waste land provided free by the government. However, some farmers in all sizes had purchased land. It was decided not to charge any depreciation or appreciation on the value of land.

Most poultry farms, especially those with the deep litter system constructed *katcha* floors, brick walls, and thatched roofs. Some moderately big and big farms with the deep litter system also utilized asbestos sheets for roofs and tiles on the floor. Farms with the cage system utilized tin sheets for roofs. The life of poultry sheds and cages was taken at 10 years. The depreciation rate was 10 per cent on these structures.

Depreciation was charged at 10 per cent for electric fittings and the value of installations for water supply.

The equipment in poultry farms comprised nests, feeders for chicks, growers and layers, waterers, brooders, fillers, debeakers, and lanterns. The life of these was taken at five years and depreciation was charged at 20 per cent. Other capital items such as egg trays and baskets were considered to depreciate fully in one year.

Interest on fixed assets: Interest on fixed assets was charged at 11 per cent per annum for all farms. Commercial banks charged a concessional rate of interest of 11 per cent for setting up poultry farms particularly in the rural areas. Small units covered under SFDA actually paid four per cent yearly interest in the Sangli-Satara and Surat-Bulsar districts. To examine the comparative costs, it was considered desirable to charge interest for small farms at par with other farms in the Sangli-Satara and Surat-Bulsar districts.

Interest on working capital: Working capital for purposes of cost analysis included expenses incurred on the purchase of birds, feed, medicines, labour, etc. The value of birds purchased was considered as working capital due to rapid changes in the size of the flock during their growth. Working capital was calculated by aggregating expenses incurred till 24 weeks of the start of the cycle. The yearly rate of interest on working capital was 11 per cent. Commercial banks also charged the same

concessional rate of interest to finance working capital to the poultry farms.

Cost of birds: This also included cost of transportation.

Cost of feeds: This included cost of chick mash, grower mash, layer mash. The cost of feed referred to net cost of feed arrived at by deducting the sale value of gunny bag *from* the total value of feed purchased.

Miscellaneous costs: These included expenditure on shell grit, chips, transportation to buy feed, selling eggs, stationery, postage, and service charges paid by small farms to co-operatives.

Distribution of costs during growth of birds: The cost of birds, hired labour, feed and medicines were included in the costs before the laying stage and during laying. Cost of litter, electricity, and fuel, depreciation, interest on fixed and working capital were distributed among two periods. To arrive at the cost of rearing till the point of lay, cost on account of mortality was also estimated.

4.2.3 Value of Output

This included value of eggs, culled birds, and manure sold during the cycle of birds reared at the farm.

4.3 Behaviour of Costs and Returns

4.3.1 Size of Farms

The gross value of output, total inputs, and net returns according to the farm size are presented in Table 4.1.

The total cost of rearing per 100 birds in sample farms indicated wide regional disparities; it was Rs. 6,415 in the Sangli-Satara districts and Rs. 6,767 in the Surat-Bulsar districts. Regional disparities were also observed among different farm sizes. The cost of rearing was higher among small and moderately big farms in the Surat-Bulsar districts as compared to the Sangli-Satara districts. The *cost* of rearing in big farms was higher in the Sangli-Satara districts.

Total costs per 100 birds increased with an increase in the farm especially in the Sangli-Satara districts where cost was Rs. 6,788 in big farms and Rs. 6,324 in small farms. In the

Table 4.1: Gross Output, Total Input and Net Returns Per Hundred Birds According to Size of Poultry Farm

(in Rs)

Farm Size	Districts									
	Sangli-Satara					Surat-Bulsar				
	Duration of Rearing	Gross Output	Total Input	Net Returns	Output Input Ratio	Duration of Rearing	Gross Output	Total Input	Net Returns	Output Input Ratio
Small	435	6953	6324	629	1.10	515	7947	6688	1259	1.19
Maderatily Big	448	7508	6033	1475	1.24	535	8443	7422	1021	1.14
Big	521	8862	6788	2074	1.31	468	8456	6336	2120	1.33
Overall	468	7774	6415	1359	1.21	506	7833	6767	1066	1.16

Surat-Bulsar districts, the total cost per 100 birds did not indi-
cate steady increase with an increase in the farm size because
total cost was higher in moderately big farms (Rs. 7,422) than
small farms (Rs. 6,688). It was lowest in big farms (Rs. 6,336).
However, net returns per 100 birds and the output-input ratios
favoured big farms in Sangli-Satara and Surat-Bulsar districts.
Net returns per 100 birds steadily increased from Rs. 629 in
small farms to Rs. 2,074 in big farms in the Sangli-Satara
districts. In the Surat-Bulsar districts, returns per 100 birds
increased from Rs. 1,259 in small farms to Rs. 2,120 in big
farms. Output-input ratios also favoured big farms whose
profits were 31 per cent as compared to 10 per cent in small
farms in the Sangli-Satara districts. In the Surat-Bulsar districts,
profits were 33 per cent as compared to 19 per cent in small
farms. The output-input ratio was higher for small farms in the
Surat-Bulsar districts (1.19) than in the Sangli-Satara districts
(1.10). The output-input ratio for small farms (3.19) in the
Surat-Bulsar districts indicated that given an appropriate techno-
logy and favourable environmental factors, even these could
also achieve reasonable efficiency standards.

4.3.2 Changing Technology

In the Sangli-Satara districts, the total cost for farms using
the cage system was Rs. 6,343 per 100 birds as against Rs. 6,736
in the Surat-Bulsar districts (Table 4.2). Despite higher costs in
the Surat-Bulsar districts, returns were higher there than in the
Sangli-Satara districts. As against the net margin of Rs. 1,649
per 100 birds in the Sangli-Satara districts, farms using the
cage system had a net margin of Rs. 1,703 in the Surat-Bulsar
districts. The benefit-cost ratio varied marginally *among* farms
using the cage system in the Sangli-Satara districts (1.26) than
in the Surat-Bulsar districts (1.25).

In the Sangli-Satara districts, the total costs for all farms
per 100 birds using the cage system were lower by Rs. 120 than
farms using the deep litter system. While in general total costs
in the cage system were higher than the deep litter system, this
happened because unusually so moderately big farms had lower
total cost in the cage system. In the Surat-Bulsar districts also,

Table 4.2: Total Costs and Total Returns Acoding to Size and Type of Rearing in Poultry Farm

(in Rs. Per 100 birds)

| | | Sangli-Satara | | | | | Surat-Balsar | | | | |
| | | Duration of Rearing | Total Costs | Total Returns | Net Returns | Benefit-Cost Ratio | Duration of Rearing | Toral Costs | Total Returns | Net Returns | Benefit-Cost Ratio |
Farm Size	Type of Rearing										
Small	Deep Litter	449	6150	6704	554	1.09	501	6615	7226	611	1.00
	Cage System	421	6465	7940	1475	1.23	529	6753	8383	1630	1.24
Moderately Big	Deep Litter	664	6364	7708	1374	1.22	—	—	—	—	—
	Cage System	433	5706	7079	1373	1.24	535	7422	8443	1021	1.14
Big	Deep Litter	566	6847	8770	1923	1.28	—	—	—	—	—
	Cage System	476	6711	8955	2244	133	469	6336	8456	2120	1.33
Overall	Deep Litter	493	6463	7728	1265	1.20	501	6615	7226	611	1.09
	Cage System	443	6343	7992	1649	1.26	511	6736	8439	1703	1.25

Districts

total costs per 100 birds in small farms using the cage system were higher than those using the deep litter system.

The net margins per 100 birds and benefit-cost ratios were advantageous for farms using the cage system both in the Sangli-Satara and Surat-Bulsar districts. Farms using the cage system had higher net margin per 100 birds in the Surat-Bulsar districts (Rs. 1,703) than in the Sangli-Satara districts (Rs. 1,649). Farms using the cage system in the Sangli-Satara districts enjoyed an additional gain of Rs. 384 in their net margins. Net margins per 100 birds were higher for farms using the cage system with the exception of moderately big farms in the Sangli-Satara districts. In the Surat-Bulsar districts, net margins were higher in farms using the cage system (Rs. 1,630) than those using the deep litter system (Rs. 611). Among different sizes, small farms were the biggest beneficiaries. In the Sangli-Satara districts, difference in the net margin between the deep litter and cage systems in favour of the latter was Rs. 921 per 100 birds in small farms as against Rs. 321 among big farms. Similarly in the Surat-Bulsar districts, the difference in favour of cage system of rearing was Rs. 1,019 per 100 birds for small farms.

Benefit-cost ratios also favoured the cage system. It was higher among small and big farms. Moderately big farms did not substantially benefit from the cage system as the benefit-cost ratio of farms using the cage system in the Sangli-Satara region was higher by only two per cent. The benefit-cost ratio in moderately big farms using the cage system in the Surat-Bulsar districts was lower than in the Sangli-Satara districts. The profit margin of 23 per cent in the Sangli-Satara districts and of 24 per cent in the Surat-Bulsar districts in small farms using cage system testify to the financial and technical support these units received.

