

**A STUDY OF THE DAIRY INDUSTRY IN POONA**

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## PREFACE

Very few studies have been undertaken in India which investigate into the economics of the urban milk production, though a significant proportion of the urban milk supply is drawn from the urban areas themselves. The few studies that have been undertaken so far have been mainly confined to the data available from the dairies managed by government or semi-government agencies. The present study investigates the facts about the city dairies in Poona and purports to ascertain the conditions under which the local supply in Poona is being produced. The facts presented in this study are based on the field investigation carried out by me for the purposes of this study.

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## Chapter I

### INTRODUCTION

One prominent feature of Indian cities is the dependence on the locally produced milk for meeting the milk requirements of the city population. Due to a rapid growth of urban population in the post war period, however, this dependence has posed a serious problem because the urban milk supply has become increasingly inadequate. The problem of urban milk supply has, therefore, received increasing attention of the government and other public agencies as is evident from its inclusion as an integral part of the Five Year Plans. Efforts are being made to increase the urban milk supply by launching milk collection schemes. Attempts are also being made to regulate and reform the prevailing system of urban production by removing the milch animals from the city boundaries and settling them in colonies outside.

Poona, to which the present study concerns, is a city which has in the last two decades experienced a phenomenal growth in its size, both in terms of its area and population. The stables in the city have played an important part in meeting the milk requirements of the city population in the past and continue to occupy a significant role in meeting the present milk supply. The present study, therefore, purports to ascertain the conditions under which the local

supply is being produced, the factors that influence the costs and returns of the urban milk producers and the general advantages and disadvantages of the system.

### 1.1 Milk Supply of Poona

The part played by the city stables in the total milk supply of Poona can be realized by considering the data presented in table 1.1. The table brings out the total milk supply of Poona and its development in the past, together with changes in the per capita availability of milk. It may be noted that the table is composed by presenting the data obtained from two published sources. Thus, the figures

Table 1.1 : Trends in the supply of milk to the Poona City.

	Y e a r		
	1916	1938	1957
Total internal production (daily in seers*)	20,000	18,000	19,250
Total imports (daily in seers)	5,000	6,000	30,750
Total supply (seers)	25,000	24,000	50,000
Total population	117,000	240,000	600,000
Per capita availability (in oz.)	6.84	3.20	2.67
Total No. of milch animals	2,688	3,249	5,100
No. of milch animals per 1000 population	22.97	13.54	8.50

(\* A seer is equivalent to 32 oz.)

for the year 1916 are quoted from "Report of the Committee appointed to consider measures for the improvement of the

milk supply in large cities in the Bombay Presidency, 1916" (Chairman G. F. Keatings).<sup>1/</sup> The estimations made were based on figures of animals in milk, collected on a particular day, and on special enquiries conducted for the purpose of that committee. The figures for the year 1938 are quoted from "Poona, A Socio-Economic Survey, 1945".<sup>2/</sup> The internal production, in this case, was estimated on the basis of the total number of milch cattle held within the city area. The milk supply coming from outside was, however, arrived at by taking an actual count of the quantity of milk coming through various octroi stations. Such procedure could not be followed for the determination of the imports into the city at the time of this study. The data for 1957 are, therefore, based on computations. Assuming an average daily yield of four seers per buffalo and two seers per cow (based on the results of the present study), the total milk produced in the city was first computed. This figure was then deducted from the total milk supply of the city as estimated by the Dairy Development Department, Government of Bombay, for arriving at the net imports. The data presented in the table is thus very approximate but is sufficient to indicate the trends in the milk supply of the city over a

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<sup>1/</sup> G. F. Keatinge (Chairman), Report of the Committee appointed to consider measures for the improvement of the milk supply in large cities in the Bombay Presidency, (1916) p.2.

<sup>2/</sup> D. R. Gadgil, Poona, A Socio-Economic Survey, Gokhale Institute of Politics and Economics, Publication No.12, 1945, Part 1, p.206.



period of the past some years.

It can be seen from table 1.1 that about 38 per cent of the total milk supply of the city is being met by the internal production carried on by the city stables. Two decades ago, this proportion was as high as 75 per cent of the total milk supply. It can be observed from the table that the average number of milch animals per thousand human population decreased continuously during the last four decades. Naturally, the internal production could not keep pace with the rapidly growing city population with the result that a greater and greater proportion of the total milk supply was met by imports. There was, thus, a five-fold increase in the imports since 1938. However, even imports fell short of the total requirements resulting in lower and lower per capita availability of milk to the inhabitants of Poona. It can be seen that the per capita availability of milk was reduced from 6.84 oz. in 1916 to 2.67 oz. in 1957.

The most important internal source of milk is, of course, the city milkmen who maintain milch animals quite in the heart of the city and undertake retail sale of milk. However, suburban areas also constitute an important internal source since a substantial portion of the buffalo and cattle population of the city is maintained by the cultivators in the suburban areas who pursue dairying as a subsidiary occupation to agriculture.

Milk which comes from the external sources is mainly brought by the private agencies such as producer-retailers from the adjoining villages and milk collectors who exploit the distant sources in the rural areas. Milk is, thus, imported from villages situated on the Poona-Bombay, Poona-Satara, Poona-Paud, and Poona-Nagar roads. The bulk of the imported milk comes from the areas within a radius of 50 to 60 miles from the city. The following figures, quoted from the survey carried out by the Dairy Development Department of the Government of Bombay,<sup>1/</sup> regarding the proportion of milk brought by different vehicles, would help to give some idea about the distance from which milk is imported.

	%
Bicycles	45.4
Railways	19.3
Motor trucks	17.8
Tongas	13.5
Head-loads	3.2
Bullock carts	0.8
<u>Total imports</u>	100.0

This picture in respect of the total milk supply of the city and the part played by the imported milk is likely to change significantly in the near future since the Poona Milk Supply Scheme is expected to play a major role in the supply of milk to the city population. As was noted earlier, milk supply schemes have been launched by different state

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<sup>1/</sup> Gazetteer of Bombay State, District Series, Vol. XX, Poona District, 1954, p.410.

governments under the first two Five Years Plans for improving the milk supplies of important cities. Poona Milk Supply Scheme was first introduced in 1950 and is operated by the Dairy Development Department of the Government of Bombay. Under this scheme, 6000 lb. of milk is imported daily from nearly 50 villages and hamlets situated on Bombay-Poona and Paud-Poona roads. The scheme envisages an increase in this supply by nearly 18,000 lb. in the near future. According to the Second Five Year Plan of the Bombay State,<sup>1/</sup> it is proposed to extend the collection of milk over a larger area so that, ultimately, about 50,000 lb. of milk will be handled per day towards the end of the Second Five Year Plan. While the existing schemes benefit the cultivators who are in the vicinity of the city, it is also proposed under the Plan to organize the cultivators residing in the villages which are situated away from the cities but are near the railway lines so that milk produced by them can be transported to these cities.

Another important factor which is likely to affect the supply position is the scheme contemplated by the Poona Municipal Corporation for shifting the cattle sheds outside the city precincts. Details of this scheme are considered in the following section.

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<sup>1/</sup> Second Five Year Plan, Bombay State, Government Printing Press, 1958, p.64.

## 1.2 Quality of Milk in Poona

Quality of milk is judged by the bacterial and the chemical standards. There are, at present, no legal provisions anywhere in India which enforce a bacterial standard for milk. However, as it is generally recognized, the circumstances under which milk is produced in the city dairies are such that milk is liable to contamination at every stage of its journey to the consumer. Municipal laws provide certain measures for ensuring the cleanliness of the stables though the enforcement of these laws is not rigorous. Thus, in Poona, the Poona Municipal Corporation is responsible for controlling the production, handling and sale of milk within the Corporation limits. This control falls under two categories. These relate to the prescribing of rules and regulations in respect of (1) maintenance of cattle and cattle sheds, handling of milk from health and sanitation view-points, and (2) the prevention of sale of adulterated milk through checking.

Both the above types of regulations are enforced by the Health Department of the Municipal Corporation. The Bombay Provincial Municipal Corporation Act, 1949, empowers this Department to undertake inspection of the cattle sheds and to enforce standardization. This department undertakes the licensing of premises as well as the men engaged in the milk trade for enforcing the above regulations. There are four types of licences which the Corporation issues for

regulating the trade. Firstly, the dairymen have to obtain a licence for undertaking house to house delivery of milk or for retailing milk outside the stable or dairy shop. Secondly, the dairymen who undertake sale of milk in a dairy shop also have to obtain a licence. Thirdly, a licence has also to be obtained for making use of the river water for washing the cattle within the Corporation limits. The fourth type of licence is in respect of maintenance of animals in stable for commercial purposes. Thus, the Corporation issues licences to those persons who maintain stables for housing draught or milch cattle or any other animals like horses, mules, etc., which are kept for commercial purposes. Those persons who maintain milch animals purely for meeting the household requirements of milk and, therefore, do not undertake any sale of milk are, however, not required to obtain the above licence.

As referred to earlier, the Poona Municipal Corporation is contemplating a scheme for shifting the cattle sheds outside the city limits. The purpose of the scheme is two fold: "(1) that the danger to environmental hygiene and sanitation which at present exists owing to the location of these stables in the residential areas of the city should be eliminated; (2) that milk should be produced under hygienic and sanitary conditions and not contaminated or polluted as happens at present by its production in the stables in the city." <sup>1/</sup>

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<sup>1/</sup> Poona Municipal Corporation, Administration Report, 1954-55, Poona Municipal Corporation Press, 1955, p.353.

In order to implement this scheme, arable waste land measuring about 58 acres from the Parvati village is being acquired by the Corporation. This site is near Vithal Wadi and is very close to the city. The scheme in the final stages envisages an acquisition of about 135 acres of arable waste land with sufficient open land for grazing and growing Para grass for the 5100 milch cattle presently housed in the city stables. The final scheme is expected to cost about fifteen lakhs rupees and is to be run on the lines of the Aarey Milk Colony. To begin with, the shifting of about 500 cattle ( about 200 stables) from the Shaniwar and Narayan wards has been planned but the work in this respect has not begun, pending the acquisition of land.

As regards the prevention of sale of adulterated milk, there was a state legislation up to 1956, called the Bombay Prevention of Adulteration Act, which had empowered the Municipal authorities for the prevention of the sale of adulterated milk. An all-India legislation, enacted in 1954, for bringing a uniformity in the various state legislatures, and known as "The Prevention of Food Adulteration Act, 1954", has now replaced the above state legislation. This act prescribes minimum standard of purity for the various foods and also provides or approves the appointment of a public analyst for analysing food samples. It authorises the persons in the employ of local authorities as

food inspectors for taking (purchasing) food samples for legal purposes. It also prescribes penalties for infringement of the various sections of the Act. This Act has given wider powers to the Municipal authorities for the enforcement of the anti-adulteration measures. Thus, the Act makes any offence in respect of adulteration of food punishable with imprisonment and a substantial fine.

The Act stipulates that "Milk (cow's) shall contain not less than 3.5 per cent of milk fat. The milk solids other than milk fat, shall not be less than 8.5 per cent. Buffalo milk shall contain not less than 5 per cent of milk fat except in Delhi Punjab, Pepsu, Uttar Pradesh, Bihar, West Bengal, Assam, Bombay and Saurashtra, where it shall be not less than 6 per cent. The milk solids other than milk fat, shall be not less than 9 per cent." Any milk which does not comply with the above standard is, therefore, to be regarded as adulterated. This Act came in force in 1956.

Table 1.2 gives a clear idea about the extent of adulteration prevailing in the city. The data relates to the year 1956-57 and is quoted from the Municipal records. The number of samples drawn was 687. These samples were taken at random without applying any lactometer test and were then chemically analysed by the Public Analyst.

Out of the total samples drawn, nearly 34 per cent

Table 1.2 : Distribution of <sup>milk</sup> samples both according to months and the frequency groups showing the percentage of water added. (1956-57)

Month	Per-centage of water added						Fat de- ficiency	Total adul- tera- ted samples	Genu- ine sam- ples	Blanks	Total samp- les
	Up to 10	10.1 - 20	20.1 - 30	30.1 - 40	40.1 - 50	50.1 - 60					
April	-	-	-	-	-	-	-	-	-	-	-
May	-	1	-	1	-	-	-	2	5	-	7
June	3	11	1	-	2	-	1	18	64	2	84
July	1	4	5	2	-	-	1	13	35	-	48
August	-	6	2	-	-	-	1	9	23	1	33
September	1	5	5	1	-	-	-	12	48	3	63
October	1	6	-	3	-	-	-	10	28	3	41
November	3	2	-	2	-	-	-	7	18	-	25
December	1	7	4	5	-	1	-	18	44	-	62
January	3	31	16	7	-	-	2	59	54	-	113
February	7	26	16	9	3	1	3	65	94	-	159
March	5	8	3	2	1	±	-	19	33	-	52
<u>Total</u>	25	107	52	32	6	2	8	232	446	9	687

(Source : Poona Municipal Corporation, Health Department)



were found to be adulterated. It can be seen from the table that the majority of the adulterated samples were concentrated in the second and the third frequency groups. Thus, addition of 10 to 30 per cent of water seems to be a common practice among the milkmen but adulteration of water up to 50 per cent was also not rare. Nearly 93 per cent of the total adulterated samples, however, came under the first four frequency groups. There were eight samples where there was fat deficiency but no addition of water.

Table 1.3 : Percentage of adulterated samples in the total samples taken from the milkmen in the city area and from those coming from the rural areas.

	Number of samples taken	Number of samples found to be adult- erated	Percentage of adulterated samples to the total samples
City area	403	101	25
Rural area	284	131	49
<u>Total</u>	687	232	34

Another point which emerges from this data is the greater degree of prevalence of the practice of adulteration among the dairymen from the rural areas as shown in table 1.3. Thus, out of 687 samples, 403 were taken from the city dairymen while 284 were taken from the gaolis coming from the rural areas outside the city. Nearly 25 per cent of the samples taken from the city milkmen

were found to be adulterated while the same percentage in case of the samples taken from the milkmen coming from the rural areas was as high as 49 per cent. The extent of adulteration was, however, found to be the same among the samples taken from the dairymen from the rural as well as from the city area (table 1.4).

Table 1.4 : Extent of adulteration found among the samples taken from the dairymen in the city as well as from the rural areas. (Data for 1956-57 and 1957-58)

Percentage of water added	1956-57			1957-58		
	No. of samples from City area	Rural area	Total	No. of samples from City area	Rural area	Total
Up to 10	15	10	25	15	13	28
10.1 - 20	40	67	107	46	64	110
20.1 - 30	23	29	52	22	43	65
30.1 - 40	16	16	32	15	17	32
40.1 - 50	4	2	6	3	6	9
50.1 - 60	1	1	2	1	2	3
60.1 & above	-	-	-	1	-	1
Fat deficiency	2	6	8	2	3	5
T o t a l	101	131	232	105	148	253

Punitive action does not seem to serve as an effective deterrent and there is, according to an authoritative source,<sup>1/</sup> hardly any vocal public opinion against adulteration. In fact due to the scarcity of milk and its high price there is

<sup>1/</sup> Poona Municipal Corporation, Administration Report, 1952-53, Poona Municipal Corporation Press, 1953, Report of the Health Officer, pp.16-17.

a demand for the diluted article which is openly sold at a price that would be ridiculously low for good milk.<sup>1/</sup> This fact was also stressed by the dairymen during the course of our survey who complained that the consumer preferred cheaper milk and did not care for the quality. It is not known how far the enforcement of the All India legislation mentioned above has made any favourable effect on the practice of adulteration. The record of the proportion of samples that were found to be adulterated is available in the Municipal Administration Reports for the period prior to the enforcement of the new legislation. But the data in this respect are not comparable with the data given in table 1.2. Formerly, the samples were taken only when adulteration was suspected after the application of the lactometer test; so that the proportion of samples that were found to be adulterated was very high. Since 1956 this method has been discontinued and samples are taken at random without applying the lactometer test.

### 1.3 Price of Milk in Poona

Price of milk in Poona is not fixed by any regulating body and it is natural, therefore, that there are large day-to-day variations in the market price of milk. As was pointed out in the preceding section, in spite of the legislative stipulations regarding the chemical components

<sup>1/</sup> Poona Municipal Corporation, Administration Report, 1953, op. cit., pp.16.17.

of milk, there is no standard quality of milk available except that provided by the milk supply scheme. Consequently, there is a confusing array of prices prevailing in the city at one point of time.

There are several market places in Poona where buyers and sellers come together for purchasing or selling milk. The corporation has also built two market sheds, one in Shivajinagar and the other in Ganesh Peth. The Ganesh Peth Milk Market is comparatively very important since the prices ruling in this market influence the prices of milk in the whole city.

No official record is maintained regarding either the daily prices prevailing or the daily arrivals in the market. The Corporation, however, levies a sort of tax on the quantity of milk that is brought in the market premises for sale. This tax is levied on a slab basis. Taking into consideration the rate of tax and the total annual receipts some estimation of the daily arrivals in the market can be attempted.

<u>Quantity</u> of milk	<u>Rate of tax</u> nP.
Up to 5 seers	6
Between 5 and 10 seers	12
Between 10 and 20 seers	25
For every 10 seers above 20	12

(Note : 100 nP. = Re.1)

The total annual receipts amount to Rs.31,000 <sup>1/</sup> or about Rs.85 per day. Assuming a flat tax rate of 6 nP. per five seers of milk, the total daily arrivals in the two markets amount to about 7000 seers, i.e. nearly 14 per cent of the daily milk supply of the city.

Some data in respect of the daily prices prevailing in the city were obtained from a dairyman who had sold his surplus milk in the market and who had kept a day-to-day record of the milk prices ruling in the Ganesh Peth milk market.

Table 1.5 : Monthly average prices ruling in the milk market during 1956-57-58-59.

Month	Price in naye paise per seer of milk in the year			
	1956	1957	1958	1959
January	45	52	54	57
February	44	59	57	67
March	65	64	76	75
April	75	71	81	81
May	81	94	93	100
June	82	81	103	102
July	86	65	94	91
August	64	71	80	83
September	64	72	71	86
October	61	61	62	67
November	55	42	66	67
December	51	52	63	62
Average	64	65	75	78

<sup>1/</sup> Poona Municipal Corporation, Administration Report, 1957-58, Poona Municipal Corporation Press, 1959, p.26.

Table 1.5 presents these data indicating monthly average prices in the milk market during the period from January 1956 to December 1959. The data are also presented in the form of a chart (No.1). The prices presented in the table refer to the prices for which milk of a particular quality was sold. There were, usually, different groups of sellers in this market who had varying reputations regarding the quality of milk sold by them. The above mentioned dairyman represents a group which sold a superior quality of milk and the prices shown in the table can be regarded as fairly representative of a good quality of milk offered in the market.

Two observations can be made regarding these data. Firstly, the price level in 1959 was generally higher during the whole year than the price level prevailing in the preceding three years. Secondly, the price level had suddenly shot up since 1958. Thus, the average yearly prices in 1956 and 1957 were 64 nP. and 65 nP. respectively as against the annual average of 75 nP. and 78 nP. respectively in the years 1958 and 1959.

This sudden rise in the price of milk during the last two years is mainly due to the rise in the general price level but especially due to the rise in the prices of feed which absorb a major portion of the current expenditure on the production of milk. Another plausible reason which

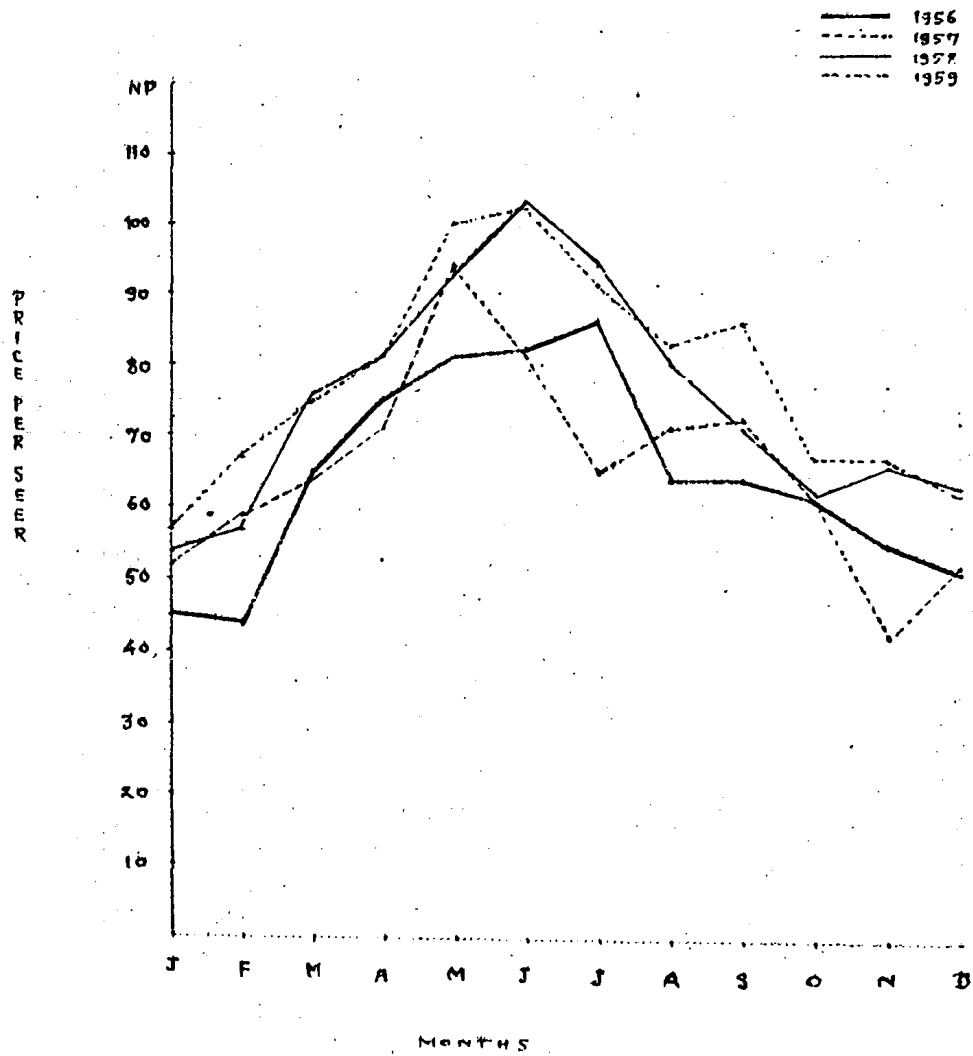


Figure 1 : Monthly average prices ruling in the milk market during 1956, 1957, 1958 and 1959.

might have, at least to some extent, raised the milk prices by affecting the total milk supply is the influence of the Prevention of Food Adulteration Act, 1954.

Table 1.5 also brings out the seasonality in the milk prices in Poona. The price of milk, as the price of any other commodity, is the function of supply and demand conditions. The explanation for the seasonal fluctuations in the prices of milk can, therefore, be sought in the changes in the supply and demand conditions in the various seasons. On the supply side, calving of a large number of animals and availability during a particular season of pastures influences the variations in the production and, thereby, the supply of milk. The calving season of buffaloes, the most popular dairy animal, usually spreads between July and November. This is a season, therefore, when there is a glut in the market and the prices are at a low level. The lowest level of production is reached during the summer season, i.e. from March to June, when most of the animals are dry or give very little milk. Another important factor which governs the seasonal fluctuations of milk prices is the cost of production. Cost of production is generally higher in the summer season due to the scarcity of fodder while it is lower during the monsoon and winter seasons when grazing facilities are available and fodder becomes plentiful. It may be noted from the table that price of milk reached its peak level during the months of May and

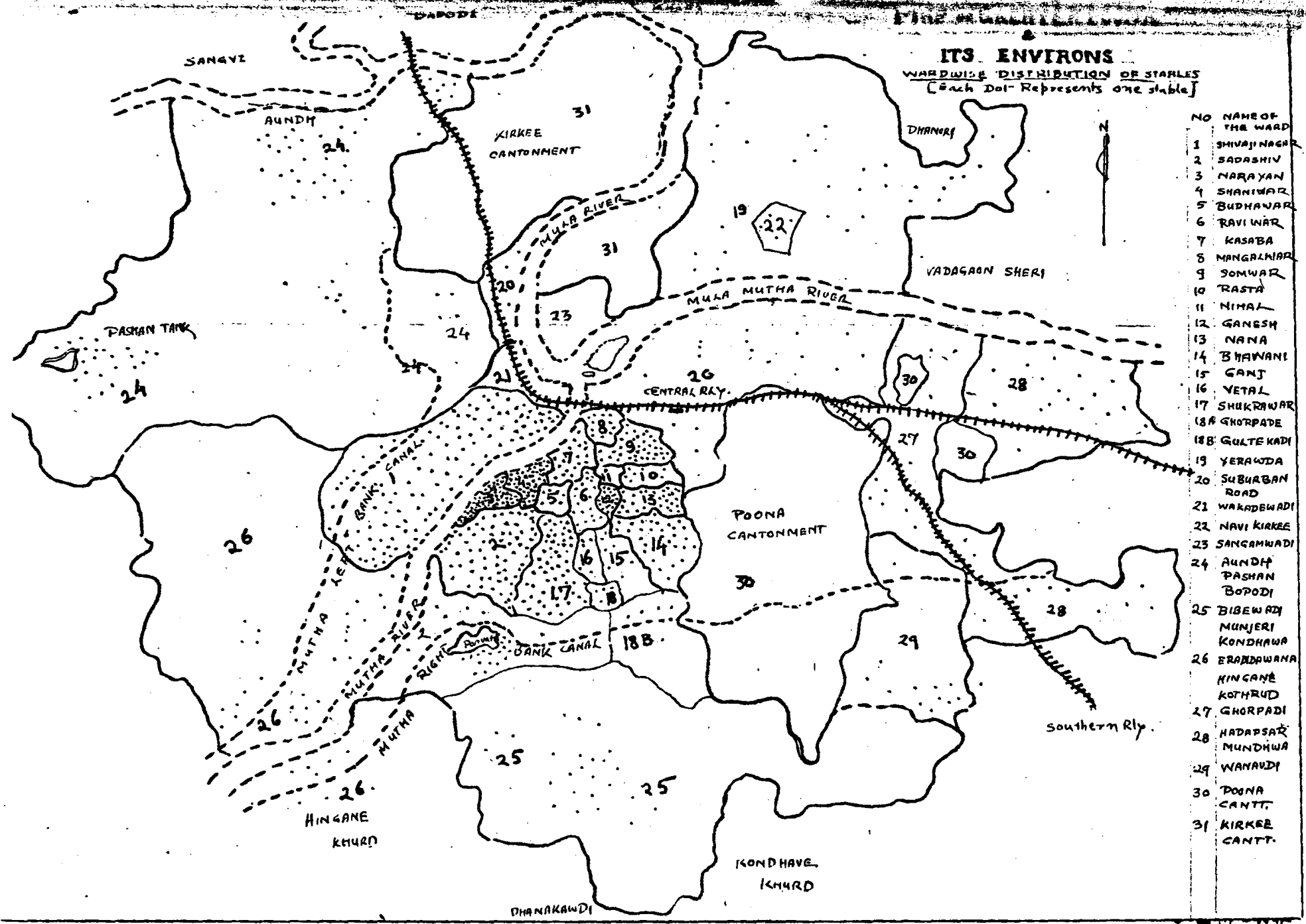


June, after which they showed a downward trend.

Besides these seasonal fluctuations in the prices of milk, there are also day-to-day fluctuations. These are the results of temporary changes in the demand and supply conditions. Thus, if during the monsoons there is a heavy rain and the roads connecting the city become unplyable, the supply is immediately affected and the prices shoot high. Sometimes the milk prices shoot up if severe checking is undertaken by the inspectors of the Poona Municipal Corporation for the detection of adulterated milk. Supply of milk is then reduced since the adulterated milk at once goes out of market. On the demand side, festivals and festive occasions account for the temporary price rise in the market. The average consumer is, however, not affected by these day-to-day fluctuations in the milk market since he receives his milk at his door on monthly credit basis. The rates charged for such home delivery of milk are usually higher than those prevailing in the market and are stationary for a particular season. There are very few individuals who go to the market and purchase their daily household requirement of milk. The majority of those who purchase milk in the milk market are the hotel and dairy shop owners, the sweetmeat shop owners, etc., who require large quantities of milk.

#### 1.4 Location of the Dairies

It must be mentioned here that the term 'Poona City'



**ITS ENVIRONS**

WARDWISE DISTRIBUTION OF STABLES  
 [Each Dot Represents one stable]

NO	NAME OF THE WARD
1	SHIVAJI NAGAR
2	SADASHIV
3	NARAYAN
4	SHANIWAR
5	BUDHANAR
6	RAVIWAR
7	KASABA
8	MANGALWAR
9	SOMWAR
10	RASTA
11	NIMAL
12	GANESH
13	NANA
14	BHAWANI
15	GANTJ
16	NETAL
17	SHUKRAWAR
18A	GHORPADE
18B	GULTE KADI
19	YERAWDA
20	SUBHABAN ROAD
21	WAKADEWADI
22	NAVI KIRKEE
23	SANGAMWADI
24	AUNDH PASHAN BOPODI
25	BIBEWAR MUNJERI KONDHAWA
26	ERADAWANA HINGANE KOTHRUD
27	GHORPADI
28	HADAPSAR MUNDHWA
29	WANAUDE
30	POONA CANTT.
31	KIRKEE CANTT.

used in this study refers to the area incorporated with in the Poona Municipal Corporation limits. The Record of Licences mentioned earlier is kept for the whole of this area which includes the city proper as well as the suburban areas which together constitute 'Greater Poona'. 'Greater Poona' was formed only after the establishment of the Poona Municipal Corporation in 1950. Before 1950, the city area and the suburban area were administered by two independent Municipalities. The Poona Corporation was constituted by amalgamating the Poona City Municipality and the Suburban Municipality and subsequently the areas of the whole or part of some 17 adjoining villages<sup>1/</sup> were added to the Corporation limits to form 'Greater Poona'. The areas of the Poona and Kirkee Cantonments are still independently administered and are now completely surrounded by the Poona Corporation area.

The old city is sub-divided into different wards which are listed on the adjoining map indicating the area included in Greater Poona. Kasaba, Somwar, Shaniwar, Budhawar and Raviwar are the oldest of all wards dating back to the 16th and 17th centuries. Most of the other wards between the Mutha river and the Poona Cantonment area were established

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<sup>1/</sup> (1) Aundh, (2) Pashan, (3) Kothrud, (4) Hingane, (5) Parvati, (6) Dhankawadi, (7) Kasabe Poona, (8) Hadapsar, (9) Lohogaon, (10) Ghorpadi, (11) Mundhwa, (12) Yerawada, (13) Dhairi, (14) Kalas, (15) Bhosari, (16) Dapodi, (17) Vadagaon.

Table 1.6 : Data showing changes in the wardwise distribution of milch animals and stables in Poona since 1938

Name of the ward	1938*				1957**			
	No. of animals	Percentage of the total	No. of stables	Percentage of the total	No. of animals	Percentage of the total	No. of stables	Percentage of the total
Shivaji Nagar	310	9.54	62	10.20	823	16.80	113	14.45
Sadashiv	668	20.58	210	34.54	558	11.39	74	9.46
Shukrawar	457	14.07	64	10.53	270	5.52	56	7.16
Shaniwar	182	5.60	19	3.12	352	7.18	46	5.88
Narayan	247	7.60	30	4.93	397	8.10	57	7.29
Somwar	314	9.66	27	4.44	314	6.42	35	4.47
Ganesh	136	4.18	16	2.63	170	3.47	18	2.30
Nana	116	3.57	23	3.78	166	3.39	28	3.58
Kasaba	124	3.82	25	4.11	55	1.12	19	2.43
Budhawar	103	3.17	13	2.14	53	1.08	6	0.77
Raviwar	142	4.37	25	4.11	102	2.08	18	2.30
Bhawani	106	3.26	30	4.93	109	2.22	30	3.84
Ghorpadi-								
Gultekadi	25	0.77	4	0.66	59	1.21	9	1.15
Ganj	35	1.08	13	2.14	64	1.31	7	0.89
Mangalwar	93	2.86	17	2.80	60	1.22	11	1.41
Rasta	107	3.29	16	2.63	39	0.80	7	0.89
Nagesh(Nihal)	31	0.95	3	0.49	2	0.04	1	0.13
Vetal(Guruwar)	53	1.63	11	1.81	14	0.28	5	0.64
Total City Area	3249	100.00	608	100.00	3607	73.63	540	69.05
Suburban wards	-	-	-	-	1292	26.37	242	30.95
T o t a l	3249	100.00	608	100.00	4899	100.00	782	100.00

Source : \*Poona, A Socio-Economic Survey, Part 1, p.203

\*\*Record of Licences, 1957, Health Department, Poona Municipal Corporation

during the 18th century. The rest of the expansion of the city took place chiefly after the first World War.

It is interesting to study the wardwise location of the dairies and the changes, in this respect, since 1938. Table 1.6 presents the relevant data. The data for 1938 were obtained from 'Poona, A Socio-Economic Survey'<sup>1/</sup> referred to earlier. These data relate to the old city proper. Data for 1957 were obtained from the Municipal Record of Licences. It can be seen from these data that nearly 69 per cent of the total establishments and 73 per cent of the milch animals are located in the old city area proper, while the rest are located in the suburban areas. This was obviously due to the necessity of producing milk on the spot so as to facilitate quick distribution of this extremely perishable commodity. The table also brings out that within the city area itself, concentration of stables as well as of the milch animals is greater in a few wards like Shivajinagar, Sadashiv, Shukrawar, Narayan and Shaniwar.

The most important factors which influence the location of these dairies seem to be (1) consideration of space, and, (2) access to the supplies of water. It is, therefore, natural that as the older wards came to be thickly populated the stables tended to shift along the outlying wards. The

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<sup>1/</sup> Op. cit., p.203

data under consideration (table 1.6) bring out such a shift in the area of concentration of milch animals since 1938. Thus, the cattle population in the wards like Shukrawar, Budhawar and Kasaba has considerably reduced during 1938 and 1957, while it increased significantly in Shivajinagar during the same period. The decline in the cattle population in the old part of the city is both in terms of absolute number and percentages. This is, however, not true in respect of some older wards like Shaniwar and Narayan. But, it may be noted, that these are river-side wards and the population of milch animals in both these wards has considerably increased during the period under consideration in spite of their <sup>an</sup> ~~in~~ favourable situation from the point of view of space. The influence of the proximity of water supplies is, thus, very marked.

#### 1.5 Herd Size

The two sources of information considered in the preceding section also give us some data about the trend in the average size of the dairies. These data are presented in table 1.7. It may be noted that though the average herd size has changed only slightly during the past two decades, the increase in the average size of units in the largest size group is very prominent, i.e. it has increased from 28 milch animals per unit in 1938 to 37 animals per unit in 1957. This increase in the size of the larger units may indicate a greater degree of commercialization

Table 1.7 : Trends in the herd size over <sup>the</sup> a period from 1938 to 1957.

	Number of milch animals maintained					Total
	1	2 to 5	6 to 10	11 to 21	21 & above	
<u>1938</u>						
No. of animals	104	1049	940	880	276	3249
% of the total	3	33	29	27	8	100
No. of units	104	311	122	61	10	608
% of the total	17	51	20	10	2	100
Average size					27.60	5.34
<u>1957</u>						
No. of animals	67	1499	1203	1251	879	4899
% of the total	1	30	25	26	18	100
No. of units	67	443	163	85	24	782
% of the total	9	58	19	11	3	100
Average size					36.62	6.26

of the trade. As will be discussed elsewhere, this increase in the herd size of the larger units is primarily due to an increase in the scale of operation of the dairies which were operated on a smaller scale in the past and not due to the entry of persons with substantial financial backing in the trade.

#### 1.6 Composition of the herd

There is a general tendency among the dairymen in Poona to maintain a cow or two in the herd. Table 1.8 brings out the proportion of establishments with cows during 1938 and 1957. It can be seen that the proportion of establishments with cows (i.e. those with cows alone as well as those with

Table 1.8 : Composition of the Dairy Herd during 1938 and 1957

	<u>1938</u>	<u>1957</u>
Number of establishments with-		
Cows only	- 35(6%)	37(5%)
Cows & Buffaloes	- 198(32%)	270(34%)
Buffaloes only	- 375(62%)	475(61%)
<u>Total</u>	- 608(100%)	782(100%)
Number of - Cows	- 398(12%)	569(12%)
Buffaloes	- 2851(88%)	4330(88%)
<u>Total</u>	- 3249(100%)	4899(100%)

cows and buffaloes both) has remained constant since 1938. The proportion of establishments with cows in 1938 was 38 per cent and that of establishments with buffaloes only was 62 per cent. In 1957, the respective percentages were 39 and 61. Also there is no change in the proportion of establishments with cows only. Such establishments constituted 5.75 per cent and 4.75 per cent respectively in 1938 and 1957. Similarly, there is little change in the proportion of cows in the total dairy herd. Cows constituted 12.25 per cent of the dairy herd in 1938 whereas the relevant percentage in 1957 was 11.61. Table 1.9 gives the distribution of total units according to the number of cows and buffaloes maintained in them.

It is thus clear that cows were not regarded as the dairy animal, yet a small number was maintained in the herd either for the domestic requirements or for meeting



Table 1.9 : Distribution of total units in the source list according to the number of cows and buffaloes maintained. (Source: Poona Municipal Corporation, Public Health Department)

No. of Buffaloes	Number of Cows							Total Units	Total Buffaloes
	Nil	One	Two	Three	Four	Five	Six & above		
Nil	-	19	7	6	1	2	2	37	..
1	48	14	5	2	2	-	1	72	72
2	104	28	10	1	-	-	-	143	286
3	78	19	8	3	2	-	-	110	330
4	75	29	7	1	-	-	-	112	448
5	52	15	7	2	-	-	-	76	380
6	31	12	6	2	-	-	-	51	306
7	22	8	2	2	-	-	-	34	238
8	11	3	3	2	-	-	-	19	152
9	5	4	-	1	-	-	-	10	90
10	13	8	1	1	1	-	-	24	240
11	5	4	1	1	-	-	-	11	121
12	5	5	1	-	1	1	-	13	156
13	3	1	3	-	1	-	-	8	104
14	2	1	2	2	-	-	-	7	98
15	4	2	2	-	-	-	-	8	120
16	3	5	-	1	-	-	-	9	144
17	-	1	-	-	-	-	-	1	17
18	3	4	3	-	-	-	-	10	180
19	2	1	-	-	-	-	-	3	57
20	1	1	1	-	1	-	-	4	80
21 & above	8	6	2	1	-	-	3	20	711
Total Units	475	190	71	28	8	3	6	782	4330
Total Cows		190	142	84	36	15	102	569	4899

the occasional demand for cow's milk which arose mainly from the need of feeding children with cow's milk. Cow's milk was preferred to buffalo's milk because of its lesser fat content.

## Chapter II

### THE PLAN OF THE STUDY

The present chapter describes the plan of the study in details. The study is based on two types of data, the sample survey data and the case study data. Sample survey was undertaken for collecting general information regarding the business practices, the herd and its management, etc. The purpose of the case study method was, mainly, to study the financial structure and the working of the dairies in more details.

#### 2.1 The Sample Survey

(a) Source list : As was noted in the preceding chapter, four types of records of licences were available with the office of the Poona Municipal Corporation. The record which consisted of persons who had obtained licences for maintaining stables for commercial purposes was the most satisfactory choice as the source list, for it included all those concerns which undertook the production of milk for commercial purposes. There were a few dealers in dry stock in this list who had maintained a stable for the convenience of their clients who brought milch animals for the purposes of sale. These animals were housed in such stables against a small amount of rent until they were disposed of in the market. These stables which lodged milch

animals brought for sale were also included in the list. Such cases were, however, few and were neglected while selecting the sample.

The source list for the selection of the sample was thus obtained from the record of licences issued to persons who had maintained stables for commercial purposes. In the record was also available information regarding the number and type of animals kept. From this list, therefore, the stables which had housed only animals other than cows and buffaloes were eliminated. A list was then drawn of those licensees who had kept cows and buffaloes in their stables during the year 1957-58. Detailed information regarding the number of animals kept belonging to either of the types was also noted for the purposes of stratification. There were a total of 829 stables out of which 47 stables had to be omitted because information in the above respect was incomplete. Such cases, which had to be omitted for the above reason, were of two types: (1) those who had very recently applied for licences and (2) those who had a prosecution case filed on them for having failed to comply with the municipal regulations. The licensees of the first type were merely registered in the record if they had submitted licence fees but the entry of details regarding the type of animals owned and their number was deferred until the agency of the licensing authority had actually visited the stable for verification. In the latter type

of cases the size of the unit in the current period was assumed to be the same as that recorded in the previous year's register. Those cases where the previous record also failed to give any details regarding the number and type of animals kept were, however, excluded in the process of sample selection.

(b) Selection of the sample : The stables, hereafter also mentioned as dairies, were first stratified both according to the wards in which they were located and according to the number of milch animals they had maintained (table 2.1). No distinction was made between cows and buffaloes while considering the size of the unit. The Municipal record itself was maintained wardwise and this classification was merely retained while stratifying the stables according to the size. This procedure was thought to be necessary because there was some variation in the nature of stables located in different wards. Thus, in some wards, there was a concentration of the bigger sized stables while in some others dairying was followed only as a subsidiary occupation to agriculture. In still others, stables were maintained primarily for meeting the household requirements. It was, therefore, thought necessary to have a wardwise representation of the stables in the sample. The selection of the sample in each ward was then made according to the probability proportionate to the size of stables. A total sample of 49 stables was selected which

Table 2.1 : Wardwise distribution of the stables in the Source list according to the number of milch animals (cows and buffaloes) owned.

Sr. No.	Name of the ward	Number of milch animals owned															
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1.	Ganj	-	1	2	2	-	-	1	-	-	-	-	-	-	-	-	
2.	Ghorpadi	-	2	1	-	-	-	1	-	-	-	-	-	-	-	-	
3.	Gultekdi	2	-	-	-	1	-	-	-	-	1	-	-	-	-	-	
4.	Bibawewadi	2	3	3	7	7	1	-	-	-	-	-	-	-	-	-	
5.	Guruwar	1	3	-	-	-	-	1	-	-	-	-	-	-	-	-	
6.	Shukrawar	6	6	15	11	6	4	3	-	-	1	-	-	-	-	-	
7.	Sadashiv	8	13	10	6	7	3	2	3	3	4	1	1	-	-	1	
8.	Parwati	2	6	2	2	2	-	1	-	1	1	-	1	-	-	-	
9.	Narayan	1	6	9	11	11	4	2	1	-	1	1	1	2	-	1	
10.	Kasaba	5	6	4	-	2	1	-	-	-	1	-	-	-	-	-	
11.	Somwar	3	1	3	4	5	2	2	1	2	1	1	1	1	2	2	
12.	Mangalwar	1	3	1	1	-	2	1	-	-	-	-	1	1	-	-	
13.	Suburbs (Yeravda side)	1	6	6	6	9	2	3	3	2	2	1	2	3	-	-	
14.	Suburbs (Kothrud side)	8	19	16	11	12	11	5	5	1	2	4	2	-	2	-	
15.	Shivaji Nagar	6	16	13	21	13	10	13	5	3	-	4	1	2	-	-	
16.	Budhawar	-	-	1	-	2	-	-	1	-	-	-	-	-	-	1	
17.	Raviwar	1	4	2	2	1	2	-	2	-	3	-	-	-	-	1	
18.	Ganesh	1	1	1	1	1	2	2	1	-	2	-	-	1	-	1	
19.	Shanivar	4	9	4	8	7	2	1	1	-	2	2	-	-	-	2	
20.	Rasta	-	1	3	1	-	-	1	-	-	-	-	-	-	-	-	
21.	Nagesh	-	1	-	-	-	-	-	-	-	-	-	-	-	-	-	
22.	Bhawani	6	6	8	5	2	1	-	-	-	-	1	-	-	-	-	
23.	Nana	7	2	1	2	3	1	3	2	1	2	-	-	2	-	1	
24.	Suburbs (Hadapsar)	2	10	12	6	3	9	3	1	-	-	-	1	-	-	1	
Total units		67	125	117	107	94	57	44	27	13	22	15	11	10	6	8	
Total milch animals		67	250	351	428	470	342	308	216	117	220	165	132	130	84	120	

(Continued below)

Sr.	Name of	Number of milch animals owned										Total stables	Total milch animals	Unspecified	
		1	2	3	4	5	6	7	8	9	10				
1.	Ganj	-	-	-	-	-	-	-	-	1	-	7	64	1	
2.	Ghorpadi	-	-	-	-	-	-	-	-	-	-	4	15	-	
3.	Gultekdi	-	-	-	-	-	-	-	-	1	-	5	44	-	
4.	Bibawewadi	-	-	1	-	-	-	-	-	-	-	24	105	1	
5.	Guruwar	-	-	-	-	-	-	-	-	-	-	5	14	-	
6.	Shukrawar	3	-	-	-	-	-	-	-	1	-	56	270	-	
7.	Sadashiv	2	-	2	1	2	1	1	-	1	-	74	558	7	
8.	Parwati	-	-	-	-	-	-	-	-	-	-	18	76	3	
9.	Narayan	1	-	1	-	1	-	-	1	-	1	57	397	7	
10.	Kasaba	-	-	-	-	-	-	-	-	-	-	19	55	1	
11.	Somwar	-	1	1	1	-	-	-	-	-	1	35	314	6	
12.	Mangalwar	-	-	-	-	-	-	-	-	-	-	11	60	3	
13.	Suburbs (Yeravda side)	-	-	-	2	-	-	1	-	-	-	49	332	-	
14.	Suburbs (Kothrud side)	2	-	-	-	-	1	1	-	-	-	102	543	3	
15.	Shivaji Nagar	1	1	-	-	-	-	-	1	1	2	113	823	4	
16.	Budhawar	1	-	-	-	-	-	-	-	-	-	6	53	-	
17.	Raviwar	-	-	-	-	-	-	-	-	-	-	18	102	1	
18.	Ganesh	-	1	1	1	-	-	-	-	-	-	18	170	-	
19.	Shaniwar	-	1	-	-	-	-	-	1	2	-	46	352	-	
20.	Rasta	1	-	-	-	-	-	-	-	-	-	7	39	-	
21.	Nagesh	-	-	-	-	-	-	-	-	-	-	1	2	-	
22.	Bhawani	-	-	1	-	-	-	-	-	-	-	30	109	-	
23.	Nana	-	-	-	-	-	-	-	-	-	-	28	166	2	
24.	Suburbs (Hadapsar)	-	-	-	-	-	-	-	-	-	-	49	236	8	
Total units		11	4	7	5	3	2	3	3	2	11	782	-	47	-
Total milch animals		137	72	133	100	63	44	69	72	50	581	-	4899	-	-

\* The population of milch animals in 1957 was more than that shown in this table since information in respect of 47 stables was incomplete. Considering the average size of the stable as obtained from the available data, the total number of milch animals in these 47 stables might have been about 280 to 300. Considering, however, that there were a few stables which were used by the cattle traders or commission agents for temporarily housing the cattle brought for sale in the market, the total population of the milch animals in the city could be taken to be around 5100. For the purposes of the survey, however, the figure 4899 will be considered.

comprised nearly 14 per cent of the total animal population.

The size of the sample was kept small on two grounds :

- (1) It was revealed when the questionnaire was first canvassed among a group of dairymen during the course of a pilot survey that data was of a repetitive character. An enlargement in the sample was, therefore, not likely to contribute much to our study.
- (2) Most of the dairymen did not maintain any sort of records so it was decided that, besides the sample survey, efforts should be concentrated on a few case studies of the dairymen who had maintained and who were willing to show their records, account books, etc.

The process of sampling as described above was thought to be appropriate for the purposes of our study. Firstly, it was convenient for the field work since this made it possible to observe a large number of milch animals by visiting fewer stables. Secondly, it also gave us a proportionately greater number of larger dairies which were more commercial in character. Since we wanted to study dairying as a business enterprise we had to adopt a process of sampling which, while giving a sample representing all the size-groups, would also give some weightage to the large size units.

Table 2.2 brings out the distribution of the selected dairies and the milch animals contained in them by size-groups.

Table 2.2 : Distribution of the sampled dairies and milch animals contained in them according to herd-size

	Herd Size (No. of animals)					Total
	Upto 5	6-10	11-15	16-20	21 & above	
Number of dairy establishments	15	11	8	4	10	48
Number of milch animals	48	86	103	72	355	664

(c) The Questionnaire : A questionnaire was devised for the purposes of the survey as has already been mentioned above. This questionnaire was divided into five parts. The first part sought information about the short history, investment, etc. made in the enterprise. The second part dealt with the general business practices such as the mode of sale, disposal of the total milk produced, rates, seasonality etc. Information was also asked regarding the employment provided by the establishment. The third part aimed at gathering information regarding the dairy herd. Detailed information regarding the herd such as purchase price, number of lactations given, breed, yield, etc. was taken down in a tabular form. There were in all five tables in this section, each aiming at different sets of data. The fourth section was devoted to the information regarding the feeding practices and costs, etc. The last section contained questions regarding the inventory, marketing practices, etc. This section

also sought to assess the opinion of the respondents regarding the scheme contemplated by the Corporation authorities for shifting the city stables outside the city limits. Full text of the questionnaire is given in Appendix I.

## 2.2 The Case Study Method

The questionnaire, as described above, included information about the herd and the business practices only. It was, therefore, of a limited value for eliciting the data regarding the financial structure, cost of production, etc. This deficiency in the questionnaire was to a great extent inevitable. The dairy industry in Poona was in the hands of those who had received very scanty or no education at all. Even among the educated few, there were very few who cared to maintain accounts or any other records. We could not, under such circumstances, expect any reliable information in the above respects from the sampled units. Reliance had to be placed, therefore, on the case study method along with the sample survey.

Though there were a few educated persons in the trade who had maintained some records, very few were willing to put them at our disposal for the purposes of this study. Most of them looked upon such an inquiry with apprehension as they suspected us to be incognito income-tax personnel. Some were afraid that their trade secret would be revealed and, therefore, would not part with their account books.



However, some dairymen were approached in a very informal manner, mostly through personal contacts, and were assured that the information was required purely for statistical purposes. They were also assured that the information obtained regarding their incomes and profits, etc. would not be divulged and that their identity would not be revealed in any manner. In all, 10 establishments were studied and, wherever possible, data in respect of these dairies were collected for three years, i.e., for 1956, 1957 and 1958. The basic data in respect of these dairies are listed in table 2.3.

In case of dairies I and J, data regarding only one year, i.e., 1958 and 1957, respectively, were available whereas in the case of dairy B, data regarding the years 1956 and 1957 were available. In the rest of the cases, data for the three consecutive years mentioned above were available. All the ten dairies were typical urban dairies in the sense that almost all of them had depended for fodder and feed requirements as well as for herd replacement on purchases from outside. All these dairies excepting one (i.e. J) had maintained buffaloes of the North Indian breeds and some had a part of their stock purchased directly from Rohatak near Delhi. Others had their stock purchased from traders who imported buffaloes from the breeding tracts in North India.

Table 2.3 : Basic data in respect of the dairies whose case studies were made for the purpose of this inquiry

Name of Dairy	Average herd size	Number of cows in the herd	Investment		Number of full-time workers		Average rate charged to the regular customers (nP.per seer)	Year
			In herd (Rs.)	Other than in herd (Rs.)	Family members	Hired		
A	75	2	58950	2850	1	9	75	1957
B	29	5	18850	1550	2	4	81	1957
C	6	-	3300	60	1	1	100	1957
D	20	1	16000	600	1	3	81	1957
E	46	5	38410	1250	1	7	81	1957
F	34	3	30158	1650	1	5	77	1957
G	35	3	29995	1050	1	5	81	1957
H	26	2	19214	1450	1	3	81	1957
I	13	-	9243	550	1	1	75	1958
J	7	-	3050	400	1	1	75	1957

It may be noted that efforts were made to study the dairies of varying sizes. In addition to these 10 dairies, some data <sup>were</sup> ~~was~~ also collected in respect of two dairy shops, one of which collected milk from the rural areas and the other had purchased from the milk market. The purpose was to obtain data regarding milk prices in Poona.

The data obtained in respect of these dairies can be regarded as fairly reliable since <sup>they were</sup> ~~it was~~ obtained from the account books maintained by these dairymen for their personal use. However, these account books were not kept systematically and the accounts were often mixed with household accounts. Also there were several lacunae which will be discussed fully in Chapter VI. Thus, for example, some dairymen had not maintained even the record of milk yield while in many cases the number of animals that were in milk during the 12 months also was not recorded. These and other deficiencies had to be made good by making inferences. We, however, note that many of the dairymen who had come in our contact during the course of our field work realised the utility of maintaining systematic accounts in their own interest. Some of those whose case studies were made have introduced certain improvements in their accounting systems. Some have even started recording the daily milk yield of individual milch animals. Our inquiry has, thus, evoked a certain degree of enthusiasm among some of these dairymen in favour of keeping systematic records.

### 2.3 The Field Work

(a) Period of the field work : The field work regarding both the above types of studies was done simultaneously. The work regarding the sample survey was, however, started in the first week of October, 1958, and was completed in the first week of October, 1959. The survey period was, thus, spread over a period of one full year so as to cover all the seasons and one stable in the sample was visited every week. - The work regarding the case studies was, however, completed in April, 1959.

(b) Method of field work : For some characteristics such as milk-yield, feeding costs and practices, etc., it was found convenient to collect data regarding a day or a week prior to the date of visit instead of for the whole year. Spreading the inquiry over the full course of one year, therefore, meant a further sub-sampling of period with regards to the sampled units. The list of randomly selected dairies was re-arranged with the help of the Random Number Tables for eliminating the bias in the ward-wise list. Otherwise, the stables located in the wards which were first in the serial order would have obtained a greater chance of being visited in the early part of the survey than the wards which were further down in the list of wards. The bias involved in such a process may be realised when it is recalled that certain wards had shown a concentration of small sized units while some others had

shown a concentration of bigger sized units. The process described above gave an equal chance for a selected stable in any ward to be anywhere in the whole survey period.

(c) Interview Method : Having prepared the final list as described above, the whole sample of 49 units was covered during the course of one full year by visiting one unit in a week in the serial order. The serial order in the final list was preserved as far as possible but exceptions had to be made in a few cases where the dairyman who had to be interviewed could not be contacted in the course of a week. In such cases, the dairyman next in the order was visited for taking down the information.