4.4 Cost of Egg Production

The cost estimates of egg production are presented in Table 4.3. The cost of production of 100 eggs indicated regional and intra-farm variations in the technology used. On an average, cost of production of 100 eggs amounted to Rs. 27.53 in farms using the deep litter system in the Sangli-Satara districts as against Rs. 29.39 in similar farms in the Surat-Bulsar

Table 4.3: Cost of Production Per Hundred Eggs According to Size and Technological Changes in Poultry Farms

(Output in Nos. and Cost in Rs.)

Farm Size		Districts					
		bangli-Satara			Surat-Bulsar		
		Output of Eggs	Cost of Production ifmn	Cost of Production Per 100 Eggs	Output of Eggs	Cost Production	Cost of of Production Per 100 Eggs
Small	Deep Litter						
	Cage System	359136	107212	29.85	422334	124118	29.39
	Overall	63036	17197	27.28	243600	62039	25.47
Moderately Big	Deep Litter	—	—	29.47	—	—	27.95
	Cage System	833953	231135	27.72	—	—	31.48
	Overall	683553	180218	26.35	865998	272662	31.48
Big	Deep Litter	—	—	27.11	—	—	—
	Cage System	640150	165189	25.80	—	—	—
	Overall	628860	162944	25.91	1.267522	306332	24.17
Overall	Deep Litter	—	—	25.86	—	—	24.17
	Cage System	1833239	504724	27.53	422334	124118	29.39
	Overall	1375446	371582	27.01	2377120	615822	25.91
		—	—	27.31	—	—	26.43

Note The Cost of Production was arrived at by subtracting the value of birds sold and value of manure produced form the total value of input

districts. The higher cost of production in the Surat-Bulsar districts cannot be compared with the situation in the Sangli-Satara districts due to absence of moderately big and big farms in the deep litter system. But farms using the cage system in the Surat-Bulsar districts had a lower cost of production (Rs. 25.91) than in the Sangli-Satara districts (Rs. 27.01). On an average, cost of production was lower in farms using the cage system (Rs. 27.01) than the deep litter system (Rs. 27.53) in the Sangli-Satara districts.

In the Sangli-Satara districts, cost of production of 100 eggs declined steadily as farm size increased. Cost of production of 100 eggs was lower by Rs. 3.61 in big farms (Rs. 25.86) than small farms (Rs. 29.47). In the Surat-Bulsar districts, cost of production of 100 eggs was lower by Rs. 3.78 in big farms (Rs.24.17) than small farms (Rs. 27.95). However, in moderately big units cost was the highest (Rs. 31.48) among all sizes.

Cost of production per 100 eggs was lower in farms (barring big ones) with the cage system in the Sangli-Satara districts. However, among small and moderately big farms, the difference in the cost of production due to the types of rearing was greater in small farms. As against the difference of Rs. 2.57 per 100 eggs in small farms in favour of the cage system, the difference was only Rs. 1.37 in moderately big units. In the Surat-Bulsar districts the cost of production per 100 eggs among small, farms was lower by Rs. 3.92 in the cage system of rearing (Rs. 25.47) than in the deep litter system (Rs. 29.39). Thus small farms in the Surat-Bulsar districts enjoyed more advantage in the cost of egg production in farms using the cage system than farms in the Sangli-Satara districts. The implications are that through proper management and the judicious use of resources, cost of egg production in small farms could be brought under control near to the efficiency level of big farms.

4.5 Factors Influencing Total Costs
4.5.1 Duration of Rearing

The duration of rearing also influenced total costs, as net returns, particularly in the Sangli-Satara districts (Table 4.2), varied according to the duration. In the Sangli-Satara districts, duration of rearing was shorter in the cage system than in the

deep litter system and total costs increased with the duration. Therefore, the behaviour of total costs vis-a-vis the duration of rearing was studied. The Sangli-Satara districts which alone had farms with the deep litter and cage systems were studied (Table 4.4).

Total costs increased as rearing duration extended both in farms having the deep litter and cage systems. Total costs and total returns increased simultaneously. Cost-benefit ratio declined in farms having the deep litter system where rearing lasted more than 500 days. Apparently poultry entrepreneurs were aware of the economic disadvantages in rearing poultry birds for longer than 500 days, because no farms with the cage system reared for more than 500 days.

4.5.2 Cost Structure

The value of various inputs according to the farm size is presented in Table 4.5.

Variable costs accounted for 92 per cent of the total costs in the Sangli-Satara districts and for about 90 per cent in the Surat-Bulsar districts. Variable costs varied between 90 to 94 per cent among different farm sizes in the Sangli-Satara districts and between 87 to 92 per cent in the Surat-Bulsar districts. Fixed cost averaged only eight per cent in the Sangli-Satara districts and about 10 per cent in the Surat-Bulsar districts. Fixed and variable costs were erratic in absolute terms. Fixed costs declined with an increase in the farm size in the Sangli-Satara districts while they increased in the Surat-Bulsar districts. Variations in the rearing technology in different sizes might account for the erratic behaviour.

1. Cost of birds: The cost of 100 birds was Rs. 569 in the Sangli-Satara districts and Rs. 360 in the Surat-Bulsar districts. It accounted for only about 9 per cent of the total costs in the Sangli-Satara districts and for about five per cent in the Surat-Bulsar districts. Cost of purchase of birds in absolute terms and in proportion to total costs declined with an increase in the farm size. Because entrepreneurs in the Sangli-Satara districts purchased birds of different age groups, they incurred higher costs per 100 birds.

Table 4.4: Behaviour of Total Costs and Returns Per Hundred Birds According to Duration of Rearing in Sangli-Satara Districts

Rearing	Deep Litter System				Cage			
	Average Duration	Total Costs (Rs.)	Total Returns	Benefit-Cost Ratio	Average Duration	Total Costs (Rs.)	Total Returns (Rs.)	Benefit-Cost Ratio
Up to 450	4'3	6117	7419 (1302)*	1.21	423	6235	7643 (1408)	1.22
450-500	483	6410	7834 (1424)	1.22	464	6451	8341 (1890)	1.19
Above 500	563	6883	7934 (1071)	1.16				
Overall	493	6463	7728 (1265)	1.20	443	6343	7992 (1649)	1.26

*Net returns per 100 birds,

Table 4.5: Distribution of Cost Items in Different Sizes of Poultry Farms

(in Rs. per 100 birds)

	Districts							
	Sangli-Satara				Surat-Bulsar			
	Small	Moderately Big	Big	Total	Small	Moderately Big	Big	Total
1	2	3	4	5	6	7	8	9
Fixed Costs								
Depreciation Charges	247	316	218	271	278	521	429	344
	(3.9)*	(5.2)	(3.2)	(4.2)	(4.1)	(7.1)	(6.8)	(5.1)
Interest on	224	272	209	246	267	440	359	316
	(3.5)	(4.5)	(3.1)	(3.8)	(4.0)	(5.8)	(5.6)	(4.7)
Sub-Total	471	588	427	517	545	965	788	660
	(7.4)	(9.7)	(6.3)	(8.0)	(8.1)	(12.9)	(12.4)	(9.8)
Variable Costs								
Purchase of Birds	927	420	338	569	387	355	349	360
	(14.7)	(7.0)	(5.0)	(8.9)	(5.8)	(4.8)	(5.5)	(5.3)
Litter	34	26	17	26	11	—	—	2
	(0.5)	(0.4)	(0.3)	(0.4)	(0.2)	—	—	(0.0)
Hired Labour	—	98	48	73	—	328	334	251
	—	(1.6)	(0.7)	(1.1)	—	(4.4)	(5.3)	(3.7)
Feed	4336	4390	5588	4777	5070	5136	4321	4852
	(68.6)	(72.8)	(82.3)	(73.9)	(75.8)	(69.2)	(68.2)	(71.8)

Table 4.5: Contd

1	2	3	4	5	6	7	8	9
Medicines	188	161	110	169	261	338	279	265
	(2.9)	(2.7)	(1.6)	(2.6)	(3.9)	(4.6)	(4.4)	(3.9)
Electricity and Fuel	68	90	45	68	26	26	25	28
	(1.1)	(1.5)	(0.6)	(1.1)	(04)	(0.4)	(0.4)	(0.4)
Miscellaneous	77	86	45	69	173	51	50	136
	(1.2)	(1.4)	(0.6)	(1.1)	(2.6)	(0.7)	(0.8)	(2.0)
Interest on Working Capital	223	173	170	197	215	223	190	211
	(3.6)	(2.9)	(2.6)	(3.0)	(3.2)	(3.0)	(3.0)	(3.1)
Sub-Total	5853	5445	6361	5948	6143	6757	5548	6107
	(92.61)	(90.3)	(93.7)	(92.0)	(91.9)	(87.1)	(87.6)	(90.2)
Grand Total (A+B)	6324	6033	6788	6465	6688	7422	6336	6767
	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)

Percentage to total.