A few stables in the sample list had to be substituted during the course of the survey. There were eight such cases. Of these, three had to be replaced because they declined to give information; another three had to be replaced because they were no longer in the business; and the remaining two were replaced because, though they had maintained a stable, they did not undertake the production of milk. These two persons were commission agents and had maintained stables for the benefit of their clients who brought buffaloes for sale. Whenever the necessity for substitution, thus, arose, a stable next to the originally selected one in the stratified list was chosen as a substitute.

(d) Response of the Dairymen : It was but natural that such an inquiry should, in the beginning, evoke anything but the feeling of apprehension among the people who were not used to such type of inquiries. Most of the dairymen naturally mistook us for the inspecting agency of the Poona Municipal Corporation, and we found it very difficult to convince some of them regarding the purpose and nature of our inquiry. One common query was 'where did you get our names?' and 'why we, of all the others, have been selected for this investigation?' Two dairymen, in fact, refused to give any information until others in the locality had done so. On the whole, however, the response was good and there were very few refusals. Those who refused never did so in the first meeting; instead, they tried to avert the meeting by taking future appointments which they kept on postponing under one pretext or another. This experience was common both to the investigations regarding the sample survey and the investigations regarding the case studies. Such persons had to be visited and re-visited for several times until they finally gave a refusal.

(e) Reliability of the data : Most of the respondents felt at ease as they realised during the course of the interview that the questions asked in the questionnaire did not contain anything detrimental to their business interests. The data collected, therefore, seems to be quite reliable though a possibility of underestimation in reporting the

yields and overestimation in reporting the costs cannot be ruled out. This bias was, however, carefully guarded against by incorporating internal checks in the schedule. For example, questions regarding total yields were asked at two places in the schedule and particulars regarding the breed, the stage of lactation, etc. of the milch cattle were also asked along with the figures regarding the yield at the time of the visit. The whole schedule was checked for the internal consistency on the spot and discrepancies were corrected by seeking additional information.

Complete information regarding certain items could not be collected in case of some stables. Especially in the case of bigger sized units, detailed information regarding the herd could not be obtained because the respondents were just unable to give any detailed information in respect of each and every animal in the stable. In such cases, the description about the peculiarities regarding the herd, its average yield, its purchase price, etc. was taken down.

Inquiries were made during the course of the survey whether the respondent has kept any record or accounts and whether he was willing to show them. Very few among the sampled dairymen had kept any records and there were fewer still who were willing to keep them at our disposal. And even those who had initially shown some willingness in this respect constantly tried to avoid showing their account books until at last attempts to persuade them had to be

given up.

#### 2.4 Processing of the data

The whole data from the case studies as well as from the sample survey <sup>were</sup> ~~was~~ hand-tabulated. The work regarding the case studies, however, occupied a good deal of our time because the account books kept were not systematic and were often in the form of personal diaries. The information from these diaries had to be taken down, reclassified and then tabulated. The data regarding the amount of feed required and its cost had to be taken down from the cash memos themselves. Similarly for the estimation of the yield, etc., the amount distributed by way of home deliveries had to be calculated from the daily register. Very few dairymen had readily available figures regarding these various items of costs and receipts.

As stated earlier, in all 49 schedules were canvassed during the course of the field work. At the time of the processing of the data, however, one schedule was rejected as the answers contained in it were thought to be unreliable. The data presented in the following chapters is, therefore, based on the remaining 48 schedules.

#### 2.5 Chapter Scheme

The thesis is divided into seven chapters, and besides the first two chapters, there will be five more chapters as indicated on the following page.



Chapter III deals with the structure of the Dairy Industry in Poona and discusses the size of the stables and its relationship with such factors as the capital investment, employment and business practices, etc.

Chapter IV is devoted to the discussion of the data obtained through the survey regarding the herd management practices. Topics dealt with, in this chapter, include such topics as the rearing and replacement practices, the composition of herd, etc.

Chapter V also deals with the management practices but the discussion is confined only to feeding practices and production characteristics of the herd.

Chapter VI attempts to calculate the cost of production per unit of milk on the basis of the data presented in the preceding chapters. This chapter also deals with the earnings of the dairy operators in Poona.

Chapter VII is a concluding chapter which summarizes the data presented in the preceding chapters and also deals with the implications which emerge from the data.

## Chapter III

### STRUCTURE OF THE DAIRY INDUSTRY IN POONA

The present chapter attempts to bring out the structure of the dairy industry in the city. It studies the size of the stables and its relationship with the capital investment, employment and locational aspects. Other topics such as past history and origin of the dairies, mode of doing the business, disposal of milk and the rates charged during the different seasons are also discussed. Information obtained from the survey is, wherever necessary, supplemented by the data collected through the case studies.

#### 3.1 Size of the herd

It may be remembered here that at the time of the sample selection weightage was given to the large size dairies by selecting them according to the probability proportionate to the size of the stables. The size distribution of the sampled units does not, therefore, compare with the size distribution of the dairies in the city, but with the distribution of animals according to the size of the dairies they are in. This is clearly brought out by Table 3.1. It can be noted from this table that the percentage distribution of the milch animals in respect of the source list is nearly 32 per cent and 18 per cent respectively in the first and the last size groups and

Table 3.1 : Distribution of the stables and milch animals in the sample and in the source list according to the herd size

	H e r d S i z e					Total
	Up to 5 animals	6-10	11-15	16-20	21 & above	
Total number of units (Source list)	510	163	50	35	24	782
Percentage distribution	65.23	20.84	6.39	4.47	3.07	100
Number of animals (Source list)	1566	1203	631	620	879	4899
Percentage distribution	31.97	24.56	12.88	12.65	17.94	100
Sampled units	15	11	8	4	10	48
Percentage distribution	31.25	22.92	16.67	8.33	20.83	100
Number of animals in the sampled units	48	86	103	72	355	664
Percentage distribution	7.23	12.95	15.51	10.84	53.47	100

and roughly corresponds to the percentage distribution of the sampled units in these size groups. So is roughly the case in respect of the rest of the size groups as regards the distribution of the number of milch animals in the source list and the distribution of the sampled units. It may therefore be noted that estimates regarding the universe, i.e. with regards to all the dairy establishments, are made throughout this work on the basis of the livestock maintained in the different size groups. This process of estimation is illustrated in the following paragraph.

The average size of the dairy herd in Poona, based on

the source list, came to about six milch animals per establishment. In addition to the milch animals there were a number of calves, heifers and breeding bulls maintained in the stable. The average size would be still larger if all these animals are taken into consideration. An estimate in this respect is arrived at in the following manner: On the basis of the sample data the number of young stock as well as the herd bulls per 100 milch animals is first arrived at for each size group and estimates are made regarding the universe after taking into consideration the total number of animals in different size groups as obtained from the source list. This process is illustrated in table 3.2. The average size of the herd per establishment thus came to eight including the young stock and the breeding bulls.

The size of the stables mentioned above was obtained from the source list. As has already been mentioned in the preceding chapter, the source list was obtained from the 1957 Municipal record of licence holders. It may also be recalled that the sampled dairies were visited during the period from October, 1958, to October, 1959. During the intervening period, i.e. between the date of official record and the date of visit, many of the sampled dairies had changed their size groups. Thus, out of the 48 sampled units only eight units had not changed their size and the size of the herd in these cases was found to be the same

**Table 3.2 :** Table illustrating the method adopted for making estimates on the basis of the sample data

Size group	Sample Data							Estimates				
	No. of milch animals	Young stock (under two years)	Young stock per 100 milch animals	Grow-ing heifers, bulls, etc.	Heifers, per 100 milch animals	Breed-ing bulls	Breeding bulls per 100 milch animals	Total milch animals in source list	Young stock	Grow-ing heifers, bulls, etc.	Breed-ing bulls	TOTAL herd including young stock, etc.
<u>Buffaloes</u>												
Up to 5	39	15	38.46	4	10.26	1	2.56	1348	518	138	35	2039
6 - 10	67	16	23.88	3	4.48	1	1.49	1059	253	47	16	1375
11 - 15	89	20	22.47	2	2.25	3	3.37	581	131	13	20	745
16 - 20	68	8	11.76	1	1.47	2	2.94	571	68	8	17	664
21 & above	333	63	18.92	16	4.80	6	1.80	771	146	37	14	968
<b>Total</b>	<b>596</b>	<b>122</b>		<b>26</b>		<b>13</b>		<b>4330</b>	<b>1116</b>	<b>243</b>	<b>102</b>	<b>5791</b>
<u>Cows</u>												
Up to 5	9	3	33.33	2	22.22	-	-	218	73	48	-	339
6 - 10	19	4	21.05	4	21.05	-	-	144	30	30	-	204
11 - 15	14	14	100.00	1	7.14	-	-	50	50	4	-	104
16 - 20	4	1	25.00	-	-	-	-	49	12	-	-	61
21 & above	22	11	49.99	2	9.09	2	9.09	108	53	10	10	181
<b>Total</b>	<b>68</b>	<b>33</b>		<b>9</b>		<b>2</b>		<b>569</b>	<b>218</b>	<b>92</b>	<b>10</b>	<b>889</b>
<u>Total herd</u>	<b>664</b>	<b>155</b>		<b>35</b>		<b>15</b>		<b>4899</b>	<b>1334</b>	<b>335</b>	<b>112</b>	<b>6680</b>

as that recorded in the 1957 Municipal Record. Out of the remaining 40 dairies, 22 had decreased their herd-size while 18 had increased their herd-size. There was, however, only a slight overall decrease in the total population of the dairy herd in the sampled units. Thus the average size of the sampled units as per 1957 records was about 15 milch animals while the average size obtained after the actual count during the survey period was about 14 milch animals per unit. Table 3.3 indicates the number of animals that were either added or culled by various units in different size groups.

Table 3.3 : Distribution of the sampled dairies in the different size groups according to the number of animals added or disposed of.

Size group	Number of animals added										Total
	1	2	3	4	5	6	7	8	9	10 & more	
Up to 5	3	-	-	-	-	-	-	1	-	-	4
6 - 10	3	-	-	1	1	1	-	-	-	-	6
11 - 15	-	1	-	-	-	-	-	-	-	1	2
16 - 20	-	-	-	1	-	-	-	-	-	-	1
21 & above	-	-	1	-	-	-	1	1	-	2	5
<u>Total</u>	6	1	1	2	1	1	1	2	-	3	18

Size group	Number of animals disposed of										Total
	1	2	3	4	5	6	7	8	9	10 & more	
Up to 5	3	2	1	-	-	-	-	-	-	-	6
6 - 10	2	1	1	-	-	-	-	-	-	-	4
11 - 15	-	-	2	1	-	1	-	-	-	-	4
16 - 20	-	-	1	-	-	-	-	-	-	1	2
21 & above	-	-	1	-	1	-	-	-	1	3	6
<u>Total</u>	5	3	6	1	1	1	-	-	1	4	22

It may, however, be noted from table 3.4 that in spite of these short term fluctuations in the herd-size, the pattern of distribution of the sampled dairies in various size groups as obtained through actual count at the time of the survey very closely confirmed with the original pattern as obtained from the records.

Table 3.4 : Distribution of the sampled units according to size groups as obtained from the Municipal Records and as obtained from the actual count.

Herd-size	As obtained from	
	Municipal Records	Survey
Up to 5	15	15
6 - 10	12	11
11 - 15	6	8
16 - 20	3	4
21 - 25	4	2
26 - 30	2	2
31 and above	6	6
<u>Total</u>	48	48

The size of a dairy generally indicated the degree of commercialisation as is brought out by table 3.5. It may

Table 3.5 : Data showing the degree of commercialisation in different size groups.

Size group	Proportion of dairies reporting dairy-ing as main occupation	Proportion of dairies employ-ing wage labour	Proportion of hired labour	Propor-of milk sold
Up to 5	33.4	13.3	11.1	88.3
6 - 10	63.6	27.2	12.0	93.4
11 - 15	87.5	50.0	27.3	94.2
16 - 20	75.0	100.0	68.8	95.3
21 & above	90.0	100.0	74.1	97.2

noted from this table that proportionately greater number of dairies in the larger size groups claimed dairying as the main occupation. Dependence on wage labour was also greater in the larger size groups. Similarly, the proportion of milk sold (as against the proportion of milk retained for home consumption) also increased with the size group of the dairies. The livestock in the smaller units was thus maintained primarily for meeting the household requirements of milk and dairying, in most of the cases, was carried on merely for supplementing the family income. Such dairies, further, were mainly family concerns largely depending on family labour. It must be remembered that this classification into commercial and non-commercial dairying is applicable only in a broad sense since a clear-cut distinction between the two categories is, often, not possible. However, the broad association between the size of the dairy and the degree of commercialisation may be borne in mind since most of the topics are discussed in relation to the scale of operation.

### 3.2 Past History and Origin of the establishments

The respondents were asked to give such information as to when the business was originally started and in case of those who had inherited the business, how long were they looking after the business; the original investment made and other relevant information. Most of this information is summarized in table 3.6. It can be seen that the



**Table 3.6 :** Table showing the proportions of establishments which were inherited, which were started as subsidiary occupation, which were followed as main occupation, initial investment and standing in the trade.

Size group	Total units in the sample	Proportion of inherited units	Proportion of units started as subsidiary occupation	Proportion of units following Dairying as	
				Subsidiary occupation	Main occupation
Up to 5	15	53.3	75.5	66.6	33.4
6 - 10	11	18.2	81.8	36.4	63.6
11 - 15	8	75.0	37.5	12.5	87.5
16 - 20	4	25.0	75.0	25.0	75.0
21 & above	10	50.0	50.0	10.0	90.0
Estimated number of units in the universe	782	360	575	416	366
Percentage of 782	100	46	73	53	47

Size group	Proportion of units claiming period of standing in the trade (No. of years)				Number of units (only non-inherited) claiming initial investment (in Rs.)			
	Up to 5	6-10	11-20	21 & above	Below 500	501-1000	1001 & above	Total
Up to 5	20.0	26.6	13.4	40.0	6	1	-	7
6 - 10	9.1	9.1	36.3	45.5	8	-	1	9
11 - 15	12.5	12.5	12.5	62.5	-	1	1	2
16 - 20	-	25.0	25.0	50.0	-	-	3	3
21 & above	10.0	30.0	30.0	30.0	1	1	3	5
Estimated No. of units in the universe	126	173	149	334	325	43	54	422
Percentage of 782	16	22	19	43	43	5	6	54

proportion of stables that were inherited was significantly large in most of the size groups. The estimates on the basis of the sample data show that nearly 46 per cent of the dairies in Poona were inherited by their present owners. Considering the long-standing (about 43 per cent of the dairies were started more than 20 years ago) which most of these dairies had, they should have had a predominantly larger size. On the contrary a little more than fifty per cent of the total dairies in Poona mainly depended on sources of income other than from dairying, i.e. dairying in these cases was a subsidiary occupation. Some of the reasons put forth by these operators as an explanation in this respect were (1) lack of capital or credit for the expansion of the unit, and (2) unprofitability in the business due to high feed costs and greater risks.

In fact in majority of the cases, the origin of the enterprise was in the requirements of milk for home consumption or for supplementing the family income. It may be noted from table 3.6 that the proportion of dairies which were established originally for supplementing the family income was very high in all the size groups. The overall proportion in the total establishments in the city was nearly 73 per cent. There were, however, many cases where dairying, later on, became the main or the only source of income. Thus, there were some dairymen in the sample who had started dairying while they were serving with a view to

pursuing it as the main occupation after retirement from the service. There were also some cases where dairying was started for supplementing the income from agriculture but in most of these cases dairying continued to be their subsidiary occupation.

Since in majority of the cases the origin of the enterprise was for supplementing the income of the family the initial investment made was very small, usually confined to one or two milch animals. The table referred to, above, gives data in respect of the units which were started by the persons who were at the time of the survey looking after the trade. The data in case of the inherited establishments <sup>were</sup> ~~was~~ not available. It may be noted from the above table that the majority of the establishments had an initial investment of Rs.500 or below, indicating an investment in one or two animals. The largest number of animals in which the initial investment was made was eight. There were only four such units. Out of these four, one was a widow who had taken to dairying after her husband's death. The investment was entirely from the borrowed capital. Another was an agriculturist from Khadakwasla, a neighbouring village, whose land was acquired by the Government very recently. This person had invested in his business all the money which he received as a compensation from the Government. The third and the fourth were also agriculturists who had invested in milch animals during

the wartime boom.

A majority among the rest had started with a small initial investment. It may, therefore, be noted that in Poona the capitalist class or the class able to undertake larger investments was not attracted towards this trade. Most of the entrants were persons with small means who had entered the trade either for supplementing their family incomes or, primarily, for meeting the household requirements of milk.

It was already noted earlier that the proportion of those who followed dairying as the main occupation was greater among the larger and medium sized units than among the small sized units. Out of the 48 units, dairying was followed as the main occupation in 31 units whereas in the remaining 17 units it was a subsidiary occupation. Of those who had followed dairying as the main occupation, ten reported incomes from subsidiary occupations such as agriculture and miscellaneous business. In the case of those who had followed dairying as their subsidiary source of income, nine reported agriculture as their main source of income, four reported some type of employment as their main occupation and among the rest there was a barber, a trader in dry cattle, a pensioner, and a bullock cart driver.

Dairying in Poona was in the hands of persons who had received little or no education at all. Thus, nearly

33 per cent of the operators in the sample were illiterate persons. Though the rest were literates, the majority among them had not received education beyond vernacular final or primary school standard. Only 12 per cent of the dairymen in the sample had received education up to matriculation stage. There was only one person in the sample who had received education beyond matriculation and had obtained a diploma in agriculture. This person was the owner of an agricultural farm and belonged to the largest size group in the sample.

### 3.3 Situation of the stables

It was mentioned in the Introductory Chapter that the Poona Municipal Corporation was responsible for controlling the production, handling and sale of milk from the point of view of public health and sanitation. It was also mentioned that the Bombay Provincial Municipal Corporation Act, 1949, empowered the health department of the Poona Municipal Corporation to undertake inspection of the cattle sheds and enforce standardisation. The most important clauses of the Act in this respect were those which related to the construction and maintenance of the cattle sheds. Thus the floors of the cattle sheds had to be paved or hardened by the owners so as to prevent urine or water from being absorbed therein. The floors had also to be properly sloped towards a drain which could effectively wash all the liquid filth.

Similarly, the bye-laws compelled the dairymen to make the necessary arrangements to prevent the accumulation of dung, etc. within the stable premises. The clauses of the Act also regulated the structure of the stable itself, i.e. the height of the stall or shed, the ventilation, the space allotted to each animal, etc. Though the Municipal regulations provided wide measures for ensuring the cleanliness of the stables they were not rigorously enforced. It was found during the course of this survey that latrines were located in the stable premises and, quite often, the stables were located within the structures used for residential purposes in spite of the regulations which prevented any such practices. The danger to the public sanitation on account of the proximity of such stables to the residential quarters can be well realised.

Information was collected during the course of this survey in respect of the situation of the sampled stables. Most of these stables were located very close to the residential buildings and in congested areas, i.e. areas where there was no or little open space left around the stables. As many as 41 out of the total of 48 sampled units were found to be situated within the very premises of the residential buildings. Out of these 41, twelve were located within the residential buildings themselves (under one and the same roof), seventeen were situated adjoining the residential quarters (i.e. where one or more walls of the

stable coterminated with those of the residential quarters) and the remaining twelve, though located within the premises, were segregated from the residential quarters. It may be mentioned that those who had housed their herds within the residential buildings belonged to size groups maintaining up to 10 milch animals.

The only advantage obtained from the practice described above was that milk could be supplied in a fresher condition without incurring additional costs like refrigeration and transport costs. Many of these dairies were situated very close to the place of the operator's own residence. This was natural in view of the fact that most of the dairies were family concerns and management of the herd, sale of milk, etc. was undertaken by the family members themselves. Thus in only two cases, out of the total sampled units, were the stables located at a distance of more than half a mile from the operator's residence. In the rest of the cases, including the large sized dairies, the stables were located either within the premises where they lived or within not more than five minutes' walking distance from the place of residence.

One dairyman in the sample whose stable was located away from his residence said that the degree of his dependence on the hired workers was greater due to the distance between the stable and his residential quarters. In effect

he had to employ a greater number of workers and his wage bill to that extent had increased. This dairyman further complained that because of his dependence on hired labour he had to forgo such sundry receipts as those from the sale of cowdung since the workers themselves pocketed much of these receipts. These views were also corroborated by a dairyman in the case studies who also was in a similar position. Proximity of stables to the residential quarters undoubtedly facilitated better supervision of the workers and better herd management since the operator himself or his family members could pay constant attention. It is, therefore, natural that the location of the stables in close vicinity of the residence was looked upon as a prime necessity for running a dairy business. The extent to which this factor weighed upon the minds of dairymen can be realised by one ~~or~~ more illustration from the sample. There was one dairyman in the sample who had shifted his stable from Narayan Peth to Shivaji Nagar merely because the stable in Shivaji Nagar had attached residential quarters; in spite of the fact that he had to <sup>pay</sup> Rs.75 per month as 'goodwill charges' over and above the rent of the stable.

#### 3.4 : Investment

The most important item of investment was the dairy herd and investment in such items as stable buildings, machinery, etc. absorbed relatively a very small proportion. Table 3.7 presents the relevant data in this respect. It



Table 3.7 : Data regarding the investment in the herd, buildings, etc. as reported by the dairies on the date of visit.

	S i z e G r o u p s					Estimates
	Up to 5	6-10	11-15	16-20	21 & above	
Investment in						
Dairy herd (Rs)	19975	43825	56115	33575	273550	2618288
Buildings (Rs)	4550	6900	5500	8800	18000	395090
Machinery & utensils (Rs)	243	1325	1122	2320	10390	79056
<u>Total</u> (Rs)	24768	52050	62737	44695	301940	3092434
Total units	15	11	8	4	10	782
Average per unit (Rs)	1651	4732	7842	11174	30194	3954
Total milch animals	48	86	103	72	355	4899
Average per milch animal (Rs)	516	605	609	621	850	631

can be seen that nearly 84.67 per cent of the total estimated investment in the trade was in the herd. Investment in the structures which served as stables amounted to about 13 per cent whereas the proportion of investment in machinery and utensils was insignificant.

It may be noted here that the amount of investment in each of the establishment was estimated by taking into consideration the purchase price. In those cases where the respondents were unable to report the purchase price or the original investment, an attempt was made to evaluate the present value of the item of investment in consultations with the respondents. Such procedure had to be followed

mostly in respect of stables or buildings used for housing the dairy herd and the milch animals that were home-bred.

The average investment per establishment in Poona came to Rs.3954 though it varied considerably from one size group to another. Investment per milch animal came to Rs.631 and it varied between Rs.516 in the first size group and Rs.850 in the last size group.

Table 3.8 brings out the proportionate share of owned capital in the total investment. Out of the total reported investment as much as 77 per cent was in the form of owned capital whereas the remaining was borrowed capital. Though

Table 3.8 : Proportion of borrowed capital and borrowings per reporting unit.

Size group	Number of reporting units	Total borrowings (Rs.)	Borrowings per reporting unit (Rs.)	Total investment (Rs.)	Proportion of borrowed capital
Up to 5	9	6258	695	24768	25.27
6 - 10	6	14800	2466	52050	28.43
11 - 15	4	7930	1982	62737	12.64
16 - 20	1	4000	4000	44695	8.94
21 & above	8	87000	10875	301940	28.81
Estimates	448	719380	1606	3092434	23.26

the proportion of borrowed capital in the total investment was small, the proportion of those who could not finance their investment entirely from owned capital was greater

than those who had depended only on owned capital. Thus out of the total of 782 units, 448 or about 57 per cent reported borrowing whereas the remaining had managed on their own. Average borrowings per reporting unit came to Rs.1606. Borrowed capital was in the form of cash or in the form of instalment purchase of cattle. Further details regarding the sources and the interest charges, etc. were not asked as it was believed that reliable information would not be supplied in this respect.

(a) Investment in the herd : As already referred to earlier, estimations in respect of the investment in the home-bred herd were arrived at in consultation with the dairy operators themselves. Figures in this respect are somewhat arbitrary and may be regarded as broadly indicating the prevailing market-price. Table 3.9 gives the survey data in respect of the investment in the home-bred and purchased herd as reported by the dairymen in the sample. It can be seen from this table that the average investment per dairy animal tended to increase with the size of the herd. Thus it came to Rs.408 in the first size group, Rs.504 in the second size group, Rs.529 in the third size group and Rs.754 in the last size group. The average investment in the fourth size group was comparatively small but this was because of one dairy in this group which had invested only in the herd that was in the last stages of lactation. The operator concerned was a trader of dry herd and pursued

dairying only as a secondary occupation. The purchase value of the dry-stock was usually less than half the value of the fresh stock. The investment in herd reported by this particular dairy was, therefore, very low and this, in turn, depressed the average in the whole group since there were only four dairies belonging to this size group in the sample. It can, therefore, be stated that generally there was a positive correlation between the average investment per animal and the size of the herd. It can further be seen from the table that this was particularly true in respect of the purchased buffaloes. In fact, the variations in respect of the average investment in the herd in different size groups were mainly influenced by the variations in the average investment in respect of purchased buffaloes. There was no relationship between the investment per animal and the size group in respect of home-bred buffaloes, home-bred as well as purchased cows, etc., and since these formed only a minor portion of the total herd, the average investment per animal in the different size groups was largely influenced by the average investment per buffalo. This aspect will be more fully discussed in the following chapter where this association between the herd size and the size of the investment per animal will be explained by referring to the correlation between the herd size and the type of breed.

Table 3.9 also brings out the average investment in

Table 3.9 : Investment in the herd.

Size group	Buffaloes				Cows				Buffalo Bulls			
	Purchased No.	Value (Rs.)	Home-bred No.	Value (Rs.)	Purchased No.	Value (Rs.)	Home-bred No.	Value (Rs.)	Purchased No.	Value (Rs.)	Home-bred No.	Value (Rs.)
Up to 5	32	14600	7	2900	3	610	6	1665	-	-	1	200
6 - 10	66	39030	1	500	9	2090	10	2005	-	-	1	200
11 - 15	82	49385	7	3375	3	500	11	2205	2	450	1	200
16 - 20	65	31350	3	900	2	400	2	450	2	475	-	-
21 & above	319	257650	14	8500	9	1950	13	3400	2	550	4	1000
Estimates	3969	2303815	361	157364	221	47000	348	85430	35	8329	67	13850
Average value		580.4		436.0		212.7		245.5		237.9		206.7

	Cow Bulls				Total investment (Rs.)	Average per animal (Rs.)
	Purchased No.	Value (Rs.)	Home-bred No.	Value (Rs.)		
Up to 5	-	-	-	-	19975	407.6
6 - 10	-	-	-	-	43825	503.8
11 - 15	-	-	-	-	56115	529.4
16 - 20	-	-	-	-	33575	453.7
21 & above	1	250	1	250	273550	753.6
Estimates	5	1250	5	1250	2618288	522.5
Average value		250.0		250.0		

purchased and home-bred animals in respect of the total city herd. The average investment in a purchased buffalo came to Rs.580 whereas in respect of home-bred buffalo it came to Rs.436. In respect of the purchased and home-bred cows the respective averages were Rs.213 and Rs.245. Average investment in a herd bull ranged between Rs.200 and Rs.250.

(b) Investment in stable buildings : Twenty-eight dairy operators in the sample reported ownership of structures used for housing their milch stock. Out of these 28, seven had built stables on the land not owned by them but which was leased in on rental basis. The amount of investment naturally varied with the herd size but there were a few stables where the investment in stables was disproportionate with the herd size. In such cases, the whole of the stable area was not utilized by the owner and the extra space was rented out to other dairymen. The majority of the owners were small-scale operators and even among these, a large number had invested in temporary structures consisting of a roof either of galvanised iron sheets resting on bomboo or wooden poles or of thatched roof surrounded by wattle screen, etc. This is clear from table 3.10, which follows, that the average investment in stables in the first size group was about Rs.500 or so as compared to the average investment ranging between Rs.2000 and Rs.4500 in the larger size groups. Estimates on the basis of the sample data show that about 59 per cent of the total

Table 3.10 : Average investment in stable buildings and machinery, etc. in different size groups.

Size group	Investment in stables			Investment in machinery and utensils		
	No. of units re- port- ing	Total invest- ment Rs.	Average per re- porting unit Rs.	No. of units re- port- ing	Total invest- ment Rs.	Average per re- porting unit Rs.
Up to 5	9	4550	505.5	4	243	60.7
6 - 10	7	6900	985.5	7	1325	189.3
11 - 15	4	5500	1375.0	6	1122	187.0
16 - 20	4	8800	2200.0	4	2320	580.0
21 & above	4	18000	4500.0	10	10390	1039.0
Estimates	459	395090	861.0	324	79056	244.0

establishments had owned their stables and the average value of these came to Rs.861.

(c) Investment in utensils and machinery, etc. : Table 3.10 also gives the average investment in machinery, utensils, etc. It may also be noted, here, that here also the average investment tended to increase with the increase in the size of the herd. Investment in machinery was in such items as bicycles, chaff-cutters which were either power-driven or hand-operated, tongas and small bullock carts driven by a bullock, etc. In all 31 establishments reported investment in either one or more of the above items or only in utensils. The average investment in the first three size groups was very small as compared to that reported by the last two size groups because the smaller units had invested only in

utensils and a few bicycles whereas the larger units had usually reported investment in utensils, bicycles, chaff-cutters and in some cases tongas.

Bicycles were mainly used for the distribution of milk, i.e. for undertaking house to house delivery of milk. Those producers whose production of milk was on a smaller scale or those who had their customers in the immediate vicinity of their stables could dispense with a bicycle but others had to maintain one for quick delivery of milk. However, there was one establishment in the sample where the establishment itself did not own any bicycle but the distribution of milk was entrusted to those employees who had themselves owned a bicycle. Thus in some cases the employees stipulated the ownership of bicycle as a requirement while employing a person as a distributor. Most of such distributors were students attending secondary schools. Where the distribution of milk was undertaken by the owner himself and/or by the worker in the stable, investment in a bicycle was a necessity.

Table 3.11 presents the survey data in this respect and also gives the estimated amount of investment in each type. It may be noted that out of the total estimated investment in machinery and utensils, about 43 per cent was in bicycles, 31 per cent was in chaff-cutters, 9 per cent in transport vehicles like tongas or small carts, and the



remaining 17 per cent was in utensils.

Table 3.11 : Survey data showing the amount of investment in each type of equipment.

Size group	Bicycles		Chaff-cutters		Transport vehi.	
	No. of bicy- cles	Total invest- ment (Rs.)	No. of chaff- cutt- ers	Total invest- ment (Rs.)	No. of vehi- cles	Total invest- ment (Rs.)
Up to 5	2	205	-	-	-	-
6 - 10	8	795	4	355	-	-
11 - 15	6	478	3	420	-	-
16 - 20	5	355	3	1015	2	650
21 & above	27	4125	8	3285	2	600
Estimates	324	34029	120	24499	22	7025
Per cent of the total		43.05		30.99		8.88

	Utensils		TOTAL investment (Rs.)
	No. of units report- ing	Total invest- ment (Rs.)	
Up to 5	3	38	243
6 - 10	6	175	1325
11 - 15	6	224	1122
16 - 20	4	300	2320
21 & above	10	2380	10390
Estimates	278	13503	79056
Percent of the total		17.08	100.00

Twenty-seven units in the sample reported ownership of 48 bicycles, most of which were owned by the dairies in the fifth size group. Total estimated investment in bicycles came to Rs.34,029 or Rs.105 per unit. This low

figure was due to the fact that most of the establishments had invested in second-hand bicycles. Investment in chaff-cutters was reported by eighteen establishments. Out of these eighteen, seven (all belonging to the largest size group) had maintained power-driven (electrically operated) cutters whereas the remaining had maintained hand-operated cutters. Total estimated investment in cutters amounted to Rs.24,499 or Rs.204 per cutter. The average investment in power-driven cutter came to Rs.521 whereas that in the hand-operated cutter came to Rs.128. Only two establishments in the sample reported investment in one tonga each while another two had reported investment in a small bullock cart. All of them belonged to the last two size groups. The average investment in case of a tonga was Rs.400 and that in case of a cart was Rs.225. Estimated investment in utensils amounted to Rs.13,503 or Rs.48 per reporting unit.

### 3.5 : Renting of stables

It was noted above that as many as 20 establishments in the sample did not own the stables in which their herds were housed. Even out of the remaining 28 establishments which reported ownership of stables, there were seven dairymen who had built their stables on the land leased-in for that purpose. Three of these were dairies having a herd-size below 5 dairy animals while the remaining four were those having a herd-size about 15 dairy animals. Out of the three small sized dairies, two reported a rent

payable on monthly basis. Both of these had a herd-size of three animals but the rent in case of one was one rupee per month while in the case of another it was Rs.5½ per month. Both these stables were located on the outskirts of the city. The remaining small sized dairy paid a rent on the basis of the number of animals kept in the stable. This was because the land was jointly leased-in by a group of three dairymen. The rent paid was Rs.2.50 per month per animal and the stable was located in the heart of the city.

In case of the four large sized dairies reporting leasing-in of land as mentioned above, two paid a monthly rent of Rs.45 and Rs.35 respectively whereas the remaining two paid a monthly rent of Rs.10 each. One of those who paid a monthly rent of Rs.10 and the one who paid a rent of Rs.35 both belonged to the suburban areas. The stables in the remaining two cases were located in the city area.

Table 3.12 presents the data in respect of those dairies which reported renting of stables and the average rent paid by them. Most of the 20 operators who did not own a stable had housed their herds in rented stables. Only two out of these twenty did not pay any rent. Thus, there was one dairy operator who had housed his herd in a stable belonging to his relatives and, therefore, did not have to pay any rent. The herd-size in this case consisted of two milch animals. In the case of the remain-

Table 3.12 : Average rent paid per milch animal per month.

Size group	No. of units reporting	No. of milch animals	Monthly rent paid (Rs.)	Average per milch animal per month (Rs.)
Up to 5	5	17	43.25	2.54
6 - 10	3	21	47.00	2.24
11 - 15	4	38	103.00	2.71
16 - 20	-	-	-	-
21 & above	7	232	530.00	2.28
Estimates	247	1655	4012.95	2.42

ing dairyman, the ownership of the stable was in dispute and this dairyman himself was one of the claimants. This very dairyman had, however, rented another small stable for housing his two cows. In addition to these twenty dairymen there was one dairyman, from among those owning their stables, who also reported renting of an extra stable as his own stable was insufficient to accommodate his herd. Thus there were 20 stables in all which were taken on rent. One out of these 20 refused to reveal the amount of rent paid by him. The data with regards to the remaining 19 stables is presented in the table referred to above. It may be noted from the table that the average rent paid per animal in the stable did not vary much in the different size groups. The estimated average rent per animal per month amounted to Rs.2.42.

### 3.6 Employment

Table 3.13 gives the distribution of the sampled dairies in different size groups according to the number of workers engaged in them and also the average number of workers per unit in each size group. Thus the average number of workers engaged per unit came to about two in the first two size groups, about three workers in the third size group, nearly 4 workers in the fourth size group and eight in the last size group. The forty-eight sampled establishments together gave employment to 171 workers. The estimated number of workers in the total stables came to 1703 or about two workers per establishment.

Table 3.13 : Distribution of the dairies according to number of workers engaged in them.

No. of workers	H e r d - s i z e					Total	Total workers
	Up to 5	6-10	11-15	16-20	21 & above		
One	5	2	-	-	-	7	7
Two	8	4	3	-	-	15	30
Three	2	5	4	1	1	13	39
Four	-	-	1	2	-	3	12
Five or more	-	-	-	1	9	10	83
Total	15	11	8	4	10	48	..
Total workers	27	25	22	16	81	..	171
Total workers in the industry	879	350	135	138	201		1703
Total units	510	163	50	35	24	782	
Average No. of workers per unit	1.72	2.15	2.70	3.94	8.37	2.18	

Table 3.14 : Data showing the number of family and hired workers in the total labour force employed in the industry.

<u>Size group</u>	<u>Family workers</u>	<u>Hired workers</u>	<u>Total workers</u>
Up to 5	24	3	27
6 - 10	22	3	25
11 - 15	16	6	22
16 - 20	5	11	16
21 & above	21	60	81
Estimates	1283	420	1703

It may, however, be noted from table 3.14 that most of these workers were family workers. Thus, nearly 75 per cent of the total workers engaged in the industry consisted of family workers. Table 3.15 brings out the number of males and females as well as the number of fully and partially employed workers in the total family workers.

Table 3.15 : Data showing the number of male and female workers as well as the number of partially and fully employed workers in the total family workers.

<u>Size group</u>	<u>Family workers</u>				<u>Total</u>
	<u>Fully employed</u>		<u>Partially employed</u>		
	<u>Male</u>	<u>Female</u>	<u>Male</u>	<u>Female</u>	
Up to 5	11	4	5	4	24
6 - 10	13	-	5	4	22
11 - 15	12	-	-	4	16
16 - 20	5	-	-	-	5
21 & above	12	-	7	2	21
<u>T o t a l</u>	53	4	17	14	88
Estimates	687	130	250	216	1283

Those workers who were not engaged for a full day's work were regarded as partially employed. A working day was regarded to be equivalent to eight labour hours. It can be seen that females constituted about 27 per cent of the total family workers and a majority of them (about 62 per cent) were partially employed. On the other hand, the proportion of the partially employed among male family workers was only about 27.

Table 3.16 : Data showing the number of male and female workers as well as the number of partially and fully employed workers in the total hired workers.

Size group	Fully employed		Hired workers		Total
	Male	Female	Male	Female	
Up to 5	2	-	-	1	3
6 - 10	3	-	-	-	3
11 - 15	6	-	-	-	6
16 - 20	10	-	1	-	11
21 & above	42	-	17	1	60
<u>T o t a l</u>	63	-	18	2	83
<u>Estimates</u>	334	-	51	35	420

Table 3.16 presents the data in respect of the hired workers and indicates the number of partially employed workers as well as the number of male and female workers in the total hired labour force. It can be seen from this table that female workers constituted only about 8 per cent of the total hired workers and almost all of them were partially employed. On the other hand, most of the male

workers were fully employed workers, partially employed males accounting for only about 13 per cent of the total hired male workers. Furthermore, almost all of the partially employed male workers were engaged by the dairies in the largest size group. Most of these partially employed workers were engaged as milk distributors.

An attempt was made to study the variations in the total as well as in the hired labour inputs in different size groups per head of adult animal maintained in the stable. One labour day was assumed to be equivalent to eight hours' work. The contribution of the whole time workers was, therefore, assumed to be eight labour hours per day. In the case of the part-time workers data was available regarding the number of hours put in by them. For the calculation of the labour inputs per animal unit, adult livestock in the stables including bulls and growing heifers were considered while the calves were left out of account. The result is presented in table 3.17. It may

Table 3.17 : Data showing the variations in the labour inputs according to the size of the units.

Size group	Total adult animals	Total labour hours	Average labour inputs per animal	Total labour inputs by the hired labour	Average hired labour inputs per adult animal
Up to 5	52	134.5	2.59	13.5	0.26
6 - 10	91	139.5	1.53	24.0	0.26
11 - 15	106	137.5	1.30	56.0	0.45
16 - 20	75	118.0	1.57	83.0	1.11
21 & above	378	467.0	1.23	355.0	0.94



be noted that the average labour input per animal per day was 2.59 labour hours in the first size groups whereas it was 1.23 hours per animal per day in the last size group. In the intermediate frequency groups, the labour inputs per animal per day were 1.53 hours, 1.30 hours and 1.57 hours respectively in the second, third and the fourth size groups. It can be seen, therefore, that though there was a marked variation as between the first and the rest of the frequency groups, it was not so prominent among the rest of the groups themselves. The first size group was obviously at a disadvantage. This was quite natural due to the factor of indivisibility of labour. If one worker could look after a herd consisting of 7 to 8 animals, his capacities obviously remained under-utilized in a herd of a lesser size. But it is also possible that the higher labour inputs in the small-scale dairies were due to the existence of disguised underemployment or unemployment, i.e. existence of family members who worked in the family concern merely because they did not have any alternate employment. The larger units also had family members working in the trade but in such units their labour could be more profitably utilized due to the larger herd-size. The larger units, furthermore, could adjust the labour inputs to the size of the herd by employing part-time workers like the milk distributors.

In the case of the hired labour inputs, however, the

results showed quite an opposite trend, i.e. they increased with the herd-size. This was natural since, as was noted earlier, the proportion of units employing hired labour was greater in the larger size groups. The proportion of hired labour was also greater in the large size groups.

Almost all the hired workers were engaged on monthly wage basis though a few dairies also reported employment on daily wage and contract basis. Most of the operators made their wage payment in cash. An adult worker was generally paid a monthly wage ranging between Rs.40 and Rs.60 depending upon the experience and the nature of the work done by the worker. Where the payment was on cash-and-board basis, the cash payment ranged between Rs.20 and Rs.30 per month. Out of the total of 334 wholetime hired workers, 101 or nearly 30 per cent were employed on cash wage and board basis. There was one dairy in the last size group in the sample which reported employment on daily wages. Similarly, there was one small sized dairy which reported employment of hired labour on contract basis. In this case, separate payments were made to the hired worker for each type of work at a certain fixed rate. Thus, for example, a monthly rate of Rs.3 per adult animal was paid to the worker for washing the animal. The same rate was paid for milking the dairy herd. The wage-bill of the operator, therefore, depended on the number of animal's in the stable and the number that was in milk.

The part-time employees were mostly milk distributors. The distribution of milk was generally entrusted to school going boys who worked on part-time basis. These distributors were employed either on monthly time wages or on contract basis. A monthly wage usually varied between Rs.10 and Rs.15. Those who were paid on contract basis were paid on the basis either of the number of households served or the quantity of milk distributed. In the former case, the rate of payment usually was about a rupee per month, per household served. In the latter case, the monthly rate of payment depended on the quantity of milk delivered per day. This rate was 50 nP. per seer. Thus a seer of milk delivered daily for the whole month fetched a distributor 50 nP. at the end of the month. The basis of wage payment in such cases was, thus, a seer-month, i.e. a seer of milk delivered per day for the whole of the month.

Most of the workers, whether employed on purely cash basis or on cash-and-board basis, received other perquisites such as clothing and an Indian blanket, morning tea or one-fourth seer of milk, etc. in addition to wages. Almost all received some extra allowance at the time of Diwali festival. These perquisites and boarding facilities were evaluated at a certain standard rate for arriving at the total wage bill. Table 3.18 presents the data regarding the total wage payments made by the operators in each size group as well as the estimated overall payment. The

Table 3.18 : Average monthly wage payment made to the fully and partially employed workers and average payment per animal per month.

Size group	Fully employed		Partially employed		Total wage payment (Rs.)	No. of milch animals reported	Average per animal per month (Rs.)
	No. of work-ers	Wage pay-ment (Rs.)	No. of work-ers	Wage pay-ment (Rs.)			
Up to 5	2	75	1	7	82	10	8.2
6 - 10	3	127	-	-	127	25	5.0
11 - 15	6	297	-	-	297	52	5.7
16 - 20	10	475	1	30	505	72	7.0
21 & above	42	2271	18	206	2477	355	7.0
Estimates	334	15765	87	997	16762	2494	6.7
Average rate		47.20		11.45			

average rate of wage payment thus arrived at amounted to Rs.47.20 per head per month in case of the fully employed worker and Rs.11.45 per head per month in case of the partially employed worker. The above mentioned table also brings out the average wage payment per milch animal per month. It may be noted that for the calculation of this average only the milch animals in the stable were considered whereas the calves and the breeding bulls, etc. were left out of account. The average rate of payment per milch animal ranged between Rs.5 in the minimum to Rs.8.2 in the maximum. The maximum rate was paid by the smallest operators.

Table 3.19 presents the case study data in respect of the labour charges per milch animal per month. Here the variation in the average wage payment made per animal, per month was still greater as between different dairies. This was mainly because

Table 3.19 : Case-study data showing labour charges per milch animal per month.

Dairy	1 9 5 6			1 9 5 7			1 9 5 8		
	Herd in the stable	Wages paid during 1956 (Rs.)	Wages per animal per month (Rs.)	Herd in the stable	Wages paid during 1957 (Rs.)	Wages per animal per month (Rs.)	Herd in the stable	Wages paid during 1958 (Rs.)	Wages per animal per month (Rs.)
A	70	7322.59	8.72	75	5776.90	6.42	75	7063.42	7.85
B	26	1772.85	5.68	29	1816.80	5.22	-	-	-
C	-	-	-	4	515.25	10.73	4	500.00	10.41
D	12	999.00	6.94	15	1411.17	7.84	15	1521.91	8.45
E	-	-	-	46	5701.00	10.33	41	5906.25	12.00
F	29	3877.00	11.13	27	4033.50	12.45	26	4234.00	13.57
G	27	3289.00	10.15	25	3768.00	12.56	25	3429.62	11.43
H	17	1811.75	8.88	21	2201.33	8.73	23	2097.61	7.60
I	-	-	-	-	-	-	10	718.34	5.98
J	-	-	-	7	1440.00	17.14	-	-	-
Total	181	19072.19	8.78	249	26663.95	8.92	219	25471.15	9.69

of the particular situation in which some of the dairies were placed. Thus, dairy E had maintained its own dry depot on the outskirts of the city. It had, therefore, to maintain a greater number of hired workers for looking after the stable as well as the dry depot. Dairy J itself was located on the outskirts of the city. Since the owner of this dairy resided in the city, he had to employ a greater number of workers for looking after the herd and for bringing the milk to the city for distribution. Wage payment per animal, thus, depended on the extent of dependence on the hired labour. It was mentioned earlier that dairy B was a partnership concern where two brothers worked in partnership. Their wage payment was, therefore, somewhat lower than in the case of the rest of the dairies. Another reason was that it employed workers on daily wages so that the number of workers could be adjusted according to the herd-size and secondly, the rate of payment was also, to some extent, lower than that paid on the monthly basis.

One point may be noted in respect of the dairy A. The herd in the stable as mentioned against it in the table also includes the herd maintained on the leased-in farm since a separate account of the wage bill of the workers employed on this farm was not available.

### 3.7 Nature of the business

Most of the dairymen in Poona sold milk that was

produced in their stables, but there were a few, especially those who maintained a herd of 20 or more animals, who sold milk produced in their stables as well as that purchased from outside. Most of the dairymen in the case studies were regular purchasers of outside milk. Outside milk was purchased, mainly for keeping their supply elastic but there were some dairymen who purchased outside milk because it was available at cheaper prices and, when mixed with the milk produced in the stable, could be sold at a fairly high price.

Nineteen out of the total sample of 48 dairymen reported that the necessity of purchasing outside milk did not arise in their cases. Eleven out of these 19 were the owners of herd below 10 milch animals. Eighteen operators reported that they had to depend on outside milk but purchasing of milk was in most of the cases confined to the summer season. There were only four among them who reported that they were regular purchasers and that they purchased milk all the year round. In the rest of the eleven cases, the operators preferred purchasing a fresh buffalo to purchasing outside milk when the flow of milk became inadequate to meet the demand.

An individual operator had to weigh different factors before arriving at a decision when faced with any deficiency in production. Most of the operators faced this deficiency during the summer months when both the buffalo prices and

the fodder prices were high. The price of milk in the market, as was noted in the Introductory chapter, was also generally higher during the summer than during the rest of the seasons. A dairy which could keep its production at a comparatively low level during the flush season and high during the season of scarcity was, therefore, at a definite advantage. This could be managed either by freshening the milch animals during the season of peak prices or by purchasing fresh animals. The former was a less controllable factor and few operators in our sample reported any attempt in that direction. An individual operator had, therefore, to make a decision as to whether to purchase outside milk or to invest in additional stock when both the buffalo and the fodder prices were higher. Any decision in this respect naturally depended on the position of the individual dairy operator. Those who entered into contract with the milkmen from the neighbouring villages usually managed to get milk at much lower rate than the summer prices since the prices paid under the contract were not related to seasonal price fluctuations. Such dairies could make up for deficient production without going in for additional investment in the herd. But others had either to purchase outside milk at a rate which was, many a time, higher than the rate charged to the regular customers or to invest in additional stock unless they wanted to reduce the number of customers. It would be obviously uneconomic for a dairy to purchase



additional stock if its requirements were very small or were expected to last for a short duration. On the other hand, an additional investment in the fresh stock would be a paying proposition if a significant proportion of the produce were to go in to the market where the prices were generally higher than those charged to a regular customer. All this would, however, depend on the relative price relationships. Those who wanted to maintain the quality of their milk, however, preferred to invest in additional stock because milk purchased from outside could not be guaranteed about its quality. This was one of the reasons put forth by those respondents who reported that they purchased fresh buffaloes whenever they were deficient in their production. One large-scale operator in the sample reported that he purchased outside milk during the winter as well as the summer season for the following reasons. He purchased during the summer season because production was usually at low level during that season. During the winter season, however, he culled away a part of his herd and supplemented his own production by purchasing from the milk market where the milk prices were usually at a low level.

As referred to above, most of the operators whose case studies were undertaken reported regular purchase of milk either from the milkmen in the rural areas or from the

Table 3.20 : Proportion of purchased milk in the total quantity of milk handled in nine dairies (Case studies).

Dairy	Y e a r		
	1956	1957	1958
A	-	-	-
B	12.22	17.32	-
C	-	2.00	1.26
D	-	4.95	-
E	-	18.99	17.20
F	11.53	12.99	-
G	5.13	6.76	10.26
H	4.91	5.55	4.99
I	-	-	19.20

market. In table 3.20 is presented the data indicating the proportion of purchased milk in the total sales during 1956, 1957 and 1958. Data for more than one year period ~~was~~ were available in cases of six out of the nine dairies mentioned in the table. This <sup>case</sup> data shows that each dairy had a well-set pattern which was fairly uniform over a period under consideration.

Table 3.21 : Proportion of the total outside milk purchased during different periods in 1957

Dairy	January	April	July	October	Total
	to March	to June	to September	to December	
B	1.34	15.17	55.72	27.77	100.00
C	67.65	27.45	-	4.90	100.00
D	33.64	66.36	-	-	100.00
E	27.00	32.62	28.00	12.38	100.00
F	20.25	11.06	30.88	37.81	100.00
G	31.65	39.09	12.84	16.42	100.00
H	41.81	21.07	11.15	25.97	100.00

In table 3.21 is presented the data relating to the seasonality of purchase of outside milk. The data relates to the year 1957 only. The table brings out that excepting the dairies C and D, the rest of the dairies had purchased a major portion of the outside milk during the seasons other than the summer season.

Coming to the sample data, it was estimated that out of the total milk sold by the dairies in the city the proportion of milk not produced in the stable amounted to 3.47 per cent of the total milk handled by the dairies. The relevant data are presented in table 3.22. It may be noted that, generally, milk purchased from outside formed a very insignificant proportion of the total quantity retailed.

Table 3.22 : Data showing production and disposal of milk by the sampled dairies and estimates regarding the overall production, etc.

Size Group	Production (in seers)			Purchased Milk (B)	Total (A + B)	Milk	
	Buffalo milk	Cow milk	Total (A)			Sold	Retained
Up to 5	129.25	17.25	146.50	7.75	154.25	136.25	18.00
6- 10	279.00	26.00	305.00	8.75	313.75	293.00	20.75
11- 15	328.00	28.50	356.50	23.00	379.50	357.50	22.00
16- 20	361.00	5.00	366.00	-	366.00	349.00	17.00
21 & above	1364.00	52.00	1416.00	50.25	1466.25	1426.0	40.25
Estimates	17195	1033	18228	656	18884	17608	1276
%	94.33	5.67	96.53	3.47	100.0	93.00	7.00

It may also be noted that milk retained for household consumption formed about 7 per cent of the total milk handled.

The proportion of cow's milk in the total quantity of milk produced was also insignificant, i.e. accounting for about six per cent of the total milk produced in the city. This proportion was even less (nearly five per cent) in the total milk disposed of since a greater portion of cow's milk was retained for household consumption. Milk purchased from outside was only buffalo milk so that out of the total cow's milk produced, nearly 81 per cent was sold whereas in case of buffalo milk, the proportion of milk sold constituted as much as 94 per cent of the total buffalo milk. This supports our earlier observation that cows were maintained primarily for meeting household requirements of milk. (Table 3.23)

Table 3.23 presents the data showing the manner of disposal of buffalo and cow milk. It can be seen from this table that out of the total estimated quantity of milk with the dairies in Poona, including the milk purchased from outside, as much as 84 per cent was retailed by way of regular house to house deliveries, nearly 11 per cent was sold to casual customers and customers like hotels and dairy shops, and the remaining was disposed of in the milk market. None of the dairies in the sample reported conversion of milk into milk products.

Table 3.24 presents the case-study data showing the proportion of milk sold to regular customers as well as the casual sales including market sales. It can be also

Table 3.23 : Data showing the manner of disposal of milk.

Size group	Milk sold to			Total milk disposed of	
	Regular customer	Market	Casual & lump sum buyers		
<b>(A) BUFFALO MILK</b>					
Up to 5	106.25	11.50	7.00	124.75	
6 - 10	222.00	6.00	50.00	278.00	
11 - 15	289.00	16.00	33.50	338.50	
16 - 20	317.00	10.00	20.00	347.00	
21 & above	1141.00	7.00	238.00	1386.00	
Estimates:					
Quantity	14146	677	1943	16766	
Percentage of the total	80.35	3.84	11.03	95.22	
<b>(B) COW MILK</b>					
Up to 5	11.50	-	-	11.50	136.25
6 - 10	6.00	-	9.00	15.00	293.00
11 - 15	19.00	-	-	19.00	357.50
16 - 20	2.00	-	-	2.00	349.00
21 & above	40.00	-	-	40.00	1426.00
Estimates:					
Quantity	706	-	136	842	17608
Percentage of the total	4.01	-	0.77	4.78	100.00

seen from this table that sales consisted of fluid milk which was mostly home-delivered to the regular customers. The quantity of milk mentioned in column 5 consisted of milk that was retained by the operator and also that which was converted into milk products. Conversion of milk into milk products was undertaken only by dairies B, C and H, but the quantity involved was insignificant. Almost all the dairies purchased outside milk but milk produced formed a very large portion of the total milk sold. It may be

Table 3.24 : Case-study data showing the total production, the quantity of purchased milk and the manner of disposal of milk during 1957.