2. Cost of Utter: In both districts, the cost of litter consti-tuted less than one per cent of the total cost.

3. Hired labour: Due to non-availability of detailed data on the utilization of family labour, only paid out expenses for hired labour were considered. Small farms in Sangli-Satara and Surat-Bulsar districts incurred no expenditure on hired labour. But the cost of hired labour in proportion to the total costs was higher in the Surat-Bulsar districts (3.7 per cent) than in the Sangli-Satara districts (1.1 per cent). In absolute terms, expendi-ture per 100 birds in the Surat-Bulsar districts was four times more in moderately big farms and about seven times more in big farms in the Sangli-Satara districts.

4. Cost of feed and medicines: Feed and medicines accounted for 76.5 per cent of the total cost in the Sangli-Satara districts and 75.7 per cent in the Surat-Bulsar districts. Medicines con-stituted only about three per cent in the Sangli-Satara districts and about four per cent in the Surat-Bulsar districts. Among different farm sizes, cost of feeds varied between 69 and 82 per cent in the Sangli-Satara districts and between 68 and 76 per cent in the Surat-Bulsar districts. In absolute terms, the cost of feed per 100 birds increased steadily with an increase in the size of the farm from Rs. 4,336 to Rs. 5,588 in the Sangli-Satara districts. In the Surat-Bulsar districts, it was higher in moderately big farms and lower in big farms as compared to small ones. The trend was similar for the behaviour of cost of feed in relation to total costs. Thus cost of feed was single most important factor influencing total variable and total costs. This trend raised an important issue on feed consumption in quantitative and money value terms for 100 egg production in different rearing systems.

In the Sangli-Satara districts, quantity of feed consumed per 100 egg production was 23.8 kgs. in the cage system and 28.7 kgs. in the deep litter system (Table 4.6). Differences in the quantity of feed consumption in the regions were marginal. In the Surat-Bulsar districts, the quantity of feed consumed was 28.1 kgs. in the deep litter system and 23.3 kgs. in the cage system. Consumption was uniformly lower in the cage system in the Sangli-Satara districts and the Surat-Bulsar districts. Costs of feed consumed per 1C0 eggs were lower in cage system in all farm sizes. The per unit money values of feed consump-tion for ICOeggs varied significantly. The values varied between

Table 4 6: Quantity and Value of Feeds in Poultry Rearing as Factor In Egg Production in Poultry Farms

(Production in Nos., Value in Rs. and Quantity in Kgs.)

Farm Size	Type of Rearing	Sangli-Satara					Surat-Bulsar				
		Egg Production Per Bird	Total Feed Consumed Per Bird	Total Value of Feed Consumed Per Bird	Quality of Feed Consumed Per 100 Eggs	Value of Feed Consumed Per 100 Eggs	Egg Production Per Bird	Total Feed Consumed Per Bird	Total Value of Feed Consumed Per Bird	Quality of Feed Consumed Per 100 Eggs	Value of Feed Consumed Per 100 Eggs
Small	Deep Litter	172	51.2	45.66	29.8	26.66	198	55.6	49.77	28.1	25.14
	Cage System	204	44.2	40.86	22.6	20.03	232	57.7	51.63	24.9	22.25
	Overall	188	47.7	43.36	25.4	23.06	215	56.7	50.70	26.35	23.58
Moderately Big	Deep Litter	193	52.2	46.73	27.0	24.21	—	—	—	—	—
	Cage System	175	45.9	41.07	26.2	23.47	210	57.4	51.36	28.3	24.46
	Overall	184	49.0	43.90	26.6	23.86	210	57.4	51.36	28.3	24.46
Big	Deep Litter	217	63.9	57.05	29.4	2.29	—	—	—	—	—
	Cage System	223	51.0	54.71	22.9	24.53	214	48.3	43.21	22.6	20.19
	Overall	220	57.5	55.88	26.1	25.40	214	48.3	43.21	22.6	20.19
Total	Deep Litter	194	55.6	49.79	28.7	25.64	198	55.6	49.77	28.1	25.14
	Cage System	201	47.8	45.75	23.8	22.76	226	52.6	47.09	23.3	20.84

Rs. 20.03 and Rs. 26.66 in the Sangli-Satara districts and Rs. 20.19 and Rs. 25.14 in the Surat-Bulsar districts. It appears that poultry entrepreneurs having different farm sizes were unaware of giving a proper quantity of feed to birds in different stages of their growth. They also had their preferences for feed manufacturers/suppliers and wanted to economize on feed. Feed manufacturers were also not supplying balanced feed. A strategy has to be worked out so that poultry entrepreneurs may not have adverse effect on their egg production programme.

   5. Other costs: Fuel and electricity, interest on working capital, expenses on marketing of eggs, transportation, etc. constituted about five per cent of the total costs. Big farms were at an advantage in managing their working capital in all the districts as charges of interest declined on account of working capital with an increase in the farm size. In the Surat-Bulsar districts small farms were covered by co-operatives to assist their marketing. Small units incurred the highest in the Surat-Bulsar districts.

4.5.3 Cost of Rearing During Growth of Birds

   The behaviour of costs of poultry birds in different farms was also studied in two growth stages: (1) till the laying stage, (2) during laying. This analysis might reveal the factors influencing the total costs in the deep litter system and the cage system of rearing, and why the entrepreneurs choose to buy birds of different age groups (Tables 4.7 and 4.8).

   Rearing costs till laying stage alone accounted for 24 to 27 per cent of the total costs in the cycle. In the Sangli-Satara districts, rearing costs till the laying stage were about 23 per cent of the total costs in farms having the deep litter system and about 27 per cent in farms having the cage system. In the Surat-Bulsar districts rearing costs till the laying stage accounted for about 25 per cent of total costs in farms having the deep litter system and about 24 per cent in farms having the cage system.

   Though costs during laying constituted about 77 and 73 per cent of the total costs in farms having the deep litter and cage systems respectively in the Sangli-Satara districts, feeds and medicines accounted for the major ones: about 67 per cent in farms having the deep litter system and 64 per cent in the cage

Table 4.7: Average Cost of Rearing Per Hundred Birds in Different Stages of Growth in Sangli-Satara Districts

Cost of Various Items	Small Deep Cage	Small Deep Cage	Moderately Big Deep Cage	Moderate Big	Big Deep Cage	Big Deep Cage	Overall Deep Cage
Rearing Cost till Laying							
Value of Birds and Cost of	572 (9.3)*	1282 (19.6)	467 (7.3)	374 (6.5)	355 (5.1)	322 (4.8)	479 (7.4)	659 (10.3)
Transportation	11 (0.2)	—	10 (0.2)	—	5 (0.1)	—	9 (0.1)	—
Litter	—	—	—	—	—	—	—	—
Hired Labour	0	0	24 (0.4)	56 (1.0)	10 (0.1)	25 (0.4)	11 (0.2)	27 (0.4)
Feeds	743 (12.0)	591 (9.0)	707 (11.1)	650 (11.3)	675 (9.8)	635 (9.4)	704 (10.8)	646 (10.2)
Medicines	52 (0.8)	69 (1.0)	61 (1.0)	69 (1.2)	23 (0.3)	56 (0.8)	45 (0.7)	65 (1.0)
Electricity and Fuel	21 (0.3)	35 (0.5)	26 (0.4)	46 (0.8)	8 (0.1)	21 (0.3)	18 (0.3)	34 (0.5)
Miscellaneous	24 (0.4)	26 (0.4)	23 (0.4)	35 (0.6)	11 (0.2)	23 (0.3)	19 (0.3)	28 (0.4)
Mortality till Grower Stage	25 (0.4)	87 (1.3)	38 (0.6)	27 (0.5)	42 (0.6)	16 (0.2)	38 (0.6)	27 (0.4)
Depreciation on Fixed Assets	76 (1.2)	83 (1.3)	107 (1.7)	90 (1.6)	53 (0.8)	64 (1.0)	79 (1.2)	86 (1.4)
Interest on Fixed assets	65 (1.1)	79 (1.2)	85 (1.3)	85 (1.5)	49 (0.7)	64 (1.0)	68 (1.0)	80 (1.3)

	48	43	45	46	52	56	84	60
Interest on Working Capital	(0.8)	(0.7)	(0.7)	(0.7)	(0.9)	(0.9)	(1.3)	(1.0)
Sub-Total	1700 (26.7)	1513 (IS.0)	1270	1277 (18.H)	1484 (25.9)	1604 (25.2)	2336 (35.6)	1649 (26.7)
Cost during Laying								
Litter		17 (0.3)		12 (0.2)		16 (0.3)		23 (0.4)
Hired Labour	73 (1.1)	35 (0.5)	41 (0.6)	20 (0.3)	78 (1.4)	38 (0.6)	0	0
Feeds	3929 (61.7)	4275 (65.8)	4836 (71.9)	5030 (73.1)	3457 (60.3)	3966 (62.2)	3495 (53.3)	3843 (62.2)
Medicines	112 (1.8)	107 (1.6)	93 (1.4)	48 (0.7)	95 (1.7)	97 (1.5)	139 (2.2)	116 (1.9)
Electricity and Fuel	47 (0.7)	37 (0.6)	35 (0.5)	27 (0.4)	67 (1.2)	41 (0.6)	38 (0.6)	43
Miscellaneous	54 (0.8)	38 (0.6)	35 (0.5)	23 (0.3)	(0.3)	(0.6)	(0.6)	(0.6)
Depreciation on Fixed Assets	178 (2.8)	199 (3.0)	155 (2.3)	161 (2.3)	189 (3.3)	248 (3.9)	166 (2.5)	169 (2.7)
Interest on Fixed Assets	172 (2.7)	172 (2.6)	152 (2.3)	151 (2.2)	177 (3.0)	(3.1)	166 (2.5)	169 (2.7)
Interest on Working Capital	105 (1.6)	109 (1.7)	(1.6)	140 (2.0)	(3.0)	(3.1)	(2.4)	(2.3)
Sub-Total	4670 (73.3)	4988 (76.7)	5457 (81.1)	5612 (81.5)	4249 (74.1)	4768 (74.8)	4716 (64.4)	4326 (73.3)
Grand Total (A+B)	6370	6501	6727	6889	5733	6372	6552	6175
◆Percentage to total.	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)	(100.0)

Table 4.8: Average Cost of Rearing Per Hundred Birds in Different Stages of Growth in Surat-Bulsar Districts (in Rs.)