Dairy	Total milk sold (seers)	Proportion of milk sold to		Milk retained & converted into milk products	Total production (seers)	Total milk purchased (seers)
		Regular customers	Casual customers			
<u>1</u>	<u>2*</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
A	111082	96482(87%)	13520(12%)	1080(1%)	113351	-
B	48934	44626(91%)	2428(5%)	1880(4%)	41287	8645
C	9826	6940(71%)	1788(18%)	1098(1%)	9924	102
D	36321	32323(89%)	3278(9%)	720(2%)	35227	1834
E	59643	53302(89%)	5441(9%)	900(2%)	49306	11554
F	76866	75017(98%)	769(1%)	1080(1%)	68247	10187
G	61752	60015(97%)	657(1%)	1080(2%)	58754	4258
H	53078	43005(81%)	8618(16%)	1455(3%)	51158	3003
**I	29072	27879(96%)	113 -	1080(4%)	24096	5581
J	11138	9988(90%)	70(1%)	1080(9%)	9730	1635
Total	497712	449577(90%)	36692(7%)	11453(3%)	461080	46799

\* Two per cent of the total milk handled was assumed to have been lost by way of spillage, evaporation, etc.

\*\* Data relate to the year 1958.

noted that the totals in columns 6 and 7 do not add up to the totals in column 1. This was because two per cent of the total milk was assumed to have lost by way of spillage, evaporation, etc.

Though the majority of the dairymen undertook sale of milk to regular customers, the method of sale was different in different cases. Thus, some operators mainly undertook house to house delivery of milk while others milked the animals in the presence of the customers and sold milk on the spot.

In the former case, the sale was on monthly credit basis while in the latter case, where milk was sold in the stables, the sale was either on credit or on cash basis. The main advantage of this system from the point of view of the customers was that they could personally supervise the milking of the dairy herd and satisfy themselves that the milk was unadulterated. Such a class of customers had, in many cases, to pay a higher price due to the superior quality of milk obtained by them. In some dairies such customers were not discriminated against since there was a net saving on the cost of distribution. However, a majority of those who undertook sale to regular customers undertook home deliveries. Thus, out of the 45 who sold milk mainly to regular customers, 32 undertook home delivery of milk, nine undertook sale of milk mainly to those customers who

came to the stable for taking the delivery of milk, and four dairymen reported that they catered for both types of customers. It may, however, be mentioned here that none catered exclusively for one type of customer. Those who sold milk mainly in the milk market also had a few customers who received their milk home-delivered or who received the delivery of milk at the stable. Similarly, those who mainly catered for the regular customers also undertook sale of milk in the market or to the casual customer.

With regard to those who milked their animals in the presence of customers again there were some who went to the residence of the customer and milked the animal in his presence. There were two dairymen in the sample who thus took their dairy animals to the residential premises of the customers. Those who followed this practice were necessarily owners of very small herds, consisting of one or two milch animals. Furthermore, their customers lived in the vicinity of the stable and in the vicinity of each other. Thus, the practice of taking the dairy animal to the door of the customer prevailed only where there were a few customers who were able to purchase comparatively larger quantities of milk and who lived in the same locality so that the total quantity of milk yield could be disposed of at a time, on one and the same spot. One dairy operator who used to follow this practice but who had recently



discontinued it reported that such practices were on the decline especially during the post war period. The practice, however, was still prevalent in Poona though it was confined mainly to wealthy localities.

### 3.8 Milk Prices

Seasonal fluctuations in the price of milk sold in the market were noted in the Introductory chapter. In case of the milk sold by way of regular household deliveries also the rates fluctuated with seasons and the trend generally confirmed with the trend observed in case of market price of milk. However, even during a particular season, divergent rates were reported by the dairy operators who were interviewed during the course of this survey. This divergence in the rate of milk got accentuated due to the practice of discrimination between customers. Discrimination generally depended on such factors as whether the customer was a regular purchaser, whether he paid his bills promptly, or whether he purchased relatively larger quantities of milk. Furthermore, it may be assumed that the rate at which milk was sold indicated the quality of milk. There is no data to substantiate this statement but since consumers paid higher rates for milk even when it was available at lower prices, it is possible that the higher rates were paid mainly for the difference in quality. It is, therefore, possible that the retailer supplied different qualities of milk when he discriminated, except on the grounds mentioned above, as between

one customer and another in respect of the rates charged.

The variations in the rates charged by different dairies are brought out by table 3.25. One dairyman did not report on this matter since he sold only in the milk market. Out of the remaining 47, thirty reported that the rates charged by them were uniform over the whole year, almost all of the remaining made seasonal adjustments in the rates charged. Out of the 30 dairies where the rate

Table 3.25 : - Distribution of the sampled dairies according to the rates charged during different seasons.

<u>Rate per seer (in nP.)</u>	<u>Summer season</u>	<u>Monsoon season</u>	<u>Winter season</u>	<u>Constant rate all the year round</u>
50	-	3	2	-
57	-	2	4	-
64	-	1	1	-
66	2	8	5	18
75	2	1	1	4
80	10	2	4	5
87	3	-	-	3
Total	17	17	17	30

of sale was constant over the whole year, 18 had charged a rate of 66 nP. per seer, four had charged 75 nP. per seer, five had charged 80 nP. per seer, and the rate in the remaining three cases was 87 nP. Out of the 17 dairies where different rates were charged in different seasons, the majority had charged 80 nP. during the summer season. In the monsoon and the winter seasons the rates charged were

divergent.

To illustrate the diversity of rates prevailing at a point of time and the extent of this diversion, table 3.26 gives the rates charged by a dairyshop to different customers and the rate obtained in the market. It may be remembered here that the data in this table refer to the practices followed by a dairyshop and not to the type of the dairies with which the present study is concerned. However, as the

Table 3.26 : Rates charged by a dairyshop in Poona to regular and casual customers and the rate obtained for the surplus milk sold in the market during 1956-57.

(Rate per seer of milk)

Month	Rate charged to		Rate obtained in the milk market (nP.)
	Regular customers (nP.)	Casual customers (nP.)	
September	46	50	30
October	33	45	23
November	29	43	19
December	32	40	26
January	31	41	26
February	40	48	28
March	40	48	30
April	36	54	27
May	40	57	33
June	42	57	43
July	42	61	31
August	36	61	..
Average	37	48	28

dairyshops, which only import milk from the neighbouring rural areas, play a vital part in influencing prices of milk, reference to this data is helpful. Such data was were

not available in the case of any of the dairymen whose accounts were studied, though all of them reported that they discriminated between the regular and the casual customer and among the regular customers also, between one customer and another depending upon the factors mentioned above. The difference in the rates ranged between 6 and 12 nP. per seer. The rate charged to the casual customer depended mainly on day to day supply and demand conditions in the market but was always higher than the rate charged to the regular customers.

Data in table 3.26 clearly bring out the difference in the rates charged to the regular and casual customers. The difference in the average rates for the whole year amounted to eleven naye paise. It may be noted that the rates obtained by this dairyshop for the surplus milk sold in the market were very low as compared to the rates quoted in Chapter I. This would also give a clear idea about the the disparity of the rates prevailing in the milk market. This would also give some idea about the disparity in the quality of milk sold. The above dairyshop had no doubt sold a very low quality of milk as is evident from the extent to which it had adulterated the milk. Total quantity of the milk purchased by this dairyshop during the year 1956-57 amounted to 55,008.50 seers whereas the sales amounted to 56,802.30 seers, indicating addition of water

up to 1,793.80 seers or nearly 33 per cent of the total milk purchased.

Table 3.27 : Average rate of sale reported on the date of visit.

Size group	Quantity sold (Seers)	Total receipts (Rs.)	Average rate of sale per seer (nP.)	Estimated sales (Seers)	Value (in Rs.)
Up to 5	136.25	101.46	74	4544	3362.56
6 - 10	293.00	214.30	73	4425	3230.25
11 - 15	357.50	251.79	70	2247	1572.90
16 - 20	349.00	249.49	71	2948	2093.08
21 & above	1426.00	1130.49	79	3444	2720.76
Estimates	17608.00	12979.55	74	17608	12979.55

Table 3.27 gives the sample data regarding the rates at which milk was sold on the date of visit. It may be noted from this table that the rate of sale in the highest size group was higher than the average rate obtained for the remaining size groups. The estimated average rate for the total units came to 74 naye paise. In the case of the case-study dairies, the rate of sale charged to the regular customers differed from dairy to dairy and usually varied between 75 naye paise and one rupee during 1956-57.

We have so far noted the prices of milk in connection with the milk sold by the dairies in the sample. The practice of purchasing milk from outside, in order to make good the deficiency in production, was referred to earlier.

Table 3.28 : Average rate of purchase in respect of outside milk as reported on the date of visit.

Size group	Quantity purchased (seers)	Value (Rs.)	Average rate (nP.)	Estimated purchase (seers)	Value (Rs.)
Up to 5	7.75	5.75	74	258	190.92
6 - 10	8.75	5.86	64	132	88.44
11 - 15	23.00	18.61	81	145	117.45
16 - 20	-	-	-	-	-
21 & above	50.25	36.20	72	121	87.12
Estimates	656.00	483.93	74	656	483.93

The rates paid for such milk also would give some idea about the milk prices in Poona. Table 3.28 presents the sample data in this respect and gives the average rate of purchase in the different size groups. It can be seen that the estimated average rate of purchase came to ~~75~~<sup>74</sup> naye paise per seer though its variation as between different size groups was from 64 nP. to 81 nP. It may be noted that there was no difference between the average sale price and the average purchase price. However, since purchased milk formed only about three per cent of the total milk handled, the margin of profit or loss obtained on the sale of this milk can be regarded as insignificant. This margin was of greater importance in the case study dairies as shown by table 3.29. In most of the cases it varied between 15 nP. and 20 nP. depending on the difference between the rate of sale and the purchase rate. Many of these dairies had purchased

Table 3.29 : Case-study data : Margin of profit obtained by dairies on the sale of outside milk during the year 1957.

Dairy	Quantity purchased (seers)	Total outlay (Rs.)	Average rate of purchase (per seer) (nP.)	Average rate of sale per seer (Ratib)** (nP.)	Average margin per seer (nP.)
E	11554	7802.70	67	80	<del>13</del>
F	10187	6460.00	63	77	14
G	4258	2627.86	62	81	19
H	3003	1933.96	64	81	17
B	8645	5581.73	64	78	14
C	102	62.31	61	100	39
*K	37386	21209.73	57	76	19
Total	75135	45678.29	61	79	18

\* 'K' was a dairy shop where all the milk sold was purchased in the milk market.

\*\* Regular household deliveries.

this milk from the farmers in the neighbouring villages on annual contract basis. This, to some extent, explains the difference between the average purchase price noted in the case of the sampled dairies and the average purchase price noted above. Another reason may be that these two sets of data do not refer to the same period.

## Chapter IV

### HERD MANAGEMENT - I

The efficiency of the Dairy Industry depends on the herd management practices which include the method of maintaining the herd (whether by breeding or by purchase) the feeding practices, regularity in breeding and regulation of the time of calving, etc. If the herd is maintained by purchasing the stock from outside, the period over which this stock is maintained, i.e. whether permanently or for a few lactations only, also forms an important aspect of herd management practices since rapid turnover of stock leads to heavy replacement charges and thereby increases the cost of production of milk.

The present chapter deals with the herd management practices as followed by the dairies in Poona City. The topics dealt with are the herd characteristics, the rearing and replacement practices, salvaging of the dry stock and other related aspects. Feeding practices have been dealt with separately in the next chapter.

#### 4.1 Composition of the Herd

(a) Cows & Buffaloes : The 48 sampled units together gave us data in respect of 664 milch animals. Information was also available in respect of the young stock and the



herd bulls maintained in the establishments. Table 4.1 gives the distribution of the dairy herd as well as of the young stock and breeding bulls according to size groups.

Table 4.1 : Distribution of the dairy herd, the young stock and the breeding bulls according to the size groups.

Size Group	Number of milch animals					Total
	Up to 5	6-10	11-15	16-20	21 & above	
<u>Buffalo herds</u>						
No. of units reporting	14	10	8	4	10	46
No. of buffaloes	39	67	89	68	333	596
Young stock	19	19	22	9	79	148
Herd Bull	1	1	3	2	6	13
<u>Cow Herds</u>						
No. of units reporting	7	8	7	3	9	34
No. of cows	9	19	14	4	22	68
Young stock	5	8	15	1	13	42
Herd Bull	-	-	-	-	2	2

It may be noted from this table that out of 664 milch animals in the sampled dairies, nearly 90 per cent consisted of buffaloes while the remaining were cows. It is, therefore, clear that only buffaloes were considered as the dairy animal though a few cows were also kept in the herd. Out of the 48 units there were only two units which had maintained only cows while among the remaining, fourteen units consisted only of buffaloes and the rest had maintained cows as well as buffaloes. It is also evident from the table that cows were maintained by the dairies in all the size groups and the variation in the average number of cows possessed by the dairies in different size groups was not much significant.

Table 4.2 brings out the distribution of the sampled units according to the number of cows and buffaloes maintained in the herd. Since there were only two units which had maintained only cows and since cows formed only 10 per cent of the total dairy herd in the sample, the discussion in the following sections will be confined only to the buffalo herds. Peculiarities in respect of the cow herds will, however, be discussed separately at the end of this chapter.

Table 4.2 : Distribution of the units according to the number of cows and buffaloes.

	Only cows	Number of buffaloes					Total units
		Up to 5	6-10	11-15	16-20	21 & above	
Only buffaloes	-	8	3	-	2	1	14
No. of cows-							
One	-	6	2	5	-	1	14
Two	1	3	3	2	1	5	15
Three	-	-	-	-	-	2	2
Four	-	-	-	-	-	-	-
Five & above	1	-	1	-	-	1	3
Total units	2	17	9	7	3	10	48

(b) Breeds : The buffaloes owned by the dairies under consideration were of imported breeds like Delhi (Murrah), Mehsana, Surti, Jafferabadi and local or indigenous breeds like Pandharpuri, Varhadi and other nondescript breeds. The distinction between one breed and another, especially among the North Indian breeds was so slight that the respondents

were unable to distinguish between one breed and another. It was mainly because of the indiscriminate breeding between different breeds that many of the dairy animals had lost characteristics of pure breed.

The buffaloes of the imported breed generally came from places like Jafferabad, Surat, Rohatak and other Central and North Indian breeding tracts. The buffaloes from the Rohatak side (locally known as Delhi buffaloes) were very popular with the local dairymen since they were considered as the heaviest milkers. Surti buffaloes came from Anand district of Gujarat and they stood next to Delhi breed as far as the milking capacity was concerned. The buffaloes of Jafferabadi breed, which came from Girnar hills in Kathiawar, were also good milkers but were regarded as less profitable animals in view of their heavy feed requirements.

Table 4.3 gives the distribution of the sampled herd according to breed and size groups as well as the estimates for the total herd in the city. It may be recalled here that the estimates regarding the universe are made on the basis of the distribution of the buffalo herds in various size groups in the source list.

Buffaloes of the imported breeds formed 61 per cent of the total herd in the city whereas the rest were of local breeds. Among the imported breeds also Delhi breed was the

Table 4.3 : Distribution of the sampled herd according to Breed.

Breeds	Size group					Total	Percent- age of the total
	Up to 5	6-10	11-15	16-20	21 & above		
Delhi	8	16	33	27	272	356	
Mehsana & Surati	5	12	12	5	33	67	
Jafferabadi	1	3	11	8	28	51	
Unspecified	-	4	-	14	-	18	
Total imported breeds	14	35	56	54	333	492	
Local	25	32	33	14	-	104	
Total sampled herd	39	67	89	68	333	596	
<u>Estimates</u>							
Delhi	276	253	216	227	630	1602	37
Mehsana & Surati	173	190	178	42	76	559	13
Jafferabadi	35	47	72	67	65	286	7
Unspecified	-	63	-	118	-	181	4
Total imported breeds	484	553	366	454	771	2628	61
Local	864	506	215	117	-	1702	39
Total city herd	1348	1059	581	571	771	4330	100

most important breed since it formed nearly 61 per cent of the total buffaloes of the imported breeds. As has been mentioned above, many of these buffaloes did not represent a pure breed in the respective categories. The dairymen in the sample were, however, asked to classify their herds by considering certain prominent physical characteristics of various breeds and the above classification is based on the information given by the respondents.

Table 4.3 also brings out the variation in the composition of herds in the various size groups. It is thus clear from the table that the larger herds consisted mainly of the

superior (imported) breeds. Thus the herds above the size of 20 milch animals consisted only of the imported breeds. The proportion of the imported breeds in the second and third size groups was 52 per cent and 63 per cent respectively. It was only in the first size group, i.e. those maintaining up to 5 milch animals that the proportion of the local breed was overwhelmingly large, i.e. 64 per cent as against 36 per cent of the imported breeds.

(c) Dry and Milking Animals : Table 4.4 indicates the number of buffaloes in milk as well as those which were dry in the various size groups. It may be noted that the proportion of dry animals maintained in the herd varied with the herd size and was largest among the highest size group.

Table 4.4 : Classification <sup>of the herd</sup> according to milking, dry and in-calf buffaloes.

(Buffaloes)	Size group					Total	Estimates for Poona City
	Up to 5	6-10	11-15	16-20	21 & above		
Milking herd in the stable-							
In-calf	6	7	17	13	31	74	610
Not in-calf	28	48	52	50	196	374	2939
Total	34	55	69	63	227	448	3549
Dry stock maintained-							
In the stable							
In-calf	5	12	12	5	77	111	661
Not in-calf	-	-	8	-	9	17	73
Total	5	12	20	5	86	128	735
Outside the stable							
In-calf	-	-	-	-	20	20	46
Not in-calf	-	-	-	-	-	-	-
<u>Total dry stock</u>	5	12	20	5	106	148	781

Thus the proportion of dry animals was 13 per cent in the first size group, 18 per cent in the second, 23 per cent in the third, and 32 per cent in the last size group. Only in the fourth size group this proportion was very small but in the rest of the cases, it increased with the herd size, thus indicating that salvaging of dry stock was practised more among the larger than among the smaller herds. The table also indicates the number of buffaloes that were in-calf both in respect of the milking herd and the dry stock. Out of the 596 buffaloes, 448 were in milk whereas 148 were dry. As indicated by the table, out of 4330 buffaloes in the city herd as many as 781 were dry whereas the rest i.e. nearly 82 per cent were in milk. Most of the dry buffaloes i.e. about 91 per cent of the total dry stock were in-calf, indicating that these buffaloes were being salvaged for replacement in the following year. The number of dry buffaloes in the total herd approximately indicates the number of buffaloes that would be salvaged in the following year for subsequent replacement.

(d) Seasonality of and-Interval between calvings :

Information was asked about the date of going dry in respect of the dry animals and the month of calving in respect of the milkers. The information collected in this respect was scanty since the respondents could not report on these matters. We, therefore, give some case-study data in this respect in tables 4.5 and 4.6. Table 4.5 brings out the

Table 4.5 : Distribution of calvings according to months  
[case study data]

Dairy & Year	Month of calving												Total calvings
	1	2	3	4	5	6	7	8	9	10	11	12	
<b>D</b>													
1955	-	2	-	-	-	2	1	-	-	-	-	-	5
1956	-	-	-	-	-	5	-	-	-	1	-	-	6
1957	-	1	-	-	1	1	2	5	1	2	1	1	15
1958	1	-	-	1	-	-	4	4	-	1	1	1	13
<b>F</b>													
1956	-	1	1	2	1	5	2	3	3	-	-	1	19
1957	2	-	2	2	1	3	2	3	1	2	1	2	21
1958	-	2	1	-	4	2	2	1	1	5	-	2	20
<b>G</b>													
1956	3	1	3	1	3	1	1	5	-	3	1	2	24
1957	1	2	1	5	-	1	4	-	4	2	3	2	25
1958	1	1	3	3	3	4	2	2	2	3	-	2	26
<b>I</b>													
1958	-	-	-	-	-	-	2	2	1	1	1	-	7
<b>E</b>													
1957	-	-	-	-	1	5	5	-	-	10	2	1	24
1958	-	-	-	-	-	5	3	1	3	2	-	3	17
<b>B</b>													
1955	-	-	-	-	2	3	3	1	5	1	-	-	15
1956	-	-	-	-	1	1	1	3	2	3	2	2	15
1957	1	3	-	-	1	-	-	3	-	-	2	-	10
<b>H</b>													
1957	-	1	1	1	-	2	5	2	-	1	1	-	14
1958	1	-	1	-	5	1	2	1	7	1	1	1	21
<b>Total calvings</b>													
	10	14	13	15	23	41	41	36	30	38	16	20	297
<b>Percentage of the total</b>													
	3.4	4.7	4.4	5.1	7.7	13.8	13.8	12.1	10.1	12.8	5.4	6.7	100.00

Table 4.6 : Case-study data showing the interval between calvings.

Calving interval in months	Dairies					Total
	F	D	E	G	H	
11	2	1	1	-	-	4
12	7	3	1	2	2	15
13	2	3	3	2	-	10
14	3	1	3	8	3	18
15	-	1	8	4	3	16
16	2	6	4	5	4	21
17	-	1	10	1	-	12
18 & above	5	1	4	5	4	19
Average	14.5	14.7	15.8	15.4	15.7	

distribution of calvings according to months, and table 4.6 gives data in respect of the calving interval. The data are derived from the records of seven dairies which had maintained a record of the dates of calvings over a period of the past few years. Table 4.5 clearly shows that 62.6 per cent of the total calvings recorded were concentrated during the five months from June to October. The number of calvings during these five months was more than twice the same in the other seven months. Table 4.6 shows that the interval between calvings ranged from 14 to 16 months.

Now, since the calving period was mainly concentrated during the period from June to October and since the interval between calvings was about 14 to 16 months, it is obvious that production of milk was at a peak level during monsoon and winter period and at a low level during summer season.



For balancing the milk production over the different seasons, freshened animals were purchased during the season of low production as is pointed out in a section below.

#### 4.2 Average period of maintenance in the herd

It was noted above that an overwhelming proportion of the stock consisted of milkers and the dry stock amounted to about 18 per cent of the total stock only. It is, therefore, interesting to study how the total stock was renewed and the length of the period in which it was renewed. In fact, this is the most important aspect of the herd management. Information was, therefore, sought through the questionnaire regarding the period over which milch animals were maintained in the herd. Table 4.7 gives the classification of the sampled herds in different size groups according to the number of years that the animals were maintained in the herd since purchase. In the case of reared up animals the period of maintenance was calculated from the date of attaining maturity.

Table 4.7 : Number of years <sup>for which</sup> ~~that~~ the animals were maintained in the herd.

Size group	Duration of maintenance (years)					Total
	Up to 1	1 to 2	2 to 3	3 to 4	Above 4	
Up to 5	22	7	2	3	5	39
6 - 10	42	7	3	5	10	67
11 - 15	51	21	6	4	7	89
16 - 20	35	18	3	6	6	63
21 & above	101	-----	232	-----	-----	333
T o t a l	251	-----	345	-----	-----	596

It may be mentioned here that the respondents in the largest size groups were unable to give detailed information regarding the period for which each buffalo in the herd was maintained. However, the number of buffaloes that were purchased in the current year and which, therefore, were in the herd for a period of less than a year was available. Thus out of 333, 101 or nearly 30 per cent buffaloes were those which were purchased in the current year whereas the remaining 232 were maintained for a period of more than a year. An attempt can be made to obtain a break up of this figure according to the period of maintenance on the basis of case-study data. Table 4.8 presents data in this respect regarding five large scale dairies.

Table 4.8 : Distribution of the herd according to the year of purchase : Case-study data for 1956

Dairy	Year of purchase					Herd as on Jan. 1957
	1952 or before	1953	1954	1955	1956	
A	19	9	8	-	8	44
D	-	-	4	5	8	17
F	-	-	10	20	4	34
G	4	2	4	7	11	28
H	-	1	4	6	9	20
Total	23	12	30	38	40	143

It may be noted from table 4.8 that the herd maintained for a period of one year or less amounted to nearly 30 per

cent of the total milch animals covered by the above five case-studies. Since this proportion closely agrees with the relevant proportion in the sample data, the figure 232 can be split up according to the proportions obtained from the case-study data regarding the buffaloes that were maintained for different lengths of period. Thus, the proportion of buffaloes that were maintained in the herd for a period between one and two years, between two and three years, between three and four years, and more than four years was 27 per cent, 21 per cent, 8 per cent, and 16 per cent respectively. Estimates regarding the total city herd were made after splitting the relevant data according to the proportions given above. Table 4.9 gives the estimated figures. It is clear from this table that

Table 4.9 : Distribution of the city herd according to the length of period kept in the stable.

Size group	Period for which kept in the stable					Total	Average No. of years kept
	Less than one year	Between one and two years	Between two and three years	Between three and four years	More than four years		
Up to 5	760	242	69	104	173	1348	2.02
6 - 10	664	111	47	79	158	1059	2.01
11 - 15	333	137	39	26	46	581	1.82
16 - 20	295	151	25	50	50	571	1.96
21 & above	234	198	156	120	63	771	2.45
Total	2286	839	336	379	490	4330	2.06

the proportion of buffaloes that were maintained in the herd for more than a year was very high in the largest size group than in the rest of the size groups. Thus, nearly 70 per cent of the buffaloes in the largest size group were maintained in the herd for more than a year while the relevant proportion in the rest of the size groups ranged between 37 per cent in the minimum to 48 per cent in the maximum. This proportion would have been higher in the fourth size group but it got depressed because of sale and purchase practices of one dairyman, in this group, who was a dealer in the drystock.

The above observations clearly reflect on the salvaging practices prevalent in the dairies of different size groups and corroborates with the observation made in this respect in the preceding section. A larger proportion of animals which are maintained for a larger period indicates that a greater proportion of the dry stock was retained in the herd. This is also clear from table 4.9 which shows the average period for which the milch animal was kept in the herd. (For the calculation of this average, the following assumptions were made: It was assumed that the number of animals mentioned in the first column of the table (as being kept for less than one year) was maintained for one year. Similarly, the number of animals shown in the fifth column (as being kept for more than four years) was assumed to have been kept for five years. After making these

assumptions, it was possible to arrive at a rough estimate regarding the average period of maintenance of an animal in the different size groups. The estimated average period for which a milch animal was kept in the herd came to 2.02, 2.01, 1.82, 1.96, and 2.45 years in the first, second, third, fourth, and the fifth size group respectively. This average for the total herd came to 2.06 years.

#### 4.3 Replacements

It was observed that nearly 780 buffaloes in the city herd were annually salvaged and roughly 2280 were annually added to the herd. Additions to the herd were from purchases and from rearing. This section considers the practices in respect of (1) purchasing, (2) rearing, and (3) salvaging, and attempts to calculate the total annual replacements made in the city herd on the basis of the data pertaining to these practices.

(1) Purchases : Table 4.10 brings out the estimates in respect of the number of buffaloes purchased annually.

Table 4.10 : Number of buffaloes purchased annually.

<u>Size group</u>	<u>Sample data</u>	<u>Estimates</u>
Up to 5	21	725
6 - 10	42	664
11 - 15	46	300
16 - 20	35	295
21 & above	99	229
Total	243	2213

It can be noted from this table that about 2213 buffaloes were added to the stock annually by way of purchases. Information was sought through the questionnaire about the date, the place of purchase, purchase price and other related information. The data presented in table 4.11 give the distribution of the purchased animals according to the source of purchase. Thus, nearly 630 or 27 per cent of the 2200 buffaloes purchased annually were those that were directly imported from the breeding tracts in North and Central India. Almost all the imported buffaloes were, generally, freshly calved though imports of dry stock were not rare. There were, for example, two dairymen in the sample who had reported such practice. The dry stock in these cases was imported from Bombay and was salvaged in the surrounding rural areas. This practice was, however, confined to a very small number of dairymen who had contacts with the farmers in the adjoining rural areas.