Cost of Various Items	Small Deep Cage Litter System	Small Deep Cage Litter System	Moderately Big Deep Cage Litter System	Moderately Big Deep Cage Litter System	Big Deep Cage Litter System	Overall Deep Cage Litter System	Overall Deep Cage Litter System
Rearing Cost till Laying	390	385	—	355	349	390	355
Value of Birds and cosi	(5.9)*	(5.7)	—	(4.8)	(5.5)	(5.9)	(5.3)
Litter	3 (0.1)	—	—	—	—	3 (0.1)	—
Hired Labour	0 (—)	0 (—)	—	86 (1.2)	97 (1.5)	0 (—)	82 (1.2)
Feeds	832 (12.5)	807 (11.8)	—	785 (10.6)	760 (12.0)	832 (12.5)	773 (11.4)
Medicines	95 (1.4)	99 (1.5)	—	130 (1.7)	107 (1.7)	95 (1.4)	23 (1.7)
Electricity and Fuel	20 (0.3)	12 (0.2)	—	16 (0.2)	15 (0.2)	20 0(0.3)	14 (0.2)
Miscellaneous	76 (1.1)	57 (0.8)	—	14 (0.2)	15 (0.2)	76 (1.1)	19 (0.3)
Mortality till Grower Stage	33 (0.5)	25 (0.4)	—	22 (0.3)	14 (0.2)	33 (0.3)	14 (0.2)
Depreciation on Fixed Assets	79 (1.2)	72 (1.1)	—	137 (1.8)	128 (2.1)	79 (1.2)	112 (1.7)
Interest on Fixed Assets	77 (1.2)	68 (1.0)	—	115 (1.5)	107 (1.7)	77 (1.2)	97 (1.4)

Item								
Interest on Working Capital	60 (0.8)	57 (0.8)	—	58 (0.8)	—	57 (0.9)	60 (0.8)	57 (0.8)
Sub-Total	1665 (25.0)	1582 (23.3)	—	1718 (23.1)	—	1649 (26.0)	1665 (25.0)	1644 (24.3)
Cost during Laying								
Litter	8 (0.1)	—	—	—	—	—	8 (0.1)	—
Hired Labour	0 (—)	0 (—)	—	242 (3.2)	—	237 (3.7)	0 (—)	218 (3.2)
Feeds	4145 (62.8)	4356 (64.3)	—	4351 (58.4)	—	3561 (56.1)	4145 (62.4)	3936 (58.3)
Medicines	137 (2.1)	191 (2.8)	—	228 (2.8)	—	172 (2.7)	137 (2.1)	187 (2.8)
Electricity and Fuel	13 (0.2)	8 (0.1)	—	10 (0.1)	—	10 (0.2)	13 (0.2)	10 (0.1)
Miscellaneous	122 (1.8)	92 (1.4)	—	37 (0.5)	—	35 (0.6)	122 (1.8)	55 (0.8)
Depreciation on Fixed Assets	204 (3.1)	201 (3.0)	—	388 (5.2)	—	301 (4.7)	204 (3.1)	295 (4.4)
Interest on Fixed Assets	200 (3.0)	189 (2.8)	—	325 (4.4)	—	252 (4.0)	200 (3.0)	258 (3.8)
Interest on Working Capital	154 (2.3)	159 (2.3)	—	165 (2.3)	—	133 (2.1)	154 (2.3)	152 (2.3)
Sub-Total	4983 (75.0)	5196 (76.7)	—	5726 (76.9)	—	4701 (47.0)	4983 (75.0)	5111 (75.7)
Grand Total (A+B)	6648 (100.0)	6778 (100.0)	—	7444 (100.0)	—	6350 (100.0)	6648 (100.0)	6755 (100.0)

*Percentage to total.

system. Fixed costs because of depreciation and interest on fixed capital were other major items constituting about six per cent each in farms having the deep litter and cage systems.

In the Surat-Bulsar districts, costs during laying accounted for about 75 per cent in farms having the deep litter system and about 76 per cent in farms having the cage system. During the laying stage, feeds and medicines accounted for about 65 per cent in farms having the deep litter system and about 61 per cent in those having the cage system. Fixed costs because of depreciation and interest on fixed capital were also significant in the districts and accounted for about six and eight per cent of the total costs in the deep litter and the cage systems respectively.

This structure of rearing costs was observed in different farm sizes both in the Sangli-Satara and Surat-Bulsar districts. Rearing costs till the laying stage declined as farm size increased in the Sangli-Satara districts. Rearing costs in small farms having the deep litter system till the laying stage were Rs. 1,649 per 100 birds and Rs. 1,277 in big farms. In big farms having the cage system, costs were substantially lower (Rs. 1,270) than in small units (Rs. 2,336). Such a trend was not observed in the Surat-Bulsar districts. Rearing *costs* till laying stage in Surat-Bulsar districts were lower in small farms having the cage system (Rs. 1,582) as compared to moderately big farms (Rs. 1,718). In this system the lowest costs among small farms pointed out that under favourable environmental conditions, these could also achieve the desired efficiency.

Rearing costs were lower in the cage system than in deep litter system till laying stage. This was evident in moderately big and big farms in the Sangli-Satara districts and small ones in the Surat-Bulsar districts. However, higher costs in small farms having the cage system (Rs. 2,336) than deep litter system (Rs. 1,649) in Sangli-Satara districts need to be emphasized. Costs on purchase of birds were more than double in the cage system (Rs. 1,282) than the deep litter system (Rs. 572) due to the preferences of entrepreneurs to buy birds of different age groups.

Further suppliers of commercial chicks charged Rs. 300-450 per 100 one-day old chicks, Rs. 300-600 for one day to one week old chicks, Rs. 500-750 for four-week chicks, and Rs. 750-

1,200 for growers up to 19 weeks old. For choice of 20-22 weeks old, charges were Rs. 1,200 to Rs. 2,200. The price variations were because of the quality and brand name. Rearing costs vis-a-vis market charges for birds of different age groups show that one day old chicks be brought and reared at the farm. This was viewed due to the scale economies operative in the industry and the adjustment of birds to the new environmental conditions. However, with the poultry industry becoming increasingly commercialized, greater specialization is called for. Layer birds (20-24 weeks) prior to laying eggs be marketed to avoid inconvenience in rearing chicks to the commercial farms and to yield regular income by avoiding time-lag in the rearing cycle between different batches of birds.

4.6 Comparative Use of Capital

4.6.1 Break-Even Analysis

Break-even analysis was done to understand the behaviour of profits in relation to the value of output and find out the number of eggs per hen required to meet the cost of production. The previous chapter showed that market prices of eggs varied with the changes in season, place and agency of sale. However, for all districts, Bombay was the principal market for disposing eggs. Therefore, the price realized by the different farm sizes was considered to estimate the break-even sales value.

The point of break-even of sales value of eggs per bird was determined with the formula given below:

$$Y = \frac{F}{P}$$

where Y=Break-even sales value of eggs in the cycle

F= Fixed costs during the cycle

P=Contribution by sales of eggs (in percentage).

The break-even sale of number of eggs according to the price realized on their sale was estimated to be favourable for big units both in the Sangli-Satara and Surat-Bulsar districts (Table 4.9). In the cage system of rearing the break-even sale of eggs per bird declined from 51 eggs in a small farm to 36 eggs in big ones in the Sangli-Satara districts. In the deep litter system, the break-even sale of eggs per bird declined from 78 eggs in a small farm to 38 eggs in big farms. In the Surat-Bulsar districts,

the break-even sale of eggs was much lower in big farms (58) than moderately big farms (102) eggs using the cage system.

The break-even sale of eggs was lower in the cage system in all farm sizes in the Sangli-Satara districts. In the Surat-Bulsar districts, the break-even sale of eggs was lower in small farms (57) using the cage system.

A low break-even volume is usually desirable. However, the higher break-even volume in small farms than in moderately big and big ones in Sangli-Satara districts warranted promotional measures to sustain the interest of existing units and for promoting new ventures. This can be achieved by providing poultry feed by the co-operative poultry feed manufacturing units (where gross margin of profit is less than private units) and educating them by IPDP officials on the prescribed standards of feed to the birds in stages of their growth. Thus small farms can substantially cut down variable costs to realize greater profits.

4.6.2 Rates of Return on Capital Investment

To make an integrated assessment of the financial position of the poultry farms, ratios of return on capital investment were worked out for different sizes having the deep litter and cage systems (Table 4.10).

Returns on capital investments steadily increased with the increase in the farm sizes in the Sangli-Satara districts. Returns in a rearing cycle were 72 per cent in big farms as compared to 15 per cent in small farms. In the Surat-Bulsar districts, returns were higher in big farms (46 per cent) than small farms (43 per cent) using the cage system. However, returns in moderately big farms using cage system were lowest (18.57) per cent.

Returns were significantly higher in farms using cage system. In the Sangli-Satara districts, the difference in returns between farms using cage system and deep litter system, in favour of former, was about 16 per cent in small farms, about 7 per cent in moderately big farms and about 8 per cent in big farms. In the Surat-Bulsar districts also, returns were higher in small farms using cage system (42.44 per cent) than in deep litter system (15.28 per cent).

Table 4.9: Break-even Analysis of Poultry Farms in Selected Districts (Figures per bird)

	Sangh-								aurai-Bulsar			
	Small Deep Cage Litter System	Small Deep Cage Litter System	Moderately Big Deep Cage Litter System	Moderately Big Deep Cage Litter System	Big Deep Cage Litter System	Big Deep Cage Litter System	Small Deep Cage Litter System	Small Deep Cage Litter System		Moderately Big Deep Cage Litter System		Big Deep Cage Litter System
Sale Value of Eggs (Rs./bird)	54.81	64.74	63.78	57.75	73.64	76.04	61.62	71.69	—	70.95	—	71.65
Net Variable Cost* (Rs./bird)	44.72	45.13	43.68	38.61	50.27	49.24	49.81	50.09	—	51.06	—	42.57
Percentage of Net Variable Cost to Sale Value of Eggs	81.59	69.72	63.48	66.80	68.26	64.75	80.44	69.87	—	71.97	—	59.41
Contribution of Sales of Eggs Percentage	18.41	30.28	31.52	33.14	31.74	35.25	19.56	30.13	—	28.03	—	40.59
Fixed Costs† (Rs./bird)	4.55	4.86	6.36	5.41	4.14	4.36	5.60	5.30	—	9.65	—	7.88
Break-even Value of Eggs† (Rs./bird)	24.71	16.05	20.18	16.32	14.04	12.37	28.63	17.59	—	34.43	—	19.41
Break-even Sale of Number of Eggs @	78	51	61	49	38	36	92	57	—	102	—	58
Egg Production Per Bird	172	204	193	175	217	223	198	232	—	210	—	214

Total variable cost is sale of birds+value of manure

†Fixed cost

$$\%\text{Contribution of Eggs} \quad 100 @ \frac{\text{Break-even sale value of Eggs per bird} \times \text{per birds egg production}}{\text{Sale value of eggs}}$$

Table 4.10: Rates of Return on Total Capital Employed According to Size

Farm Size	Type of Rearing	Profits before Tax (P)	Sangli-Satara Total Capital Employed (K)	Rate of Return on Capital (P/K)	Profits before Tax (P)	Surat-Bulsar Total Capital Employed (K)	Rate of Return on Capital (P/K)
Small	Deep Litter	12055	93633	13.87	13686	89554	15.28
	Cage System	5074	17076	29.71	18256	43019	42.44
	Total	17129	110709	15.47	31942	132573	24.09
Moderately Big	Deep Litter	63465	264854	23.96	—	—	—
	Cage System	56211	180709	31.11	45833	246760	18.57
	Total	119676	445563	26.86	—	—	—
Big	Deep Litter	58382	85615	68.19	—	—	—
	Cage System	68128	89893	75.79	128726	280283	45.93
	Total	126510	175508	72.08	—	—	—
Total	Deep Litter	133902	444102	30.15	13686	89554	15.28
	Cage System	129413	287678	44.99	192815	570062	32.82
	Total	263315	731780	35.98	206501	659616	31.31

The sample evidenced that cage system was better than deep litter system. Small farms were also economically viable. The behaviour of costs and returns was erratic in moderately big farms and needs to be investigated further.

5

Summary and Conclusions

5.1 Introduction

Several studies have pointed out that most Indians consume less proteins than the prescribed minimum in their daily diet. National and international agencies have taken measures to minimize the problem of malnutrition in India. Some of these have not only created awareness among the masses of the nutriative value of poultry products but also have provided impetus to poultry development. The government has been supporting poultry farming and significant progress was achieved in poultry farming and egg production during 1961 to 3 974. In the Fifth-Five Year Plan poultry development was considered avlable proposition to meet the nutritional requirements and generate supplementary incomes. During the last few years, commercial poultry farms were concerned over the bullish trend in feed prices, unfavourable egg feed-price ratio, and lack of proper infra-structure for egg production and marketing. This study highlights some structural characteristics of poultry farms and the problems of egg production and marketing.

5.2 Objectives

1. To identify the structural characteristics of commercial poultry entrepreneurs in relation to their socio-economic characteristics, managerial skills, farm's structure, and poultry farming practices;
2. To examine resource availability and its utilization in commercial poultry units;

3. To study the input structure of egg production and the relationship between inputs and output;

4. To identify marketing channels and their effectiveness with reference to the structure of the units.

5.3 Summary of Findings

5.3.1 Socio-Economic Characteristics of Poultry Entrepreneurs

About 73 per cent had poultry farming as their main occupation in the Sangli-Satara districts. In the Surat-Bulsar districts for 67 per cent it was a subsidiary occupation. This finding indicates a change in the attitude to poultry farming, perceiving it mainly a means to supplement income. That high caste Hindus were involved in poultry farming and that most poultry entrepreneurs had minimum educational qualifications in the Sangli-Satara districts strengthened this finding. Small farmers in the Surat-Bulsar districts were members of the co-operative society. About 93 per cent of the poultry entrepreneurs in the Surat-Bulsar districts and 37 per cent in the Sangli-Satara districts attended training programmes organized by district authorities concerned with poultry development programmes.

5.3.2 Structure of Poultry Farms

Most of the sample poultry farms were in rural areas both in the Sangli-Satara and Surat-Bulsar districts. Farms in urban areas had rail facilities within five kms. in the Sangli-Satara districts. Most farms in the Surat-Bulsar districts which were in rural areas had no rail facilities within five kms. Most poultry entrepreneurs in the Sangli-Satara districts had to travel more than 25 kms. for veterinary facilities as compared to entrepreneurs in the Surat-Bulsar districts who travelled only five kms. Most farms were set up in the last six years and state governments gave adequate support. Poultry entrepreneurs were aware of technological improvements in the rearing system as about 50 per cent of farms in the Surat-Bulsar districts and about 36 per cent in the Sangli-Satara districts had adopted the cage system of rearing birds.

5.3.3 Capital Investments in Poultry Units

Capital investment per 100 birds was higher in the cage system of rearing than in the deep litter system in the Sangli-Satara and Surat-Bulsar districts. It was Rs. 2,429 per 100 birds in the Sangli-Satara districts and Rs. 2,345 in the Surat-Bulsar districts in farms using the deep litter system. In farms using the cage system it varied between Rs. 2,572 and Rs. 2,834 per 100 birds in the Sangli-Satara districts and Surat-Bulsar districts respectively. Capital investment on land, buildings and sheds accounted for a large portion in farms using both rearing systems in the Sangli-Satara and Surat-Bulsar districts. Capital investment per 100 birds was highest both in moderately big units using the deep litter and cage systems in the Sangli-Satara and Surat-Bulsar districts. Farms having 500 to 1,499 birds seem uneconomical from the viewpoint of capital investment.

5.3.4 Sources of Finance and Borrowings

The governments subsidized the small and marginal farmers at 33 per cent of the total investment. Commercial banks also met the capital requirements of about 46 per cent in the Sangli-Satara districts and 38 per cent in the Surat-Bulsar districts. The highest contribution for capital was met by farmers' own funds and borrowings from friends and relatives. However, among different sources of borrowings, friends and relatives were the major source in the Sangli-Satara and Surat-Bulsar districts.

5.3.5 Preparatory Background for Egg Production

Decisions on birds' purchase: Although the state governments made efforts to make birds easily accessible to the entrepreneurs, most of them in the Sangli-Satara districts travelled 225 to 300 kms. *to* procure birds. However, hatcheries were located within easy reach of entrepreneurs in the Surat-Bulsar districts, Poultry entrepreneurs developed preferences for the strains of a particular breed and established rapport with the birds supplier over the period of their operation.

Preference for buying birds of different age groups: About

67 per cent of poultry entrepreneurs in the Sangli-Satara districts and 87 per cent in the Surat-Bulsar districts preferred to buy one-day old chicks for rearing. But they also tended to buy birds between a day old to 15 weeks particularly in the Sangli-Satara districts. As entrepreneurs had problems in getting one-day old chicks on time, they switched over to buying older birds.