Table 4.11 : Total current purchases according to the source of purchase.

Size group	Farmers	Dairymen	Traders	Weekly markets	Importers	Direct imports by the dairymen	Unspecified	Total
Up to 5	2	-	3	11	5	-	-	21
6 - 10	11	-	1	14	11	-	5	42
11 - 15	7	-	2	23	14	-	-	46
16 - 20	-	18	-	17	-	-	-	35
21 & above	-	-	16	-	46	37	-	99
Total	20	18	22	65	76	37	5	243
Estimates	289	151	170	894	544	86	79	2213
Proportion of the total	13.06	6.82	7.68	40.40	24.58	3.89	3.57	100.00

The data in respect of the buffaloes imported in rail wagons from North and Central India as well as from the tracts in the Bombay Deccan were available with the Central Railways Office in Poona. Most of the imports from long distances came only through railway wagons since milch animals could be moved over long distances only by rail transport. Imports from the surrounding areas only were by motor trucks but there were no data in respect of such imports. According to an official source<sup>1/</sup> the total annual imports may be taken to be round 1000 buffaloes.

Table 4.12 : Distribution of imported buffaloes according to place of origin and month of arrival.

Month	North India	Central India	Bombay Deccan	Total
January to April	224	70	40	334
May to August	144	-	152	296
September to December	40	30	56	126
T o t a l	408	100	248	756

(Source: Railway Authorities, Central Railways Office, Poona.)

Table 4.12 presents the data in respect of the railway imports. It can be seen that the estimates, in this respect, made on the basis of sample survey data come nearly close to the figure mentioned in table 4.12. Most of the imports

<sup>1/</sup> Report of the State Dairy Development and Co-ordination Committee on the Improvement of Dairying in the State of Bombay, Government of Bombay, Government Central Press, 1953, p.17.

were confined to northern India. The important places of origin in these cases were Jullunder, Meerut City and Rohatak. The places of origin in the Central India were Rajkot, Baroach and Anand. The places from which local breeds were imported were Bhusawal, Warangaon, Yewala and Sholapur.

There were nearly 10 per cent dairy operators in the sample who reported that they had purchased a part of their stock from the places in North India. All of these were comparatively large-scale operators. Detailed information was collected from a few of these dairymen regarding this practice of importing the milking herd from these distant places. Usually it was a co-operative effort of three or four dairymen as the overhead costs such as travel expenses and the other charges could be brought to the minimum only through a co-operative effort. It was, thus, necessary that at least a wagon-load full (which consisted of eight animals) had to be purchased since the railway rates depended on the number of wagons engaged and not on the number of buffaloes booked.

The buffaloes were purchased at Rohatak after verifying the yield. The dairymen from Poona transacted the business through commission agents and the price was usually determined by closed auction method known as the 'hatha' system. Under such a system, offers by the parties concerned



were made by clasping fingers under a piece of cloth. There were permanent stock yards at Rohatak where the sellers stalled their animals. The dairymen intending to purchase the buffaloes generally took a round in the various stock-yards and selected some buffaloes. The owners of such buffaloes were then informed the day on which the dairymen wanted the yield to be varified. It was generally reported that the owners or sellers usually tried to stimulate the yield by artificial means. The animals were even not milked in the interval period. The purchaser, thus, usually relied on inflated yields and believed that purchasing a buffalo was more or less a gamble.

The cost of bringing buffalo to Poona ranged round Rs.125. This included the charges of the railway wagon which amounted to Rs.700 or so per wagon (of eight buffaloes). It also included the travel expenses of the dairymen and the expenses of the caretaker who looked after the buffaloes while in transit. Usually one caretaker was allowed to travel in one wagon free of charge. An extra caretaker had to pay his railway fare. In addition to the return railway fare, these caretakers charged Rs.3 per day as their wages. They also had to be provided with their boarding facilities.

Many difficulties were experienced while bringing these buffaloes to Poona. Firstly, it all depended on how the caretakers managed them during the course of 10 to 12 days

while in transit. The buffaloes had to be fed and milked at proper times. Generally the caretakers were provided with enough feed and fodder to last for 10 to 12 days. The milk obtained while in transit was usually sold at the stations on which the goods train took a halt. Normally, there were convenient stoppages but the milk had to be sold at a very cheap rate. The total receipts obtained from the sale of milk during the course of the journey, which usually was spread over 10 to 12 days, amounted to Rs.250 - Rs.300 per wagon. The yield of these buffaloes which were in the initial stages of their lactation was usually as high as 12 to 14 seers per day. The amount of milk obtained thus came to about 1000 to 1200 seers per wagon. Assuming a rate of sale of 24 nP. per seer, total receipts amounted to Rs.250 to Rs.300. The dairymen usually did not travel with the buffaloes and had, therefore, to rely on the hired workers who acted as caretakers. It was generally believed by the dairy operators who were interviewed that these caretakers often played a trick and made good amount of money from the sale of milk. They saw to it, by resorting to unfair practices, that the wagons were detained at such stations where milk fetched a good price. They could, thus, increase their wages since their wages depended on per day basis and, furthermore, pocket the money obtained from the sale of milk at higher prices. The dairy operator had to accept the money which the caretaker handed him as obtained from the sale of milk.

However, these receipts covered the expenses of feed and fodder as well as caretaker's charges.

Many a time, the calves did not survive the strain of the long distance journey with the result that the mother buffalo either went off the milk or considerably reduced the yield of milk on its arrival here. Additional expenses had to be incurred for restoring the original flow of the animal. There was a professional class in Poona which specialized in this sort of job. They took charge of such buffaloes and after applying some unknown indigenous remedies succeeded in restoring the flow. The charges varied between Rs.40 and Rs.60 per animal. In less complicated cases, a corpse of a calf, stuffed with roughage, was used for stimulating the milk flow.

Other items of expenditure which were incurred for bringing the buffaloes to Poona included such expenses as the carting agents' charges and other sundry charges required for bringing the buffaloes to the stables from the station. It had to be seen that the buffaloes were delivered immediately after their arrival in the station.

As given on the following page, the net expenditure for bringing one wagon-load of buffaloes from Rohatak to Poona worked out approximately to Rs.1000 or Rs.123 per buffalo. Though there were a few dairymen who thus imported a part of their stock directly from the breeding tracts, most of the

Expenses for bringing one wagon-load (eight)  
of buffaloes from Rohatak to Poona

Rs.	
700.00	Wagon charges (Railway freight)
96.00	Expenses on caretakers (two) at the rate of Rs.3 plus Re.1 for board per head per day for 12 days
100.00	Approximate travelling expenses for caretakers (only return fare for one, complete round fare for the other)
240.00	For feed and fodder at Rs.2.50 per day per buffalo (for 12 days)
150.00	Miscellaneous charges (including tips, carting expenses, etc.), travelling and other expenses of the dairyman
-----	
1,286.00	Total
- 300.00	Receipts from sale of milk
-----	
986.00	Net expenses for eight buffaloes
∴ 123.00	per buffalo.

imports were handled by cattle dealers. These cattle dealers also procured supplies of animals through their agents or traders in the neighbouring rural areas. The number of milch animals brought in from the rural area by these agents was not available from any source of information.

It can be seen from table 4.11, mentioned earlier, that for the majority of the dairy operators, the local market was the main source for purchasing their replacements. Firstly, there was the Poona bi-weekly bazaar where the villagers and cattle breeders from the surrounding areas

brought their cattle and buffaloes for marketing purposes. The cattle dealers and the milkmen from the city also participated in the market. The sale and purchase transactions in the market took place through the brokers as well as without the help of the brokers. The negotiations through the brokers were in the form of closed auction or 'hath' system if there were too many bidders for the same animal. The position of the broker was unique in such a deal and he often took advantage of his position by raising the bid in order to increase his own margin of profit. The dairymen, however, seemed to be in favour of such a system. Some of them expressed an opinion that such a system avoided the competition among the bidders and, therefore, a price rise since nobody except the broker knew the offers made..

The brokers also arranged for the sale and purchase of buffaloes outside the weekly markets. They usually provided a herding accommodation to the itinerant dealers from the villages who brought their collections for sale. Buyers in Poona as well as from the surrounding villages usually visited such stock yards for making their purchases.

Another major source of purchase was the farmers in the countryside. Those dairymen who had some contacts with the farmers in the adjoining villages purchased some of their stock from these farmers who sold their own surplus stock either farm-bred or salvaged. The dry stock from the

city stables was usually purchased by these villagers and was later on sold back to the city dairymen after salvaging.

Prices : The factors <sup>which</sup> ~~that~~ generally governed the price of a buffalo were good breed, age, potential milk yield, absence of any deformity and the terms of purchase (i.e. cash or credit). In the case of the milkers additional factors like actual yield, the stage of lactation and the presence or absence of a calf-at-heel, etc., determined the market price. The imported buffaloes were mostly milkers while the buffaloes sold in the market were those which were about to calve. In the case of milkers, the most important single factor was the yield. In fact, prices of buffaloes were often quoted in terms of so many rupees per seer of milk. Thus, if a price offered was Rs.100 per seer, a buffalo yielding 8 seers of milk at a time fetched a price of Rs.800. Another important factor was the terms of credit. Buffaloes that were purchased on instalment basis were costlier by Rs.100 to Rs.150 or so than those that were purchased on cash basis. Sometimes payment was also made by bartering dry buffaloes in exchange of milking stock. Proper adjustments were, however, made in the terms of cash payments.

Table 4.13 presents the data regarding the average purchase price paid by the dairies in the different size groups. The table clearly brings out the association of the price of purchase and the size group. As was noted earlier, this was mainly because of the breed maintained

Table 4.13 : Average purchase price according to the size groups of the dairies.

Size Group	Number purchased		Total outlay (Rs.)		Average price Rs.
	Sample data	Estimates	Sample data	Estimates	
Up to 5	21	725	10360	357664	493
6 - 10	42	664	27240	430650	648
11 - 15	46	300	31785	207294	691
16 - 20	35	295	13900	117156	397
21 & above	99	229	83247	192559	841
T o t a l		2213		1305323	590

by the dairies in different size groups. It may be remembered, here, that the proportion of the imported breed in the total herd size was greater in the larger dairies. The abnormally low purchase price obtained in the fourth size group was due to one dairy where the main business of the dairyman concerned was trade in dry stock. Almost all the buffaloes purchased by this dairymen were in the last stages of lactation.

Seasonality was still another important factor which influenced the prices of buffaloes. Thus the prices of buffaloes were generally higher during the summer season when there was a scarcity of freshly calved animals. On the other hand the prices decreased during the monsoon and winter seasons which coincided with the local calving season. Data, in this respect, were not available from all the dairies because some of the respondents could not report

the month of purchase. Table 4.14 presents the data which were available in respect of 124 buffaloes. The table gives average purchase prices in respect of the buffaloes belonging to imported breeds and of indigenous breeds purchased during different months.

Table 4.14 : Average prices for buffaloes purchased in different months.

Month of purchase	Imported breed			Local breed		
	No.	Total outlay	Average price	No.	Total outlay	Average price
January to March	39	37015	949	6	2725	454
April to June	21	20800	990	7	2585	369
July to September	9	4930	548	16	7135	446
October to Dec.	17	11130	655	9	3375	375
T o t a l	86	73875	859	38	15820	416

The table indicates that the average price was generally higher during the summer season especially in the case of animals belonging to the superior breed. In the case of the local breed, the information was available only in respect of a few animals so that there is very little scope for making any generalizations.

Table 4.14 also brings out the seasonality in respect of purchasing of the milking stock. It can be seen from this table that in case of the imported breeds, about 70 per cent of the animals were purchased in the first six months of a year, i.e. during the end of winter and the whole of



summer season. It was noted earlier that calvings were concentrated in the period from the beginning of monsoon and the beginning of winter season, i.e. from June to October. Since a lactation period lasted <sup>for</sup> ~~of~~ 10 to 12 months, it was natural that most of the stock became dry during the summer season. As the dairymen had to maintain the level of the milk production, they had to purchase freshly calved animals during this season, i.e. from March to May. This is also supported by the case-study data showing the distribution of the purchases according to different months. The relevant data is presented in table 4.15. It can be seen that about 85 per cent of the total purchases were concentrated in the first half of the year and especially during the summer months.

Table 4.15 : Case-study data showing seasonality in respect of purchases of buffaloes.

Month of purchase	Dairies							Total
	B	C	D	E	F	G	H	
1	1	-	3	4	-	-	-	8
2	1	-	-	-	-	-	-	1
3	-	-	1	3	5	4	5	18
4	-	1	2	1	1	1	-	6
5	4	-	1	-	1	4	2	12
6	1	-	-	1	-	-	-	2
7	1	-	-	-	-	-	-	1
8	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-
10	1	-	-	-	-	-	-	1
11	-	-	-	-	-	-	4	4
12	-	-	-	-	-	-	-	-
Total	9	1	7	9	7	9	11	53

(2) Rearing Practices : Though the majority of the herd was purchased, it was not uncommon to find a few home-bred animals in the herd. Thus, out of 46 dairies in the sample, 36 reported one or more home-bred animals in the total herd. There are three types of sources from which estimates can be arrived at in respect of the total reared up stock. Firstly, there are the data regarding the number of home-bred stock added to the herd during the period under study. Secondly, we have the proportion of the home-bred stock in the total herd. Thirdly, we have the data in respect of the calves in the rearing stage.

Table 4.16 : Estimates regarding the number of reared up stock annually added to the herd.

<u>Size group</u>	<u>Sample data</u>	<u>Estimates</u>
Up to 5	1	35
6 - 10	-	-
11 - 15	5	33
16 - 20	-	-
21 & above	2	5
T o t a l	8	73

Table 4.16 brings out the number of buffaloes added to the stock by rearing. Estimates from the sample data show that about 73 buffaloes were added to the herd by rearing. It was noted above that about 2213 animals were added to the stock by purchasing. Therefore, out of the total additions, the reared up stock amounted to about 3.19 per cent only.

Table 4.17 : Estimates in respect of the home-bred stock in the total herd.

<u>Size group</u>	<u>Sample data</u>	<u>Estimates</u>
Up to 5	7	242
6 - 10	1	16
11 to 15	7	46
16 - 20	3	25
21 & above	14	32
<u>T o t a l</u>	32	361

Table 4.17 presents the estimated number of home-bred animals in the city herd. The estimated number of buffaloes, thus, came to about 361 or about 8.33 per cent of the total herd. It may be remembered that the average period for which an animal was kept in the herd came to about two years which means that the annual additions by rearing amounted to about 4 per cent of the total herd. It was noted above that the annual additions by rearing came to 73 or about 1.7 per cent of the total herd. There is, therefore, some discrepancy in these two sets of data.

Table 4.18, which gives the estimates regarding the number of calves maintained by the dairymen, will give another rough figure about the number of buffaloes replaced by rearing. It can be seen from this table that out of the total estimated calves belonging to the city herd about 58 per cent were under one year of age, about 24 per cent were between one and two years of age, and the remaining 18 per cent were more than two years old. The calves in

Table 4.18 : Distribution of buffalo calves according to age and size group.

Age	Size group					Total
	Up to 5	6-10	11-15	16-20	21 & above	
Below one year						
No. in sample	9	12	19	4	54	98
Estimates	311	190	124	34	125	784
Between one and two years						
No. in sample	6	4	1	4	9	24
Estimates	207	63	7	34	21	332
Two years and above						
No. in sample	4	3	2	1	16	26
Estimates	138	47	13	8	37	243
Total for the city herd	656	300	144	76	183	1359
Of which maintained outside the stable						
No. in sample	-	2	2	1	4	9
Estimates	-	32	13	8	9	62

the rearing stage thus came to about 243. Out of these 243, about 170 were heifers, the rest being male calves. The data on hand do not enable us to estimate the proportion of these heifers which became available for annual replacements since the proportion of those which mature annually and the proportion of those which do not become available due to sales or deaths is not known. Assuming that all the 170 heifers are transferred to the herd every year, the proportion of those annually added by rearing comes to about 3.92. Now, it was estimated on the basis of the data in respect of the total reared up stock in the herd that about 4 per cent of the total herd was added annually by rearing. The

above proportion comes very close to this estimate and, therefore, we may assume that roughly 4 per cent of the total stock, i.e. about 173 heifers were transferred to the herd annually. The total annual additions to the stock by way of purchases and rearing, thus, amounted to about 2386.

It can be seen that rearing was carried practically on an insignificant scale. Some of the difficulties encountered by the dairymen are listed below.

The common experience of these dairymen was that the buffalo calves could not survive their first year of age and rearing of buffaloes was, therefore, very difficult to undertake. Many reasons were put forward to explain this phenomenon. One of the important reasons among these was that the buffalo calves were by their very nature sluggish and, therefore, difficult to take care of during the first few months after their birth. Another very important reason put forth was that due to the heavy feeding of concentrates to the mother buffaloes, the fat content of the milk became so high that the calves, who were unable to digest it, ultimately succumbed to the complications resulting from indigestion. It may be noted that weaning was not practised by these dairymen so that it was not possible to feed the calves on diluted or separated milk. Furthermore, it was generally experienced that raising of milch animals in the

urban environment was uneconomical and even impossible due to the lack of natural surroundings. Thus, besides the problems which were associated with feeding, there was the problem of lack of space. The calves were usually tied in open space round the stable where they were denied any shelter from heat or rain. In addition to these difficulties there were the Municipal regulations which discouraged the bringing up of young calves. Thus, the licence holders were not permitted to maintain in the licensed premises any number of animals in excess of the number prescribed in the licence or of a description other than that specified in the licence. The number prescribed was naturally such that each animal got a specified area in the stable. According to the Poona Corporation bye-laws, a stable owner had to provide one person to look after every 6 milch animals when they were driven on a public street; so that an extra hand had to be employed if the herd size increased beyond six. There was also a stipulation which compelled the stable owners to install a water meter and to pay the water taxes on the basis of meter readings if the herd size increased beyond 10. It was <sup>argued</sup> agreed by the dairymen that such and similar regulations discouraged the attempts for raising the calves. However, it is difficult to ascertain how far such considerations were really regarded as coming in way of raising cattle. We also do not know whether the high death rate among the calves was a result of deliberate negligence

rather than any of the reasons stated above. It is possible that the calves were starved to death by denying them the mother's milk in order to make maximum profit by selling the last drop of milk. It is also possible that the workers allowed the calves to die of neglect in order to save their work-load. It can also be seen from table 4.16 that the young stock was mostly reared in the city area itself. Thus, only about 5 per cent of the total calves were reared outside the city. All of these were heifers.

Though a few dairies reported that the calves were reared outside the city area, the practice was mainly confined to persons who had migrated to Poona from the adjoining rural areas and who, therefore, had an ancestral piece of land at their native place which was looked after by their relatives. Such persons were able to entrust the calves with their relatives in the rural areas for rearing purposes at no or little cost. Calves were also entrusted to some farmers or itinerant cattle breeders in the neighbouring villages. The parties usually entered in a contract by which fifty per cent of the total heifers entrusted became the property of the breeders or farmers while the remaining fifty per cent were returned to the owner. Another form of the same agreement was one under which the owner paid fifty per cent of the market price of a heifer to the breeder.

Besides these, there were also a few farmers in the

adjoining villages who undertook rearing of calves in consideration of a monthly charge which varied according to the age of the calf and season. Some data are presented in table 4.19 in respect of the cost of rearing on such farms. The data were obtained from the farmer who maintained a dry stock salvaging farm mentioned earlier. The calves were sent to this farm after they were about an year old or so. It can be seen from the table that the charges paid to the farmer during the period of rearing (which was nearly four years) amounted to Rs.500 to Rs.600 per heifer. No attempt

Table 4.19 : Case-study data in respect of the cost of rearing of calves on a farm.

Birth date	Calves No.	Annual cost for the year							Total
		1952	1953	1954	1955	1956	1957	1958	
-	(1)	20	75	136	199	127	-	-	557
-	(2)	20	75	136	199	197	-	-	627
10.2.54	(3)	-	-	18	62	106	175	120	481
10.2.54	(4)	-	-	18	62	106	175	120	481
3.10.53	(5)	-	-	18	62	137	80	-	297

at calculation of the total cost of rearing can be made because of the paucity or non-availability of the requisite data. For example, the milk consumed by the calves during the first year was not available. It can be, however, realised that if all the expenses from birth to maturity are taken into account, the cost of a buffalo would exceed the average market price, since the cost mentioned above is already approximately close to the market price of an



average buffalo.

Breeding practices : Rearing was thus not sufficient to meet the replacement requirements, nor was it practised with a view to build a high producing herd. Most of the dairies depended on hired bull services. Thus, ownership of a herd bull was reported by only 28 per cent of the establishments in the sample. Very few dairymen among the sample reported breeding by artificial insemination.

It was believed that artificial insemination generally failed. Besides, artificial insemination entailed upon the dairymen certain added responsibilities as watching the breeding schedule, taking the animal to the insemination centre, keeping the animals stanchioned, etc. One important difficulty in this respect was that of being unable to catch the animal soon enough when it was in heat. This difficulty was experienced especially by the large-scale operators who depended on the hired labour. This difficulty was aggravated, furthermore, by the lack of insemination facilities on a sufficient scale. There were only two centres where the dairymen could get their animals artificially inseminated and these were for most of the operators, situated far away from their stables. The dairymen, therefore, preferred the services of a bull, mostly borrowed from a neighbouring stable for a service charge varying between Rs.3 and Rs.5.

Those who had maintained their own bull were not

Table 4.20 : Estimated number of purchased and farm-bred bulls (buffalo).

Size group	Farm-bred		Purchased		Total estimates	Per 100 buffaloes
	sample	estimates	sample	estimates		
Up to 5	1	35	-	-	35	2.56
6 - 10	1	16	-	-	16	1.49
11 - 15	1	7	2	13	20	3.37
16 - 20	-	-	2	17	17	2.94
21 & above	4	9	2	5	14	1.80
T o t a l	7	67	6	35	102	2.35

particular about the breed of the bull. Many of such bulls were farm-bred. Table 4.20, given above, brings out the distribution of the estimated number of herd bulls according to whether they were purchased or farm-bred. Thus, nearly 69 per cent of the breeding bulls were farm-bred. The breed in such cases was often a mixture of the local and the imported variety. The breeds in case of the purchased bulls were Delhi, Surati and Varhadi. The majority of them belonged to Delhi breed but it is doubtful whether they were of pure breed since none had imported them directly from the breeding tracts.

The table also brings out the number of breeding bulls per 100 buffaloes, which came to about two bulls per 100 buffaloes in the city. On an average, a herd of 20 to 30 buffaloes required the services of one bull. Judging from this rough estimate, the estimated number of breeding bulls

in the city seems to be inadequate. However, since most of the buffaloes were maintained for a period of one lactation only, the dairymen were generally not interested in getting their buffaloes covered by a bull. Moreover, there was an advantage in not getting the buffaloes covered at the proper time since conception shortens the period of lactation. It was noted earlier (table 4.4) that about 1300 buffaloes in the city herd were in-calf. If that represents the number of buffaloes which required the services of the breeding bull, then the estimated number of herd bulls in the city seems to be more than adequate.

(3) Salvaging Practices : Salvaging of the dry stock was one important problem faced by the dairy operators in Poona. In fact, the high rate of turnover of milch animals noted above is explained by the paucity of the facilities for maintaining the dry stock. Information collected through the questionnaire regarding the facilities which the dairymen possessed for the maintenance of dry stock revealed that most of the dry animals were maintained in the city stables. Thus out of the total estimated dry stock in the city, nearly 94 per cent was maintained in the city itself. The remaining 6 per cent of the dry stock was maintained outside the city.

Those who salvaged their dry stock outside the city usually entrusted their animals with the farmers in the

neighbouring villages. There were two types of agreements which were entered into by the parties concerned. Under one of them, the dairymen paid a fixed monthly payment to the farmer. Usually the charges varied according to the season. Thus the charges were higher in the summer when the fodder prices were high and lower in the monsoon period when fodder was available in plenty. These charges generally included the cost of labour, the cost of supervision, the cost of fodder and feed, etc. In some cases the cost of feed was not included in the monthly charge and the dairyman concerned had to bear it, in addition to the fixed charges. Over and above these expenses, the dairyman also had to incur the cost of transportation, veterinary and other sundry expenses. The monthly fixed charges under such an agreement varied between Rs.20 and Rs.30 per month per dry animal.

Some data in respect of the cost of dry stock maintenance were available from the case-studies. Table 4.21 presents the relevant data in respect of dairies C, D, F, G, and H during 1956, 1957, and 1958. It must be mentioned here that the expenditure on dry stock as mentioned in the table does not really give a complete expenditure made on the maintenance of all the dry stock. It includes only the expenditure incurred on the dry animals which were maintained on a salvage farm outside the city. Besides the dry animals maintained on such farm, a few dry animals were also maintained in the stable itself (especially those which

Table 4.21 : Case-study data relating to the cost of salvaging dry stock during 1956, 1957 and 1958

Year & Dairy	Number of dry stock salvaged	Total expenditure on salvaging	Average salvaging cost per animal
<u>1956</u>			
C	-	-	-
D	3	1411.12	470
F	6	2609.80	435
G	9	4474.50	497
H	5	2417.37	483
Total	23	10912.79	474
<u>1957</u>			
C	2	310.00	155
D	5	1600.21	320
F	7	3462.11	495
G	10	5000.00	500
H	5	1613.11	323
Total	29	11985.43	413
<u>1958</u>			
C	3	365.00	122
D	5	1137.71	228
F	8	3895.98	487
G	10	4967.42	497
H	8	2730.01	341
Total	34	13096.12	385

were in advance stages of gestation or those which needed personal supervision). Since a separate account of expenditure on their maintenance was not available with the dairy owners, only the payment made to the salvage farm owner, together with the expenditure incurred on the concentrates fed to the dry stock has been considered. It is clear from the table that the average salvaging cost per dry animal ranged between Rs.380 and Rs.475. The dry animals

were usually sent to this salvaging farm when they ceased yielding milk and were brought in the stable just before they were due to freshen. The expenditure mentioned in table 4.21 covers the expenditure during this period. It can be seen from the table that there were considerable variations in the average cost of salvaging as from one dairy to another. This was mainly because of the type of arrangement made and the length of the dry period. Dairy C had a different type of arrangement than in the rest of the cases. The dry animals in this case were entrusted to some cattle breeders in the neighbouring villages at the rate of about Rs.25 per month per dry animal, inclusive of all expenses. The rest of the operators, as was noted above, had maintained their dry animals on a salvage farm operated by a farmer near Poona. The rate charged by the farmer varied between Rs.18 and Rs.25 per month, per animal. In addition to these charges, the dairymen had to bear the expenditure on concentrates amounting to Rs.15 to Rs.20 per month per animal.

Under the second type of agreement, the dry animal was entrusted with a farmer under the condition that the animal would be returned to the owner either at the time of or soon after calving for half the price that the animal would fetch in the market. In effect, the dairyman paid 50 per cent of the price that the animal would fetch after freshening as the dry stock maintenance charges. The

dairyman, however, had the option of rejecting the animal in which case the animal was actually sold in the market and the proceeds shared equally by both the parties.