Preferences for poultry strains: The babcock strain was most popular in the districts. The number of strains reared in the Surat-Bulsar districts was less than in the Sangli-Satara districts.

5.3.6 Intermediate Stage Before Egg Production

Housing oj poultry: Three square feet per bird was required for light breeds and four square feet for general purpose breeds for efficient management. Floor space provided was, however, less according to scientific norms, by about 35 per cent in the Sangli-Satara districts and 24 per cent in the Surat-Bulsar districts in farms using the deep litter system. Farms using the cage system in the Sangli-Satara and Surat-Bulsar districts provided floor space of about 1.5 square feet.

Rearing practices: Sample entrepreneurs usually procured sexed and one-day old chicks, for which they booked the order in advance against 50 per cent deposit money. Hatcheries rarely supplied chicks on time. For brooding chicks, entrepreneurs had separate brooders in the cage itself. Brooding was done the natural and artificial way. Indigenous brooders were generally used. To provide warmth and to regulate temperature, lanterns were used. Birds in the grower and layer stages were kept in separate compartments. Reportedly the cage system provided better opportunity for supervision, prevention of losses, maintenance of sanitation, and control of diseases. Culling was practiced throughout the cycle of rearing. Since poultry birds were susceptible to various diseases, special attention was paid to protect them from epidemics. Vaccination and tonics were also given on the advice of veterinary doctors attached to the Departments of Animal Husbandry and SFDA.

Mortality and diseases: Mortality rate among birds was higher in the Surat-Bulsar districts. It was higher in farms using the deep litter system. Mortality rate was lowest in the layer

stage. Diseases and internal parasites accounted for about 62 per cent of the mortality in the Sangli-Satara districts and 58 per cent in the Surat-Bulsar districts. Excessive heat and cold accounted for 28 per cent of the deaths in the Sangli-Satara districts and 35 per cent in the Surat-Bulsar districts. Variations in the causes of mortality revealed that big farms took better care of birds from "controllable adverse atmospheric influences" than others. Small farms offered more protection against diseases and internal parasites. Even the cage system could not control the mortality rate due to such factors. Mortality among chicks from diseases and parasites was greater in the Sangli-Satara and Surat-Bulsar districts than mortality due to excessive heat or cold. Regional diversities were prominent in mortality rate among birds in grower and layer stages as diseases and internal parasites resulted in a higher mortality rate in the Sangli-Satara districts while atmospheric adversities caused most deaths in the Surat-Bulsar districts. The cage system controlled mortality more in different growth stages.

Quantitative consumption of feed: Entrepreneurs utilized the balanced poultry feed of manufacturing units. However, regional and intra-farm variation in preferences for feed and feed consumption existed due to variations in the duration of rearing which ranged from 421 days to 566 days in the Sangli-Satara districts and 469 to 535 days in the Surat-Bulsar districts. The cage system resulted in greater economy in consumption in the Sangli-Satara and Surat-Bulsar districts. Poultry farms provided more feed than the prescribed minimum to chicks especially those using the deep litter system. Feed consumption in the grower stage was lower in the Sangli-Satara districts and higher in the Surat-Bulsar districts than the prescribed maximum. Small farms provided excessive feed than moderately big and big ones.

5.3.7 Pattern of Egg Production

Laying percentage of flock in cycle: Birds performed better in farms using the cage system in the Sangli-Satara and Surat-Bulsar districts. Small farms' performance was comparable with bigger ones. The peak laying period was earlier in the cycle in the cage system than in the deep litter system.

Egg production per bird: Despite the importance of duration of rearing of birds, on an average, egg production per bird was higher by three per cent in the cage system than in the deep litter system in the Sangli-Satara districts and about 15 per cent in the Surat-Bulsar districts. The trend in egg production per bird in the cycle was in favour of big farms using both the rearing systems. The performance per bird was better in the cage system than in the deep litter system. The performance of moderately big farms using the cage system was not comparable with small farms using this system. Peak production was achieved in the second month itself in the cage system and in the third month in the deep litter system.

5.3.8 Structure and Pattern for Marketing Eggsr

Region of sales: About 74 per cent of the eggs were marketed within the districts itself in Sangli-Satara as against 42 per cent in the Surat-Bulsar districts. Thus the marketing infra-structure in the Surat-Bulsar districts was comparatively underdeveloped to promote competitiveness in selling. Demand for eggs within the districts was lower in Surat-Bulsar due to taboos against consuming eggs among vast section of the rural and urban population. Bombay was the principal market of the sample poultry units for the disposal of eggs.

Agency of sales: The lack of an efficient and effective marketing structure was further corroborated by the fact that commission agents were the principal sales agency in the Sangli-Satara and Surat-Bulsar districts. The sales to wholesalers were almost significant. In the Surat-Bulsar districts, about 35 per cent was sold through co-operatives. Intra-farm and intra-regional preferences for marketing channels were also prominent.

Pricing pattern: The average net price realized by farms in the Sangli-Satara districts was marginally higher than that realized by farms in the Surat-Bulsar districts. Small farms were at a disadvantage than moderately big and big ones in the Sangli-Satara and Surat-Bulsar districts. Sales were made to wholesalers by the producers in the regional agency of Sangli-Satara region whereas in Surat-Bulsar region, commission agents provided better price than other agencies. The co-operatives

structure had not adequately supported small farmers in achieving higher realizations in the Surat-Bulsar districts.

Variation in prices in wholesale market: Trend in the wholesale
prices during the last 10 years in the principal market in Bombay indicated two peak periods in the egg prices. Prices of eggs were high during November and December, and June and July. Thus, entrepreneurs should adjust cycle of egg production to these peak periods to get maximum returns.

5.3.9 Behaviour oj Costs and Returns

Behaviour of costs and returns according to farm size: Total cost of rearing per 100 birds was on an average Rs. 6,415 in the Sangli-Satara districts and Rs. 6,767 in the Surat-Bulsar districts. The cost increased with an increase in the farm size. But net returns per 100 birds and output-input ratios favoured big farms in both districts. Net margins of about 19 per cent among small farms using cage system indicated that with the appropriate technology and a favourable environment, even these farms could achieve the desired efficiency.

Cost and returns according to changing technology : The total cost was lower in farms using the cage system than those using the deep litter system. Net margins and benefit-cost ratios were higher in farms using the cage system in both districts.

5.3.10 Cost of Egg Production

The cost of production of 100 eggs indicated regional and intra-farm variations in the different technologies used to rear birds. Cost of production of 100 eggs averaged Rs. 27.53 in farms using the deep litter system in the Sangli-Satara districts and Rs. 29.39 in similar farms in the Surat-Bulsar districts. Cost of production was lower in the Surat-Bulsar districts. On an average the cost of egg production was lower in all farms using the cage system. Cost of production declined with the increase in the size of the farm.

5.3.11 Factors Influencing Total Costs

Duration of rearing: Total cost and returns increased with an

increase in the number of rearing days in both systems. However, benefit-cost ratio declined in farms using the deep litter system in rearing birds for more than 500 days.

Structure of cost: Variable cost accounted for 92 per cent of the total cost in the Sangli-Satara districts and about 90 per cent in the Surat-Bulsar districts. Cost of purchase of birds accounted for nine per cent of the total cost in the Sangli-Satara districts and five per cent in the Surat-Bulsar districts. Hired labour accounted for about 3.8 per cent of the total cost in the Surat-Bulsar districts and 1.1 per cent in the Sangli-Satara districts. Feed and medicine accounted for about 77 per cent in the Sangli-Satara districts and about 76 per cent in the Surat-Bulsar districts.

Cost of rearing in different growth stages: Rearing cost till the laying stage accounted for 24 to 27 per cent of the total cost. Regional cost variations at this stage were marked. Cost of rearing till laying stage declined as farm size increased in the Sangli-Satara districts. This was not so in the Surat-Bulsar districts. Cost of rearing was lower in the cage system than in the deep litter system till the laying stage in the Sangli-Satara districts. Cost of rearing till the laying stage also varied because entrepreneurs bought birds of different age groups. Rearing cost in relation to prevalent market charges for birds of different age groups indicated that one-day old chicks were better to rear due to scale economies operative in the industry and better adjustment of chicks to the environment. In the laying stage, feeds and medicines alone accounted for about 67 per cent of the total cost in farms using the deep litter system and 64 per cent in farms using the cage system in the Sangli-Satara districts and 65 per cent and 61 per cent respectively in the Surat-Bulsar districts.

5.3.12 Break-Even Analysis

The break-even sale of number of eggs favoured big farms in both districts. It was lower in the cage system than in the deep litter system. Because the break-even volume in small farm was higher, co operatives must supply them feed at concessional prices.

5.3.13 Rates of Returns on Capital Investment

Rates of return on capital investment were highest in big farms in a cycle and increased steadily as farm size increased in the Sangli-Satara and Surat-Bulsar districts. Returns were higher in the cage system than in the deep litter system. Small farms were also economically viable. The cage system provided higher returns than the deep litter system.

5.4 Conclusions

1. Poultry farming may be advocated as a subsidiary occupation to supplement incomes of the rural poor.
2. Use of appropriate technology can further improve the lot of poultry entrepreneurs. The cage system is better than the deep litter system both in terms of feed costs which constitutes 70 per cent of the total costs and for conversion efficiency or egg production per bird.
3. The cage system, however, does not result in large increases in capital investments of the poultry entrepreneurs. Fixed costs of housing alone between the two systems differ marginally.
4. Small farms in the Surat-Bulsar districts using the cage system were more efficient than those in the Sangli-Satara districts. Greater efficiency and, therefore, better returns in the Surat-Bulsar districts can be attributed to:

   a. The efforts of the government to encourage poultry farming as an economic activity based on the concept of poultry estates. A cluster of farms was formed to provide veterinary care, facilities for the feed, and marketing of eggs.
   b. Each farm in a cluster and several clusters became members of a co-operative society which could set up a one-man office at each cluster to provide these services and watch the performance of farms.
   c. Poultry keepers did not have to travel for their requirements. Thus they could continue their regular

      primary occupation smoothly. At times youngsters

> in the family could look after poultry farms with-
> out causing worry to adults.
>
> d. Most farms in a cluster belonged to a village thus
> creating fellow feeling and encouraging co-operation.

5 It will be feasible to develop the concept of poultry clusters rather than having scattered individual farms as in the Sangli-Satara districts.

6. Even in small farms, poultry farming was economically paying if it was well organized and had a basic infra-structure. These farms could be managed without any subsidy for housing as a direct grant in aid or a subsidy in the rate of interest on borrowings. At full costs a small farm using the cage system could make as net income around Rs. 1.25 per bird per month during the laying stage. A farm having 200 birds can fetch a sub-stantial additional income of Rs. 250 per month for a poor rural family.

7. This is possible when the infra-structure facilities are well laid out. The government must divert its resources currently used to provide subsidies in creating infra-structure facilities for egg production and marketing.

8. Excess feed was given for rearing birds in different growth stages as against the prescribed minimum. Money value estimates revealed that poultry farmers can get savings in farms using both rearing systems if they were scientifically managed. Government extension programmes must devote more time to this aspect specially in small farms to enhance their economic viability. Our analysis showed that a small farmer using the cage system could increase his present income per bird from Rs. 1.25 per month to about Rs. 1.80 in the Surat-Bulsar districts. In other words, a small farmer with 200 birds using the cage system can earn Rs. 360 per month instead of Rs. 250.

9. The largest expenditure was incurred on poultry feed. This influenced the price of eggs and meat. Although local organization entered the feed manufacturing business and got customers from among farmers, prices of poultry feed could not be contained. One of the

important infra-structure facilities to be provided to small farms is a feed plant. One plant can be set up for a cluster of farms and operated on a no-profit-no-loss basis. Private feed manufacturers were working on a 30 per cent net return basis (Exhibits 5.1 and 5.2). This margin when integrated with poultry production can benefit producers and consumers.

10. Small farms need marketing help both to procure chicks of desirable strains and to market eggs and birds for meat. Although co-operative marketing *of* eggs in the Surat-Bulsar districts did not yield prices better than those fetched by commission agent, they must be continued and developed. The co-operative marketing society itself used wholesale agents in the Bombay market at great cost. This problem cannot be overcome unless co-operative wholesale units are developed at terminal markets in Bombay, Delhi, and other large consuming centres. A co-operative federation at each terminal market which can operate on either a no-profit-no-loss basis or on small margins can be set up. Constituents of such federations can be poultry co-operatives irrespective of state boundaries.

11. There is currently very little competition between well-known hatcheries in the supply of pedigree chicks. Small farms had to wait to procure chicks and, at times, received them after considerable delays which upset production plans. Quite possibly these few well-known hatcheries preferred large orders or big farms. State governments' intervention by setting up well-equipped hatcheries will improve the situation.

12. Poultry entrepreneurs must be trained in veterinary care. A structure of veterinary care which has been developed for each cluster in the Surat-Bulsar districts is quite viable.

13. The cage system was found *to* be more viable than the deep litter system. Feeding losses were relatively less in the cage system. In the recent past, commercial banks have provided financial support in establishing new units and in meeting their working capital requirements. Discussion with bankers revealed that they showed no

preferences in financing poultry farms using the cage or deep litter system. They seemed to operate more on the basis of what the borrowers demanded than according to technical information on the subject. It is felt that banks will not be able to exercise such discretions until lending windows are sufficiently backed by technical and economic information. It is suggested that it may be profitable for commercial banks interested in development financing to have a centralized cell at regional level which can develop and disseminate such information.

Appendices

Exhibit 1.1: Estimated Poultry Laying Stock and Egg Production in India

(Figures in million)

Year	Layers (Hen) Improved	Desai	Total	Egg Production Desai	Improved	Total
1961	33 (94)*	2 (6)	35 (100)	1980 (85)	360 (15)	2340 (100)
1966	25 (86)	4 (14)	29 (100)	1500 (68)	720 (32)	2220 (100)
1968	29 (69)	13 (31)	42 (100)	1740 (43)	2340 (57)	2220 (100)
1971	35 (66)	18 (34)	53 (100)	2100 (39)	3240 (61)	5340 (100)
1974	42 (59)	29 (41)	71 (100)	2520 (33)	5220 (67)	7740 (100)
1976	42 (51)	39 (49)	81 (100)	2520 (26)	7020 (74)	9540 (100)

*Percentage to total.
Source: Indian Poultry Industry Year Book: 1975-76 (New Delhi-Shakuntala P. Gupta, 1975), p. 16.

Exhibit 1.2: Poultry Production in Fifteen Leading Countries: 1973

Country*	Human Population (million)	Chickens (million)	Chickens per Person	Eggs ('000 tonnes)	Eggs per Person
USA	203	406	2.0	3927	19.3
China	590	1230	2.1	3430	5 8
USSR	242	671	2.8	2845	11.7
Japan	105	244	2.3	1800	17.1
West Germany	61	100	1.6	958	15.7
UK	55	128	2.3	821	14.9
France	50	150	3.0	821 680	13.6
Italy	54	110	2.0	639	11.8
Brazil	93	244	2.6	518	5.6
Spain	34	51	2.5	433	12.7
Mexico	48	147	3.1	420	8.8
Poland	33	150	4.5	420	12.7
India	548	136	0.2	362	0.7
Canada	22	95	4.3	314	14.3
Netherlands	11	60	5.4	286	26.0
Total world	3782	5638	1.5	22516	6.0

*Countries are arranged according to their egg production.
Sources: United Nations Year Book: 197
         FAO Year Book: 1973

Exhibit 1.3: Intensive Poultry Development Projects in Indian States

States	No. of Centres	Names of Blocks (1PDP)
Andhra Pradesh	3*	Hyderabad,* Vishakhapatnam,* and Vijayawada
Assam	3(1)*	Jorhat, Silchar, and Khanna Para*
Bihar	2*	Ranchi* and Patna*
Guiarat	1*	Surat*
Jammu & Kashmir	2(1)*	Jammu and Srinagar*
Karnataka	6(2)*	Bangalore.* Malavati. Haveri. Gangavali, Kudgi, and Mysore*
Kerala	2*	Muvatupuzah,* and Pettah*
Madhya Pradesh	5(4)*	Bhopal,* Indore,* Jabalpur,* Raipur,* and Gwalior
Madras	8(2)	Parayar, Keth, Achara, Pakkam, Ranipet, Portoneve, Omalur,
Maharashtra	14 (3)*	Satara,* Chiplun, Sholapur,* Nanded (Ratnagiri district), Akola, Yeotmal, Bhir, Osmana-baa,* Nasik, Ahmednagar, Amravati
Orissa	2*	Bhubaneshwar,* and Rourkela*
Punjab & Haryana	25 (3)*	Dasuya, Kharar, Nawanshahr,. Samrala, Pathankot, Ghanshan-ker, Kangra, Dehragopipur,. Rupar, Ludhiana,* Rajpura, Nuli,. and Ferozepur/A' arwfl/, *Jagadhari*, Sarhind, Tarantaran, *Zira,.* Phillaur,
Rajasthan	7(2)*	Jodhpur, Ajmer,* Jaipur,* Udai-pur, Bharatpur, Tonk, and Alwar
Uttar Pradesh	5(3)*	Bareilly, Dehradun,* Bijapur, Lucknow,* and Kanpur*
West Bengal	4*	Calcutta,* Durgapur,* Chino-sura,* and Barasat*
Himachal Pradesh	1	Paionta
Chandigarh	1*	Chandigarh*
Delhi	1*	Delhi*
Total	92	

Source: Panda, J.N., Intensive Poultry Production and Marketing Programme, *Indian Farming,* Vol. XV11I, No. 9, Dec. 1968, p. 22.