As has been mentioned above, estimates from the sample show that only 46 or 6 per cent of the dry stock in the city herd was maintained outside the city. This, however, seems to be an underestimation since it was noticed during the course of the case-studies that there was one dry stock depot near Poona where alone about 100 to 125 buffaloes from the city were usually maintained for salvaging. In addition to this dry stock depot there were a number of farmers in the neighbouring villages who were entrusted with the job of salvaging dry animals. In the light of these facts, it can be assumed that about 10 to 15 per cent of the dry stock was usually maintained outside. One reason for the underestimation in the above respect may be that many of the transactions by which the buffaloes were entrusted with the farmers in the villages assumed the form of conditional sale, i.e. the dry buffaloes were actually sold to the farmers on the condition that they would be sold back to the dairyman after freshening. Since such buffaloes were regarded as sold they were not reported as a part of the herd by the respondents. Notwithstanding these limitations of the data it can be broadly stated that salvaging of the dry stock was mainly undertaken within the city.

Information was collected regarding the salvaging

facilities available to the dairymen within the city. As has been mentioned earlier, the Corporation limits extended to the surrounding few villages. Those dairymen in the sample whose stables were located in the suburban areas mostly were engaged in agriculture and, therefore, could salvage their dry stock on their farms. There were a few large-scale operators in the sample who had leased in some grazing area on the outskirts of the city and had maintained a separate establishment of their own for salvaging of the dry stock. The rest of the dairymen salvaged their animals in the premises of the city stables. Thus nearly 74 per cent of the total dry stock were maintained in the city stables, about 16 per cent was maintained on agricultural farms in the suburban areas and the remaining 10 per cent were maintained on the land leased-in for that purpose.

Table 4.22 : Facilities available to the dry stock maintained in the city.

Size group	Maintained on agricultural farms in suburban area		Maintained on leased-in land		Maintained in the city stables		Total
	Sample	Estimates	Sample	Estimates	Sample	Estimates	
Up to 5	1	35	-	-	4	138	173
6 - 10	1	16	-	-	11	174	190
11 - 15	2	13	-	-	18	118	131
16 - 20	4	34	-	-	1	8	42
21 & above	10	23	31	72	45	104	199
Total		121		72		542	735



Table 4.22 summarizes the data in this respect.

It was noted so far that about 2213 animals were purchased annually, about 173 were reared and about 780 were salvaged from the dry stock. Total replacements, therefore, amounted to about 3160 animals out of which about 2380 were by fresh additions to the stock.

4) Out-going stock : The annual incoming stock, i.e. purchased and reared, estimated above was approximately matched by the out-going stock on account of sales and deaths.

(a) Sales : As in the case of purchases, detailed information was also sought in respect of the stock that was disposed of during the period of one year prior to the data of visit. The estimates regarding the buffaloes sold from the city stock, together with the average sale price obtained are presented in table 4.23. It may be noted that the total

Table 4.23 : Estimates regarding the sale of buffaloes and the average price obtained in different size groups.

Size group	Sample data		Estimates		Average price (Rs.)
	Number sold	Total receipts (Rs.)	Sales (No.)	Receipts (Rs.)	
Up to 5	28	3600	968	12442	129
6 - 10	42	6974	664	110276	166
11 - 15	27	5100	176	33225	189
16 - 20	32	5800	269	48755	181
21 & above	71	16700	164	38585	235
TOTAL for the city herd			2241	355283	158

annual sales amounted to about 2241 buffaloes. This table also brings out an association between sale price obtained and the size group. Thus, as in the case of the purchase price, in the case of the sale price also higher sale price was associated with large herd size.

In case of the individual dairies the average sale price ranged from Rs.42 in the minimum to Rs.716 in the maximum. The majority of the dairies had, however, received an average sale price between 100 and 250 rupees per dry animal. The estimated average sale price amounted to Rs.158. A dry buffalo which was in-calf generally fetched a higher price than the one which was not in-calf. Thus, the average sales price as reported by the respondents was Rs.224 and Rs.154 respectively for buffaloes belonging to imported breeds and the indigenous breeds that were in-calf, whereas it was Rs.183 and Rs.124 respectively for the imported and the local breeds that were not in-calf (table 4.24).

It can also be noted from table 4.24 that out of the total annual sales, only 23 per cent consisted of the buffaloes that were in-calf. The rest were the buffaloes not in-calf. As was observed earlier, this was due to the practice of maintaining a buffalo for a period of one lactation only. Since the dairymen did not intend to keep the buffaloes for another lactation, they naturally were not particular about getting the animals covered at the proper time. On the

**Table 4.24 :** Average sale price obtained for buffaloes in-calf and for those not in-calf.

Size group	Imported Breeds						Local Breeds					
	In-calf			Not in-calf			In-calf			Not in-calf		
	Num-ber	Recei-pts (Rs)	Average price (Rs)	Num-ber	Recei-pts (Rs)	Average price (Rs)	Num-ber	Recei-pts (Rs)	Average price (Rs)	Num-ber	Recei-pts (Rs)	Average price (Rs)
Up to 5	4	850	212	3	395	132	5	775	155	16	1580	99
6 - 10	6	1250	208	17	3030	178	1	150	150	18	2544	141
11 - 15	6	1290	215	16	3060	191	2	300	150	3	450	150
16 - 20	-	-	-	10	2000	200	-	-	-	22	3800	173
21 & above	19	5825	306	52	10875	209	-	-	-	-	-	-
Estimates	316	70991	225	681	123424	181	202	31165	154	1042	129703	124

contrary, there was an obvious advantage in postponing the next lactation. Table 4.25 presents the data showing the proportion of those buffaloes in the total sales that were maintained for the period of one lactation only.

Table 4.25 : Number of lactations given by the buffaloes sold.

Size group	One lactation		More than one lactations		Total sold
	Sample	Estimates	Sample	Estimates	
Up to 5	22	760	6	208	968
6 - 10	31	490	11	173	663
11 - 15	26	170	1	7	177
16 - 20	32	269	-	-	269
21 & above	13	30	58	134	164
T o t a l		1719		522	2241

The above table shows that 77 per cent of the total buffaloes sold had completed one lactation only whereas the rest had done more than one lactations before sale. It may be mentioned here that data, in this respect, in case of the large-scale dairies in the last size groups were not available. Data were also not available in respect of two dairies in the other size groups. In the case of these dairies, the data obtained from the rest of the dairies in the size groups to which they belonged were utilized for obtaining the break up of animals sold into those maintained for one lactation only and those maintained for more than one lactations. In the case of the large-scale dairies,

however, the proportion obtained from the case-study data was utilized for splitting the sales figures into the above two classes. The case-study data are presented in table 4.26.

Table 4.26 : Number of lactations for which buffaloes were maintained before sale.  
(Case-study data : 1957-58)

<u>Dairy</u>	<u>Lactations</u>		<u>Total</u>
	<u>One</u>	<u>More than one</u>	
B	1	8	9
E	3	8	11
D	2	3	5
F	-	7	7
G	1	9	10
H	2	4	6
Total	9	39	48
Proportion of the total	19%	81%	100%

Reasons for sale : The reported reasons for the sale of buffaloes were usually (1) that the operators could not afford to lock up their capital in dry stock on which there were no returns during the dry period; (2) there was not enough space to accommodate both the milking and dry animals; (3) dry period was often too lengthy so that salvaging became unprofitable. It was thus essentially the problem of non-availability of capital and facilities for maintaining dry stock on adequate scale. Table 4.27 gives the distribution by reasons for sale of the buffaloes sold by the

Table 4.27 : Reported reasons for sale of buffaloes.

Reason.	Size group					Total
	Up to 5	6-10	11-15	16-20	21 & above	
Low yield	-	2	3	2	-	7
Physical defect	-	-	2	-	-	2
Lengthy dry period	-	1	1	-	-	2
Unsuitable calving period	-	-	5	-	-	5
Dry	-	21	25	25	14	85
Other reasons	-	4	1	-	18	23
Unspecified	-	-	5	-	71	76
T o t a l	-	28	42	27	32	200

sampled dairies. Estimates from the sample data are not dealt with since the relevant information was not available from the dairies in the last size group neither was any information available from the case-studies. But since, as was not earlier, the large size dairies mostly salvaged their dry stock it may be assumed that most of the buffaloes sold by them were disposed of not merely because they were dry but for some other reason as low yield, lengthy dry period, etc. It can be noted from the table that most of the buffaloes sold by the dairies in the remaining size groups were disposed of only because they were dry, i.e. because they lacked the resources for salvaging the dry stock.

(b) Deaths : As estimated from table 4.28, the number of buffaloes which annually die amounted to about 3.0 per 100 buffaloes. Table 4.29 presents the case-study data. The data refer to dairy 'A' in which case the relevant data

Table 4.28 : Number of deaths as estimated from the sample data.

<u>Size group</u>	<u>Sample</u>	<u>Estimates</u>	<u>Deaths per 100 buffaloes</u>
Up to 5	-	-	
6 - 10	5	79	
11 - 15	-	-	
16 - 20	2	17	
21 & above	15	35	
T o t a l	22	131	3.0

Table 4.29 : Case-study data showing number of deaths over a period of 10 years.

<u>Year</u>	<u>Dairy 'A'</u>	
	<u>Average herd size</u>	<u>Deaths</u>
1944	54	-
1945	39	5
1946	36	4
1947	38	2
1948	44	2
1949	51	-
1950	51	-
1951	36	1
1952	35	3
1953	37	2
1954	41	1
1955	44	3
Total	506	23

for a period of 10 years were available. The death rate in this case also comes close to the sample estimates, i.e. about 4.6 deaths per 100 buffaloes.

Total deaths thus amounted to about 130 heads per year.

One important reason for such a low incidence of deaths was the high rate of turnover. As was noted earlier, most of the buffaloes were maintained only for the period of one lactation after which they were replaced by fresh stock. Secondly, the dairymen tried to dispose of an animal as soon as it became unserviceable due to disease or old age so as to recover the maximum salvage value.

We have thus seen that out of the total buffaloes replaced annually, about 2240 were replaced on account of sales and about 130 were replaced on account of deaths. The total out-going stock thus amounted to about 2370, a figure very close to the figure obtained in respect of the incoming stock. Broadly, therefore, the total herd in Poona remained constant at least during a short period. This was also noted in the preceding chapter where the official data for 1957 and the survey data were compared in respect of the average size of the herd.

What happens to the 2240 buffaloes that are annually sold out? Questions were asked in the questionnaire regarding the agencies to which the drystock was sold. A great deal of bias was shown by the respondents in answering the question since they were reluctant to admit that some of the animals were sold to a butcher. Some data were obtained from the Poona Corporation office regarding the number of cattle that was annually slaughtered. Table 4.30 summarizes



Table 4.30 : Number of cattle annually slaughtered in Poona.

Month	Y e a r s			
	1955-56	1956-57	1957-58	1958-59
April to July	592	809	834	950
August to November	726	971	869	866
December to March	1048	1032	1280	1227
T o t a l	2366	2812	1983	3043

the relevent data. Since the figures also include the cattle other than the buffaloes and buffaloes brought in from the surrounding villages, it is difficult to estimate the number that is annually slaughtered out of the buffaloes sold as dry stock by the city dairymen.

It was estimated above that annual purchases of buffaloes from the stock in the local markets amounted to about 1100 to 1200. It is likely that some of these included the buffaloes that were reared up by the farmers in the villages and sold to the city dairymen. It is also likely that some of this stock came from the dry stock which was originally sold out by the city dairymen since it was generally reported that the dry stock was sold to the villagers. There was thus an outflow of the dry animals from the city and an inflow of freshened animals in the city from the rural areas. Since, however, the local purchases amounted to about 1100 to 1200 buffaloes and the sales amounted to 2240 buffaloes it is clear that 50 per cent of the animals sold were

withdrawn from the city dairies due to slaughter or due to their retention by the farmers in the rural areas for their own use.

#### 4.4 Practices in respect of Cows

As mentioned earlier, cows were of minor importance in the dairy business. The information obtained in respect of the herd management practices was also very scanty since the cow herds were very small. However, the available data are presented in this section in order to note certain peculiarities in respect of cow herds.

Table 4.31 : Data showing the number of cows in milk and dry.

Size group	Number in sample data		Number in the source list	Estimated number of	
	Total	Milk-ers		Milkers	Dry cows
Up to 5	9	7	218	170	48
6 - 10	19	13	144	99	45
11 - 15	14	11	50	39	11
16 - 20	4	2	49	24	25
21 & above	22	13	108	64	44
T o t a l	68	46	569	396	173

Table 4.31 presents the data showing the number of cows in milk as well as those which were dry in different size groups. Out of the total cow herd in the city, the estimated number of milkers amounted to about 70 per cent. The remaining were dry cows. It may also be noted here that the proportion of the dry cows in the herds did not have any

relationship with the size groups. Thus the proportion of the dry cows was 22 ~~per cent~~ in the first size group whereas it was higher in the second size group. This proportion was still higher in the fourth size group but decreased in the last size group. It may, therefore, be noted that the replacement practices in the case of cows were entirely different from those which were noted in the case of the buffaloes. Cows, mainly for the religious and sentimental reasons, were not disposed of after the end of the lactation period but were usually maintained until they met their natural death. This is brought out by table 4.32 which shows the distribution of the total cows according to the number of years kept in the stable. It can be seen that about 53 per cent of the total herd was maintained for a period longer than four years. Stock currently added to the herd amounted to about 7 per cent of the total herd.

Table 4.32 : Distribution of the cow herd according to the length of period kept in the stable.

Size group	Period of maintenance (years)					Total
	Less than one	Between one and two	Between two and three	Between three & four	More than four	
Up to 5	1	1	1	2	4	9
6 - 10	-	-	1	6	12	19
11 - 15	2	-	2	2	8	14
16 - 20	-	-	1	2	1	4
21 & above	2	1	-	5	14	22
Estimates	41	29	51	149	299	569
Percentage	7.2	5.1	9.0	26.2	52.5	100.0

Most of these additions were from rearing. Thus, out of the total herd of 68 cows in the sample, only one was purchased and four were transferred to the herd from the reared up stock during the year prior to the data of visit.

The predominance of home-bred stock is also noticeable from the data showing the total number of home-bred stock in the present herd. This data are presented in table 4.33. It can be seen that about 61 per cent of the present stock consisted of home-bred stock.

Table 4.33 : Number of home-bred cows in the total herd.

Size group	Sample data		Estimates
	Total number of cows	Number of reared up cows	
Up to 5	9	6	145
6 - 10	19	10	76
11 - 15	14	11	39
16 - 20	4	2	24
21 & above	22	13	64
Total cow herd	569		348

Sales were not reported but since, as was noted elsewhere, the proportion of cows in the total herd was stable and also, since the size of the total buffalo herd was being maintained (as was noted in the preceding section) we have reason to believe that sales and deaths in the cow herd did correspond to annual additions to the stock.

## Chapter V

### HERD MANAGEMENT- II

#### Production Characteristics and Feeding Practices.

The present chapter deals with milk yields and feeding practices which can be considered as the most important aspects of the dairy business. Milk yields are important because incomes in the dairy industry are derived mainly from the sale of milk. The importance of the feeding practices can be realized when it is remembered that, next to the inherent capacity of the milch animal, production of milk is mainly the result of feed inputs. As in the case of the previous Chapter, data for the buffalo herds and those for the cow herds are considered separately.

#### 5.1 Milk yields : Buffaloes

Table 5.1 presents the data in respect of the total and average yields per day for the imported and indigenous breeds according to different size groups. It can be seen from this table that the yields varied markedly with the size of the herd. The larger size groups had generally reported higher average yields per buffalo per day. Thus the average yield varied between 3.80 seers per day in the first size group and 6.00 seers per day in the last size group. The overall average milk yield <sup>came to 3.97 seers per day and that</sup> per buffaloes in milk came to 4.84 seers per day.

Table 5.1 : Total and average yields per day for the imported and indigenous breeds in the different size groups.

Size group	Imported Breeds			Indigenous Breeds			T o t a l		
	No. of milkers	Yield (seers)	Average yield (seers)	No. of milkers	Yield (seers)	Average yield (seers)	No. of milkers	Yield (seers)	Average yield (seers)
Up to 5	14	73.00	5.21	20	56.25	2.81	34	129.25	3.80
6 - 10	29	169.50	5.84	26	109.50	4.21	55	279.00	5.07
11 - 15	52	254.25	4.89	17	73.75	4.34	69	328.00	4.75
16 - 20	49	305.00	6.22	14	56.00	4.00	63	361.00	5.73
21 & above	227	1364.00	6.00	-	-	-	227	1364.00	6.00
Estimates	2220	12580.00	5.66	1329	4615.00	3.47	3549	17195.00	4.84
						TOTAL HERD	4330	OVERALL AV. YIELD	3.97

Table 5.2 : Milk yields (in seers) : Case-study data

Dairy	1956					1957					1958				
	Dairy herd	Milk-ing herd	Yield for the year	Per day average yield Milk- Over-ers all		Dairy herd	Milk-ing herd	Yield for the year	Per day average yield Milk- Over-ers all		Dairy herd	Milk-ing herd	Yield for the year	Per day average yield Milk- Over-ers all	
A	70	43	106210	6.77	4.15	75	50	113351	6.22	4.14	75	50	124030	6.80	4.53
B	26	19	40001	5.79	4.23	29	20	41287	5.65	4.00	-	-	-	-	-
C	-	-	-	-	-	6	4	9924	6.75	4.50	7	4	8420	6.00	3.28
D	15	12	28895	6.58	5.26	20	15	35227	6.46	4.85	20	15	37495	6.86	5.15
E	-	-	-	-	-	46	32	49306	4.20	2.93	41	27	52850	5.37	3.53
F	35	29	68132	6.45	5.34	34	26	68247	7.19	5.50	34	25	67921	7.44	5.47
G	35	24	63993	7.29	5.00	35	25	58754	6.44	4.60	35	23	53664	6.39	4.20
H	22	17	46723	7.53	5.81	26	21	51158	6.66	5.38	31	23	57854	6.91	5.12
I	-	-	-	-	-	-	-	-	-	-	13	10	24096	6.60	5.07
J	-	-	-	-	-	7	4	9730	6.66	3.81	-	-	-	-	-
Total	203	144	253954	6.73	4.79	278	207	436984	5.78	4.31	256	177	426330	6.60	4.56

In addition to the sample survey data, case-study data were also available in respect of the milk yields. Table 5.2 presents the relevant data for the period of three years from 1956 to 1958. It may be noted in this connection that the yields as referred to in the table include buffalo as well as cow milk. The averages given also refer to the total dairy herd since separate data for cows were not available. Still, however, the average yield per day per milch animal was comparatively higher in the case-study dairies than in the sample dairies. Only the yields in the largest size group in the sample came somewhat closer to the yields in the case-study dairies.

(a) Variations in yield : The important factors which influence the yield of a milch animal are the breed of the animal, stage of lactation, seasonal variations and the feeding practices.

As was noted in the preceding Chapter, the larger units had mainly maintained imported herds whereas the smaller herds consisted predominantly of indigenous breeds. The association between the high yields and the larger size groups may, therefore, be explained by the higher yielding capacity of the imported herds. Table 5.1 referred to earlier also gives the data in respect of the yields of these two categories of breeds. It can be seen that the yields in respect of the imported breeds were higher than



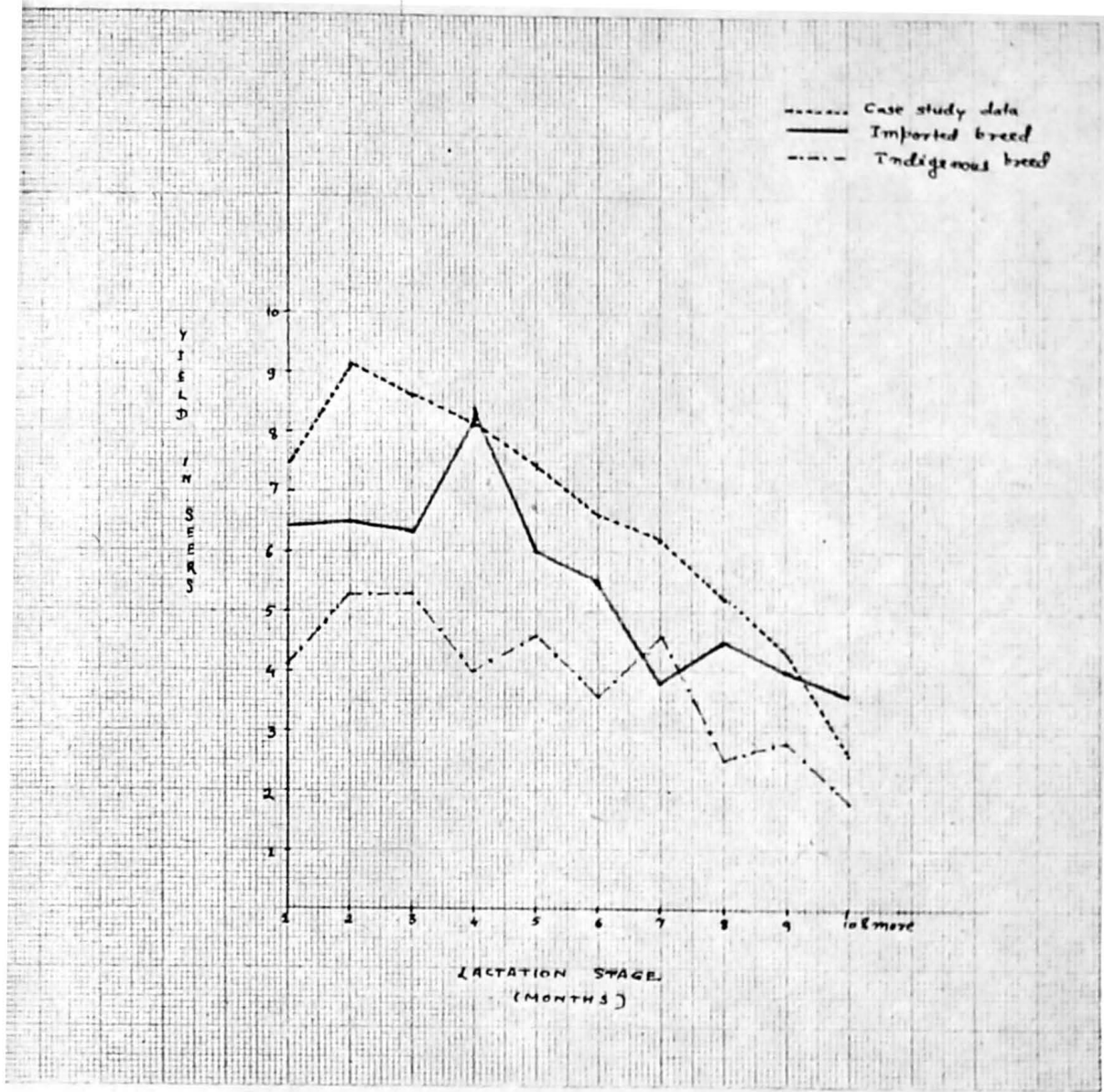
those for the indigenous breeds irrespective of the size of the herd. The average yield for the imported breed came to 5.66 seers per day and the variation in this respect as between the size groups was from 4.89 seers in the minimum to 6.22 in the maximum. The average yield for the indigenous breed came to 3.47 seers per day and the variation in this average as between the various size groups ranged from 2.81 seers in the minimum to 4.34 in the maximum. Two points emerge from this data: (1) that the imported breeds were good yielders and the larger herds had obtained higher yields because of better quality of the breed maintained in them; (2) that, even among the buffaloes of the same breed, yield varied with the size of the herd and this can only be attributed to differences in management practices such as feed inputs. This point is considered in a following section.

It was stated above that yields are also influenced by the lactational stage. Table 5.3 gives the distribution of the buffaloes according to lactation stage separately for the two main categories of breeds, i.e., for imported and indigenous breeds, and also the average yield for the two breeds in the various lactation stages. Out of the 444 buffaloes that were in milk, detailed information regarding the date of calving, breed and lactation stage was available only in respect of 189 buffaloes. Among these 189, as many as 119 belonged to the superior breed whereas the rest were of local breed. In order to bring out the range in the

**Table 5.3 :** Variation in yield according to the stage of lactation.

Lactation stage (Month)	Imported Breed			Local Breed		
	No.	Yield (seers)	Average yield (seers)	No.	Yield (seers)	Average yield (seers)
1st	8	51.00	6.4	5	20.50	4.1
2nd	15	97.50	6.5	13	69.00	5.3
3rd	15	94.50	6.3	7	37.00	5.3
4th	16	135.00	8.4	9	36.00	4.0
5th	17	102.75	6.0	9	37.25	4.6
6th	18	99.00	5.5	10	36.50	3.6
7th	7	27.00	3.8	2	9.25	4.6
8th	8	36.00	4.5	3	7.00	2.5
9th	4	16.00	4.0	3	8.50	2.8
10th and more than ten	11	39.50	3.6	9	16.00	1.8
Lactational yield		1758			1212	

variations in the yield at different lactation stages the relevant data are plotted on a chart (figure No.2) which gives the lactation curves separately for the two categories of breeds. Some case-study data presented in this respect in table 5.4 are also shown on the chart but these relate only to the imported breeds. It can be seen from this chart that the yield increased after the first month of lactation, maintained its high level during the next two or three months and then gradually decreased in the successive stages. It may also be noted that the average yield at almost all lactational stages was lower among the local than among the imported breeds. The lactational curve based on the case-study data was at all stages higher than the one based on the sample



**Figure 2 :** Lactation curves for the Imported and Indigenous breeds.

Table 5.4 : Case-study data showing the lactation yields in respect of ten imported buffaloes. (Quantities in seers)

Lactation stage (Month)	B u f f a l o e s											Average yield per head per day
	No.1	No.2	No.3	No.4	No.5	No.6	No.7	No.8	No.9	No.10	Total	
1st	201	192	110	147	269	228	265	324	265	245	2246	7.5
2nd	240	290	234	215	353	219	326	337	231	273	2718	9.1
3rd	254	297	188	222	317	204	332	294	215	259	2582	8.6
4th	215	279	210	206	292	185	336	287	195	209	2414	8.1
5th	190	220	192	210	244	185	329	280	170	211	2231	7.4
6th	194	216	190	191	213	180	273	184	163	184	1988	6.6
7th	155	182	178	191	229	138	276	185	152	164	1850	6.2
8th	142	168	167	189	179	125	226	170	133	48	1547	5.2
9th	131	73	165	115	140	53	210	137	137	-	1161	4.3
10th	93	-	103	80	112	-	188	83	-	-	659	3.7)
11th	-	-	8	14	92	-	117	-	-	-	231	1.9) 2.6
12th	-	-	-	-	45	-	16	-	-	-	61	1.0)
Total Lactation yield	1815	1917	1745	1780	2485	1517	2894	2281	1661	1593	19688	

data in respect of the imported breeds.

It was possible to arrive at an estimate regarding the total lactational yields in respect of the two categories of breeds on the basis of the lactation curves mentioned above. The average daily yield in each lactation stage was multiplied by thirty and the products were added to give the total lactational yields shown in table 5.3. The data in table 5.4 were derived from the records of a dairyman in Poona who had kept a record of the daily yields. The data relate to the lactational yields of ten North Indian buffaloes. The variations in the ten cases are worth noting. Thus the lactational yields varied from 1593 seers to 2894 seers in the ten cases mentioned in the table. Estimates, in this respect, on the basis of the available sample data came to 1758 seers in case of the imported breeds and 1212 seers in case of the local breeds.