Exhibit 1.4: Relative Importance of Important Indian States According to Poultry Population, Index Numbers of Population, and Per Capita Egg Production

	Relative Share of Poultry Population (%)			Index Numbers of Poultry Population (1961 as 100)			Per Capita Egg Production		
	1961	1966	1972	1961	1966	1972	1968-69	1973-74	1974-75
Haryana Punjab	1.5	1.9	3.0	100.0	126.9	242.9	12.2	16 8	18 1
Himachal Pradesh	0.1	0.2	0.1	100.0	226.3	227.7	1.7	3.3	3.3
Jammu & Kashmir	1.4	1.3	1.2	100.0	95.3	102.7	29.2	38.8	40.9
Central									
Madhya Pradesh	5.7	5.0	4.9	100.0	87.9	102.7	5.6	5.6	6.1
Rajasthan	0.6	0.7	0.9	100.0	120.5	172.0	2.6	11.0	11.9
Uttar Pradesh	2.8	3.3	2.9	100.0	115.9	122.4	NA	2.4	2.7
West									
Gujarat	1.8	2.0	2.0	100.0	113.5	133.6	34	4.6	5.0
Maharashtra	9.3	8.6	8.9	100.0	93.6	115.5	NA	13.1	13.5
East									
Assam	8.7	7.7	5.7	100.0	90.2	78.0	7.7	13.3	13.8
Bihar	10.7	9.4	9.2	100.0	88.6	102.5	5.3	7.6	8.3
Orissa	5.7	6.7	6.2	100.0	117.6	129.1	9.3	12.4	13.3
Tripura	0.7	0.6	0.4	100.0	87.6	68.4	6.9	9.3	10.6
West Bengal	10.3	11.0	11.3	100.0	108.9	130.8	8.8	11.4	11.5

Exhibit 1.4: Contd.

1	2	3	4	5	6	7	8	9	10
South									
Andhra Pradesh	14.2	12.7	13.9	100.0	90.5	117.3	13.1	13.9	15.7
Karnataka	7.7	7.2	7.5	100.0	93.6	116.7	24.6	46.9	54.9
Kerala	8.0	8.6	8.9	100.0	108.8	134.1	31.9	34.3	36.9
Tamil Nadu	9.9	9.7	9.8	100.0	94.4	118.4	17.1	11.9	14.9
Other States and Union									
Territories	0.9	3.4	3.2	100.0	345.4	390.3	6.3	13.7	12.6
All-India	100.0 1	100.0	100.0	100.0	101.0	119.7	8.4	12.0	13.1

Source : Calculations were made from information in:

1. *Eleventh All India Livestock Census, 1972*, Directorate of Economics and Statistics, Ministry of Agriculture and Irrigation, Government of India.

2. *Annual Plan 1974-75*, Planning Commission, Government of India, New Delhi.

Exhibit 1.5: Estimate of Commercial Poultry in India

	(Figures	in '000)
Region	Layers	Broilers
West		
Gujarat: Surat-Bulsar	400	—
Maharashtra: Bombay-Alibag-Panvel-Thana	350	300
Nasik	250	20
Pune-Vadgaon-Jalgaon-Lonavala	500	500
Sangli-Satara-Kolhapur	200	—
Sub-Total	1700	820
North		
Chandigarh	190	100
Delhi	300	150
Haryana: Jagadhari-Yamunanagar	150	10
Gurgaon	100	35
Panipat-Sonepat	50	100
Himachal Pradesh	20	5
Jammu & Kashmir: Jammu-Kathua-Samba	90	5
Punjab: Amritsar	180	10
Dasua-Tanda	150	10
Ludhiana, Sahnewal-Jagraon-Moga	750	15
Rajasthan: Ajmer	200	—
Udaipur	25	5
Uttar Pradesh: Haldwani-Kashipur	25	1
Meerut-Gbaziabad	60	40
Varanasi	25	5
South		
Andhra Pradesh: Chittor	100	—
Cuddapah	40	—
Hyderabad -Secunderabad	400	50
Kakinada-Rajahmundry	40	—
Karimnagar	50	—
Vijayawada	150	—
Vishakhapatnam	50	—
Karnataka: Bangalore	240	10
Tamil Nadu	200	10
Kerala	30	2
East		
Bihar: Jamshedpur	40	—
Patna	30	—
Ranchi		
West Bengal: Burdwan	40	—
Calcutta-Behala-24 Parganas	120	—

Source: Indian Poultry Industry Year Book: 1975-76 (New Delhi-'
Shakuntala P. Gupta, 1975), p. 19.

Exhibit 1.6: Infra-Structural **Facilities in Indian States**

States	Govt. and Private Hatcheries	Franchisers	Govt. and Private Breeding Farms	Feed Manuf (Coop., Pvt. And Govt.)	Feed Analytical Labs	Equipment Manufacturers	Egg/Poultry Processors	Dealers Distributors in Eggs and Poultry Products Dealers Distributors	Dealers and Distributors
West (Total)	20	8	8	28	8	19	6	16	100
Gujarat	7	4	3	8	—	2	—	3	20
Maharashtra	13	4	5	20	8	17	6	13	80
North (Total)	91	29	15	31	4	33	14	48	125
Union Territories	14	9	2	8	1	17	3	9	16
Haryana & Punjab	28	8	3	10	2	9	3	19	48
Himachal Pradesh	3	2		—	—	—	—	—	3
Jammu & Kashmir	8	1	2	—	—	—	2	—	2
Rajasthan	13	3	1	3	—	1	2	11	15
Uttar Pradesh	13	3	5	8	1	4	3	7	32
Madhya Pradesh	12	3	2	2	—	2	1	2	9
South (Total)	55	19	8	72	8	15	10	24	104
Andhra Pradesh	15	7	3	23	1	5	2	14	33
Karnataka	19	5	3	24	4	6	3	7	51
Kerala	9	1	1	7	—	1	2	1	10
Tamil Nadu	12	6	1	18	3	3	3	2	10

	49	8	6	28	4	5	4	<w>	35
East (Total)									
Assam	14	1	2	8	—	—	4	2	—
Bihar	4	1	1	—	—	—	2	1	4
Orissa	9	1	3	5	—	1	—	2	16
West Bengal	17	5	—	11	4	4	1	4	15
Meghalaya									
Nagaland	5	—	—	4	—	—	—	—	—
All-India	215	64	37	159	24	72	34	97	364

**Exhibit 1.7: Infra-Structural Facilities in Selected Districts
in Maharashtra and Gujarat**

Facilities	Maharashtra Gujarat	
	Districts	
	Sangli-Satara	Surat-Bulsar
Intensive Poultry Development		
Project	2	1
Government and Private Hatcheries	1	5
Franchisers	—	4
Government and Private		
Breeding Farms	—	1
Feed Manufacturers	1	2
Equipment Manufacturers	—	—
Egg/Poultry Processors	—	—
Marketeers in Eggs and Poultry Products		
(i) Dealers	—	3
(ii) Distributors	5	9

Source: Indian Poultry Industry Year Book: 1975-76 (New Delhi, Shakuntala P. Gupta, 1975), pp. 151-295.

Exhibit 1.8: Distribution of Poultry Farms and Sample Size

	Districts						
	Sangli-Satara			Surat-Bulsar			
Size of farm (No of bird)	Total no of Farms	% of Farms to Total	No of Sample Farms constituted	Total no of Farms	% of Farms to Total	No of Sample Farms constituted	Total Sample
Small (less than 500)	102	61	13	730	88	22	35
Moderately Big(500-1500)	51	31	13	30	4	4	17
Big (above 15000 1500	13	8	4	72	8	4	8
Total	166	100	30	832	100	30	60

Source: IPDB records at Surat and Satara offices.

**Exhibit 5.1: The Extent of Variation in the Feed (Layer Mash)
Prices Per Kg. in Co-operative and Private Sector**

Year	Feed Prices		
	Co-operative	Private Sector	Variation (%)
1962	0.32	—	—
1965	0.41	0.56	+37
1970	0.48	0.69	+41
1973	0.71	0.96	+ 35
1974	0.95	1.30	+37
1975	0.91	1.18	+30

Source: Indian Poultry Industry Year Book: 1976-77 (New Delhi:
Shakuntala P. Gupta, 1976), p. 35.

**Exhibit 5.2: Financial Results of Co-operative Poultry Feed
Processing Unit (Gujarat)**

Particulars	197+75 (Rs.)	1975-76 (Rs.)
1. Fixed costs	94315	158547
2. Total variable costs	5082701	3660651
(a) Trade commission	95933	81845
(b) Other variable costs	4986768	3578806
3. Total costs	5177016	3819198
4. Quantity of feed production (tonnes)	3795	3892
5. Value of feed production	5282550	4001556
6. Net profit		
(a) With trade commission	105534	182358
(b) Without trade commission	201467	264203
7. Cost of feed production per tonne		
(a) With trade commission	1364	981
(b) Without trade commission	1339	960
8. Output-input ratio	1.02	1.05
(a) With trade commission		
(b) Without trade commission	1.04	1.07

Source: Records of Bulsar Zilla Pashuahar Sahakari Mandli Limited,
Gandevi (Billimora).

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