There was a close relationship between seasonality in production of milk and the lactation curve. It was noted in the preceding Chapter that calvings were more or less concentrated during the five months from June to October. The corresponding period of peak production was, therefore, from July to December. However, it was noted that the dairy operators tried to balance the production of milk by timing the sale or purchase of buffaloes with the period of deficient or surplus production. This is also brought

Table 5.5 : Case-study data showing seasonality in milk production.  
(Quantities in seers)

Dairy	1 9 5 7				Total
	January to March	April to June	July to September	October to December	
A	24465	27362	31338	30186	113351
B	10796	10974	7119	12398	41287
C	2234	2527	2676	2487	9924
D	7100	7086	9347	11694	35227
E	10672	9794	12322	14403	47191
F	17390	14950	19090	16817	68247
G	13271	14744	15615	15124	58754
H	10745	12362	14733	13318	51158
All Dairies	96673	99799	112240	116427	425139
	22.74%	23.48%	26.40%	27.38%	100.00%

out by table 5.5 which presents the case-study data for 1957 showing the level of production during different seasons. It can be seen that though the production was generally higher during July to December, the variations in the level of production were not so marked, i.e. these were within  $\pm 10$  per cent of the average.

## 5.2 Milk yields : Cows

Table 5.6 presents the data regarding the milk yields in respect of cows. It may be noted that in case of the cow's milk, there was no perceptible trend similar to the one noted in the case of buffalo herds. The average yield was more or less the same for the first four groups though

Table 5.6 : Average yield (in seers) per day per head for cows in the different size groups.

Size group	No. of cows in milk	Yield	Average yield	Estimated Milkers	Estimated yield
Up to 5	7	17.25	2.46	170	418
6 - 10	13	26.00	2.00	99	198
11 - 15	11	28.50	2.59	39	101
16 - 20	2	5.00	2.50	24	60
21 & above	13	52.00	4.00	64	256
Total herd				396	1033
Average yield for cows in milk					2.61
Overall average yield					1.81

there was a marked difference between the average yield in the first four and the last size group. The average yield per cow in milk thus varied between 2 seers and 2.59 seers in the first four size groups whereas it was 4 seers in the last size group. The overall average yield came to 1.81 whereas that for the cows in milk came to 2.61.

### 5.3 Feeding Practices

Information was sought through the questionnaire regarding the feed and fodder inputs given by the sampled dairy operators. Since the operators could not report the annual expenditure on feeds and fodder, data regarding the feed and fodder expenditure incurred on the previous day of the visit or during any period preceding the day of the visit on which the operators could report were taken down. Most

of the small-sized dairy operators purchased their feed and fodder requirements almost daily so that it was easy to collect per day expenditure in respect of these dairies. The larger sized dairies purchased their requirements fortnightly or weekly so that per day expenditure had to be derived from the reported fortnightly or weekly expenditure. Some of the dairies reported renting of pasture lands for grazing purposes. Such pasture lands were rented for the monsoon season and the herd was usually grazed on these lands for three to four months from July onwards. The rent paid was either lump sum or, in case of pastures rented jointly by two or more operators, on the basis of per head of cattle. In either of the cases the expenditure per day could be ascertained after taking into account the period of grazing. As noted earlier, there were some dairies where dairying was pursued as a subsidiary occupation to agriculture. The fodder, in such dairies, was mostly farm produced. In those cases where purchased fodder was fed to the herd, the per day expenditure could be ascertained, but it was very difficult to ascertain the expenditure on fodder where the herd was fed on farm fodder. There were five such dairies where expenditure on fodder could not be estimated and another seven did not report on this matter. In the case of concentrates also nine dairies did not report inputs.

Inputs in respect of feed can be divided into (1) roughages and green fodder; and (2) concentrates. Fodder is an



important part of the ration of the dairy animals since it forms nearly  $\frac{2}{3}$  or more of the total dry matter consumed by them. Generally, 2.0 lb. to 2.5 lb. of dry matter is consumed by cattle per 100 lb. of liveweight.<sup>1/</sup> The milch stock, especially buffaloes, need a little more. Thus a buffalo weighing about 1000 lb. may require about 18 to 20 pounds of roughage quota and about 10 to 12 lb. of concentrate mixture as a daily ration. The data on hand do not enable to judge the adequacy or otherwise of the feeding of roughages followed by the sampled dairies since it is not possible to quantify the roughage inputs. The roughage inputs are, therefore, given only in terms of money value. In the case of concentrates, however, inputs are evaluated in terms of nutritive values and are compared with the accepted feeding standards. The inputs in respect of roughages and concentrates are dealt with separately.

(a) Roughages and green fodder : The expenditure on fodder reported by the 36 units is summarized in table 5.7. This expenditure includes the expenditure incurred on green as well as dry fodder. For calculating the average expenditure per day per head of cattle, only the herd maintained in the stable at the time of the visit has been taken into account. The herd bull and the heifers in the stable have

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<sup>1/</sup> K. C. Sen, The Nutritive Values of Indian Cattle Foods and the Feeding of Animals, Indian Council of Agricultural Research, Bulletin No.25, 1952, p.5.

been regarded as the part of the herd though calves below two years of age have been left out of account.

Table 5.7 : Expenditure on fodder per head, per day, in the various size groups.

Size group	Report- ing units	Total* dairy herd	Expen- diture per day (Rs.)	Average expen- diture (Rs.)	Herd* main- tained in the stable	Esti- mated expen- diture (Rs.)
Up to 5	10	36	40.29	1.12	1763	1973.09
6 - 10	9	76	96.90	1.27	1256	1595.12
11 - 15	7	93	105.75	1.14	655	744.80
16 - 20	4	75	86.00	1.15	637	740.46
21 & above	6	187	184.65	0.99	885	876.15
Total				1.14	5196	5929.62

\* Herd maintained outside and calves in the stable excluded. Heifers and breeding bulls in the stable included. (46 dry buffaloes, 42 cow heifers and 62 buffalo heifers maintained outside and 1334 calves in the stable are excluded.)

It can be seen from table 5.7 that the expenditure on fodder per head per day varied from Rs.0.99 to Rs.1.27, ~~the minimum and the maximum~~, as between different size groups. The average estimated expenditure for the total city herd came to Rs.1.14 per head per day.

There was no marked variation in the expenditure incurred on fodder as between different size groups. Though the expenditure on fodder reported by the dairies in the largest size group was somewhat less than that reported by the dairies in rest of the size groups. It may be mentioned

here that the expenditure per head per day reported by the dairies in the largest size group closely corroborates the data obtained from the case-studies. The relevant data are presented in table 5.8. It may be noted from this table that, barring a few cases, the average expenditure per head per day ranged between Rs.0.75 and Rs.1.00 in the majority of the cases.

Though it is not possible to arrive at the average consumption of fodder in terms of physical quantities on the basis of the survey data, an attempt at a very rough estimate in this respect can be made on the basis of the total fodder imports. The Poona Municipal Corporation levies an octroi duty on the different items of cattle feed and fodder brought into the city. Data regarding the annual fodder imports were, therefore, available with the Octroi Department of the Poona Municipal Corporation. Data were also available regarding the quantities of fodder exported out of the city. Data regarding the production of fodder within the city were, however, not available but can be regarded as insignificant. It is possible to arrive at the consumption of fodder by the city herd by relating the total fodder imports to the total cattle population. Table 5.9 summarizes the data in this respect. It may be noted from this table that the estimated per head per day availability of fodder was about 24 lb. of dry fodder and about 17 lb. of green fodder. It may, however, be mentioned here that

Table 5.8 : Data showing expenditure on fodder per head, per day, during 1956, 1957, and 1958, in some dairies in Poona.

Dairy	1956			1957			1958		
	Total expenditure on fodder (Rs)	Average number of animals	Average expenditure per head per day (Rs)	Total expenditure on fodder (Rs)	Average number of animals	Average expenditure per head per day (Rs)	Total expenditure on fodder (Rs)	Average number of animals	Average expenditure per head per day (Rs)
A	16278.06	45	0.99	16866.72	50	0.92	18047.77	50	0.99
B	7220.89	26	0.76	5472.80	29	0.52	-	-	-
C	-	-	-	1957.73	4	1.34	2016.64	4	1.38
D	3695.61	12	0.84	3941.64	15	0.72	4032.31	15	0.74
E	-	-	-	10766.53	46	0.64	9687.59	41	0.65
F	8928.20	29	0.84	13395.94	27	1.36	12274.36	26	1.29
G	8643.09	27	0.88	7931.48	25	0.77	7566.84	25	0.83
H	6197.13	17	0.87	8575.72	21	1.12	7699.43	23	0.92
I	-	-	-	-	-	-	3712.74	10	1.02
J	-	-	-	1177.62	7	0.46	-	-	-
Total	50962.98	155	0.90	69186.18	227	0.93	65037.58	197	0.90

Table 5.9 : Availability of fodder per head, per day for the total city herd.  
Source : Poona Municipal Corporation Records 1957-58.

Imports during 1957-58	*Quantity (In maunds)	Availability per day (In lb.)	Availability per head for 6100 heads (In lb.)	Per cent of the total
Green grass	2,00,017	44936	7.37	21.52
Hay	1,84,790	41492	6.80	19.87
Dry Jowar stalks	4,59,002	103074	16.89	49.38
Lucerne	25,691	5740	0.94	2.75
Green Maize stalks	60,189	13530	2.21	6.48
T o t a l	9,29,689	208772	34.21	100.00

\* 82 lb. is equal to a Maund.

these figures are derived for 5100 milch animals and the bullocks in the city used for transport purposes, etc., which numbered about 1000. Calves and heifers in the city stables have been left out of account. Also other livestock population such as horses which might have shared in the total fodder supply <sup>is</sup> ~~are~~ left out of consideration. It can, therefore, be observed that the availability of dry and green fodder might have been much less than that indicated above.

It may also be noted from table 5.9 that the bulk of imports constituted of dry fodder. Thus out of the total fodder imports nearly 69 per cent consisted of hay and

jowar grain stalks whereas the remaining 31 per cent consisted of green fodder like grass, lucern and green jowar and maize stalks. In case of the dry fodder also hay formed a very small part.

(b) Concentrates : The items of ration which were generally fed to the dairy herd were Gram-chuni, cotton-seed, oil-cakes and wheat-bran. In addition to these, feeding of gram-husk <sup>and</sup> rice-bran was also reported by some dairies. The ration usually included food adjuncts like salt, jaggery, etc. especially in case of the feeding of freshly calved animals. Cotton-seed was regarded as an important part of the ration since it was believed that it helped to enrich the milk. It was, therefore, an important item in a buffalo's diet as it helped to increase the fat content. Gram-chuni is obtained by husking the gram through the mill and contains small broken grains of split gram. It was considered as very valuable for increasing the flow of milk. Oil-cakes fed to the herd included coconut cake, groundnut cake and cotton-seed cake. However, use of cotton-seed cake was reported by very few operators. Similarly, rice-bran was also reported by very few operators though feeding of wheat-bran was a common practice. The proportion in which these different items of ration were mixed varied from one dairy to another but, generally, gram-chuni, cotton-seed and oil-cakes were regarded as the most essential part of the ration and were used in the equal proportions. Estima-

Table 5.10 : Percentage which quantities of each item of ration bears to the total quantity of concentrates used.

<u>Size group</u>	<u>Cotton-seed</u>	<u>Gram-chuni</u>	<u>Wheat-bran</u>	<u>Oil-cakes</u>	<u>Others</u>	<u>Total (seers)</u>
Up to 5	26.06	22.07	16.23	29.48	6.16	100 = 89.32
6 - 10	25.16	31.30	16.55	26.47	0.52	100 = 192.17
11 - 15	23.54	29.02	12.15	35.29	-	100 = 247.65
16 - 20	22.85	14.17	18.85	20.92	23.20	100 = 284.40
21 & above	26.71	20.09	15.13	36.24	1.83	100 = 821.25
City herd	25.18	23.24	16.07	29.39	6.12	100 = 14043.25

tions from the sample data show that oil-cake was the most important item accounting for about 30 per cent of the total quantity of ration. Cotton-seed and gram-chuni were the next important items each accounting for nearly 25 per cent of the ration. Wheat-bran accounted for about 16 per cent of the total ration whereas the miscellaneous items which included rice-bran, cotton-seed and gram-husk, etc. accounted for the rest of the portion of the total feed. Table 5.10 presents the proportion of the different items of concentrates mixed in the ration in the various size groups. Table 5.11 presents the data obtained from the case-studies indicating the proportionate share of each item of ration in the total ration.

It was noted during the course of the survey that concentrates were mainly given to the milking herd since the quantity and the quality of the milk was determined by





the ration intake. In addition to the milking herd dry cattle maintained in the stable also received some concentrates, especially those which were in the advance stages of gestation. Table 5.12 presents the sample data in respect of concentrate inputs and gives the average inputs per milking animal on the assumption that concentrates were fed only to the milking herd. No distinction is made between a cow and a buffalo since input data was not separately available. Out of the 48 sampled dairies, data regarding the inputs of concentrates were available in case of only 39 dairies. It can be seen from table 5.12 that the quantity of ration fed varied directly with the size of the herd in the sample, i.e. it was higher in the larger size groups and was lower in the smaller size groups. Thus, concentrate intake in the first three size groups was nearly 3 seers per head per day whereas it was about 4 to 5 seers per head per day in the last two groups. The overall average for the city herd came to about 3.5 seers per head per day.

Table 5.13 brings out the inputs of concentrates in terms of value. Here also the same pattern, as noted above, is evidenced, though there was no variation in the value of inputs as between the intermediate groups. In the case of the fourth group especially, the expenditure on concentrates was small as compared to the average quantity of the feed given by the dairies in this group. This was because of

Table 5.12 : Inputs of concentrates (in seers) per day, per animal (in milk) in different size groups.

Size group	No. of units reporting	Concentrates					Total	Number of milking animals	Average per head per day
		Cotton-seed	Gram-chuni	Wheat-bran	Oil-cakes	Others			
Up to 5	12	23.28	19.71	14.50	26.33	5.50	89.32	33	2.71
6 - 10	8	48.35	60.16	31.80	50.86	1.00	192.17	55	3.49
11 - 15	8	58.30	71.86	30.10	87.39	-	247.65	80	3.09
16 - 20	4	65.00	40.30	53.60	59.50	66.00	284.40	65	4.37
21 & above	7	219.33	165.00	124.46	297.66	15.00	821.25	157	5.23
City herd		3533.66	3264.41	2257.82	4127.58	859.78	14043.25	3945	3.56

Table 5.13 : Inputs of concentrates per head, per day in terms of value.

Size group	Concentrates						Milking herd	Average per animal	Average value per seer of the ration
	Cotton-seed Rs.	Chuni Rs.	Bhusa Rs.	Oil-cakes Rs.	Others Rs.	Total Rs.			
Up to 5	7.51	7.27	3.62	7.88	0.41	26.69	33	0.81	0.30
6 - 10	15.28	21.59	7.43	17.78	0.25	62.33	55	1.13	0.32
11 - 15	19.35	30.86	7.55	30.55	-	88.31	80	1.10	0.36
16 - 20	19.25	14.72	12.70	20.35	5.00	72.02	65	1.11	0.25
21 & above	70.23	76.22	31.31	102.42	2.60	282.78	157	1.80	0.34
Estimates	1121.07	1276.64	550.21	1378.96	73.44	4400.32	3945	1.11	-

Table 5.14 : Cost of concentrate inputs per head, per day, during 1956, 1957 and 1958.  
(Case-study data)

Dairy	1956					1957					1958				
	Total quantity (Mds.-Seers)	Total value (Rs.)	No. of animals in the stable	Average expen- diture per day (Rs.)	Average quantity per day (seers)	Total quantity (Mds.-Seers)	Total value (Rs.)	No. of animals in the stable	Average expen- diture per day (Rs.)	Average quantity per day (seers)	Total quantity (Mds.-Seers)	Total value (Rs.)	No. of animals in the stable	Average expen- diture per day (Rs.)	Average quantity per day (seers)
A	2662-14	32353.97	45	1.97	6.56	2590-13	31174.36	50	1.71	5.67	-	38603.89	50	2.11	-
B	-	9998.07	26	1.05	-	771-06	9671.93	29	0.91	2.91	-	-	-	-	-
C	-	-	-	-	-	-	2829.15	4	1.93	-	-	2105.58	4	1.44	-
D	639-21	7344.40	12	1.68	5.83	775-06	8872.76	15	1.62	5.65	658-11	8702.90	15	1.59	4.80
E	-	-	-	-	-	-	12516.88	46	0.74	-	-	11958.07	41	0.80	-
F	1438-19	17691.27	29	1.67	5.43	1424-37	17623.31	27	1.79	5.78	1434-16	19239.21	26	2.03	6.04
G	1366-33	16629.24	27	1.69	5.54	1329-38	17412.65	25	1.90	5.82	1359-06	19986.24	25	2.19	5.95
H	937-23	11078.59	17	1.76	6.04	1214-38	12681.65	21	1.65	6.34	-	9991.39	23	1.19	-
I	-	-	-	-	-	-	-	-	-	-	421-08	5476.80	10	1.50	4.60
J	-	-	-	-	-	-	2982.97	7	1.17	-	-	-	-	-	-
Total for all dairies	-	95095.58	156	1.67	-	-	115765.71	224	1.41	-	-	116064.07	194	1.64	-
	7044.75	-	130	-	5.94	8106.45	-	167	-	5.32	3873.02	-	76	-	5.58

one dairy (out of the four in the group) which reported a large quantity of a cheaper type of ration. Thus, the value of the ration in the rest of the size groups was about 30 to 35 nP. per seer whereas it was only 25 nP. per seer in the fourth group.

The preceding generalisation about the feeding practices followed by the larger herds is also supported by the case-study data presented in table 5.14. This table gives the concentrate inputs both in terms of money value and quantities for a period of three years (1956, 1957 and 1958) in respect of the dairies covered by the case studies. The average quantity of the ration consumed by the herd in these dairies during the period under consideration came to about 5 to 6 seers per head, per day. It may be noted that the herd indicated in the table included all the animals, whether dry or milking, in the stable. It may be remembered that in many of these dairies (excepting B, E and J) the dry stock was maintained on a dry depot farm outside the city so that the herd in the stable consisted of the milking animals only. In the case of the dairies B, E and J all the dry stock was maintained in the stable itself. The average concentrate inputs per head per day obtained in respect of these dairies (i.e. B, E and J) were considerably lower than those obtained in respect of the remaining dairies. The concentrate ration fed to the dry animals was generally fifty per cent of the ration given to the milking herd.

Therefore, the ration given to the milking herd might be a little more than that indicated in the table. It may, however, be noted that the feeding standards as followed by the case-study dairies compare favourably with the feeding standards reported by the sampled dairies in the largest size group.

It would be worthwhile, further, to correlate the feeding practices with the milk flow since it is for this that concentrates are mainly fed. The ration of a dairy animal is supposed to consist of maintenance ration and production ration. "The maintenance ration is that portion of the diet which just enables the animal at rest to carry on the essential processes of life such as breathing and circulation of blood without either gain or loss of weight ....."<sup>1/</sup> Whatever is supplied to the animal over and above the maintenance requirements is assumed to be available for milk production which increases proportionately to the extra ration fed until a limit in milk production is reached. The extra nutrient requirement for milk production varies with the fat content in milk. The limit in milk production is determined by the productive capacity of the dairy animal.<sup>2/</sup>

Now feeds differ in their nutritive values and some

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<sup>1/</sup> K. C. Sen, op.cit., p.4.

<sup>2/</sup> C. E. Bishop & W. D. Toussaint, Introduction to Agricultural Economic Analysis, John Wiley & Sons, Inc., 1953, p.58.

method has to be adopted for expressing the feed values in a common denominator. In the U.S.A. the energy value of a feed is calculated in terms of Total Digestible Nutrients (T.D.N.). Total Digestive Nutrients represent ".... the net digestible portion of the feed available for growth and production. T.D.N. is the common denominator used to express the energy content of carbohydrates, proteins and fats."<sup>1/</sup> In the following discussion the concept of T.D.N. values is used for evaluating the feeding standards followed by the dairy operators in Poona. These are calculated on the basis of the values quoted in "The Nutritive values of Indian cattle foods and the feeding of animals" (I.C.A.R. Bulletin No.25). Appendix II details out the nutritive values of selected items of foodstuffs commonly used by the dairy operators in Poona. So also a table showing the feeding standards both for maintenance and for production purposes is given in ~~the~~ Appendix III.

Tables 5.15 and 5.16 present the quantities of concentrates required for the production of 100 lb as well as 100 seers of milk respectively in case of the sample dairies and the dairies whose case-studies were undertaken. It is assumed that the maintenance requirements of the dairy herd is met by roughages and concentrates are fed only for the

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<sup>1/</sup> Arthur Shultis & G. E. Gordon, Dairy Farm Management in California, California Agricultural Extension Service, College of Agriculture, Circular 156, 1949, p.27.

Table 5.15 : Quantities of different items of ration and their nutritive values per 100 seers of milk produced (Sample data)

Item of ration	Group I		Group II		Group III		Group IV		Group V		City Herd		
	Quantity	T.D.N.	Quantity	T.D.N.	Quantity	T.D.N.	Quantity	T.D.N.	Quantity	T.D.N.	Quantity	Value T.D.N.	
Gram	31.66	23.43	50.56	37.41	40.32	29.84	22.02	16.29	36.22	26.80	35.82	7.00	26.51
Cotton-seed	37.40	29.92	40.62	32.50	32.70	26.16	35.52	28.42	48.16	38.53	38.78	6.15	31.02
Bran	23.30	15.61	26.72	17.90	16.88	11.31	29.28	19.62	27.28	18.28	24.76	3.02	16.59
Coconut-cake	13.06	9.79	19.68	14.76	23.58	17.68	11.20	8.40	45.14	33.85	21.36	7.40	16.02
Groundnut-cake	29.24	20.76	23.06	16.37	25.44	18.06	21.32	15.14	20.20	14.34	23.92		16.98
Gram husk	8.84	4.86	0.84	0.46	-	-	-	-	3.30	1.81	3.28	0.57	1.80
Rice-bran	-	-	-	-	-	-	36.06	20.91	-	-	6.16		3.57
Total	143.50	104.37	161.48	119.40	138.92	103.05	155.40	108.78	180.30	133.61	154.08	24.14	112.49
T.D.N. per 100 lb. of milk	52		59		51		54		66		56		



Table 5.16 : Quantities of different items of ration and their money as well as nutritive values per 100 seers of milk produced (Case-study data for 1957)

Item of ration	Dairy A			Dairy D			Dairy G			Dairy F			Dairy H		
	Quantity (lb.)	Value (Rs.)	T.D.N. values (lb.)	Quantity (lb.)	Value (Rs.)	T.D.N. values (lb.)	Quantity (lb.)	Value (Rs.)	T.D.N. values (lb.)	Quantity (lb.)	Value (Rs.)	T.D.N. values (lb.)	Quantity (lb.)	Value (Rs.)	T.D.N. values (lb.)
Gram	64.00	10.31	47.36	42.40	7.56	31.38	71.20	11.42	52.69	41.60	7.79	30.78	74.40	10.27	55.05
Cotton-seed	45.60	6.81	36.48	40.80	6.33	32.64	47.20	6.92	37.76	45.60	6.98	36.48	43.20	6.29	34.56
Bran	12.00	1.15	8.04	39.20	3.95	26.26	12.80	1.16	8.57	28.00	2.82	18.76	28.00	2.71	18.76
Coconut-cake	33.60	-	25.20	12.00	-	9.00	33.60	-	25.20	36.00	-	27.00	16.00	-	12.00
Groundnut cake	27.20	-	19.31	40.80	-	28.97	16.80	-	11.93	16.00	-	11.36	10.40	-	7.38
Total oil-cakes	60.80	8.19	44.51	52.80	6.25	37.97	50.40	6.80	37.13	52.00	7.26	38.36	26.40	3.27	19.38
Others	-	-	-	-	-	-	-	-	-	-	-	-	18.40	1.27	10.12
Total	182.40	26.46	136.39	175.20	24.14	128.25	181.60	26.30	136.15	167.20	24.84	124.38	190.40	23.81	137.87
Value of ration per T.D.N. pound (in nP.)			19			19			19			20			17
T.D.N. per 100 pounds of milk			68			64			68			62			68

production of milk. It can be seen from table 5.15 that the T.D.N. inputs in the five size groups in the sampled dairies varied between 52 lb. in the minimum and 67 lb. in the maximum, per 100 lb. of milk produced. Excepting the second size group, the T.D.N. inputs in respect of the first four size groups were about 52 lb. to 54 lb. T.D.N. only. The estimated T.D.N. inputs for total milk production in the city came to 56 lb. T.D.N. per 100 lb. of milk. In the case of the dairies in the case studies, the inputs per 100 lb. of milk were 62 lb. to 68 lb. T.D.N. Thus the T.D.N. inputs were very low in respect of the small-sized dairies.

The production ration as detailed out in Appendix III amounts to about 0.51 lb. T.D.N. per pound of milk with 8 per cent fat content. It may be noted that the fat content in the buffalo milk varies between 6 and 12 per cent. Since cow's milk, which contains about 4 to 5 per cent of fat, amounted to only 5 per cent of the total milk produced the fat content of the total milk produced can fairly be assumed to be around 7 to 8 per cent. The smaller size dairies in the sample had given about 0.52 lb. T.D.N. per pound of milk produced. The largest size group in the sample as well as the case-study dairies had given 0.62 to 0.69 lb. T.D.N. per pound of milk produced. Now, it was assumed that all the ration was given only to the milking herd and as a production ration. It is, however, likely that a part of the ration was given to the dry stock, breeding bulls and the

growing heifers maintained in the stable. In that case, the ration available to the herd for production purposes, at least in the case of the small-sized dairies, would have been less than the standard prescribed in the Appendix III. In the case of the larger dairies, however, it seems likely that the feeding standards followed were according to the standard.

(c) Combined Expenditure on feed and fodder : It is now possible to calculate the combined expenditure on feed and fodder on the basis of the available data. The estimated expenditure on fodder was noted in table 5.7. The estimated expenditure on concentrates was also calculated in table 5.13. It may be remembered that in case of concentrates the estimates were based on the assumption that concentrates were given only to the milking herd. The two estimates are merely combined in table 5.17 to arrive at the total feed and fodder expenses from which average expenditure per head of animal is derived. The table also gives the average per milch animal in different size groups. The positive association between the average expenditure on feed and fodder and higher yields may be noted. It can be concluded, therefore, on the basis of the data presented in table 5.17 that dairies in the last two size groups had incurred comparatively greater expenditure on feed and fodder and had obtained higher yields than those in the first three size groups.

Table 5.17 : Average expenditure per head, per day and average yields in different size groups.

Size group	Average expenditure on concentrates per milk-er (Rs.)	No. of milk-ers	Total feed expenditure (Rs.)	Average expenditure on fodder (Rs.)	Herd in the stable	Total expenditure on fodder (Rs.)	Combined feed and fodder expenses (Rs.)	Average per head (Rs.)	Total yield (seers)	Average yield per animal in milk (seers)
Up to 5	0.81	1345	1087.61	1.12	1763	1973.09	3060.70	1.74	4883	3.63
6 - 10	1.13	968	1097.00	1.27	1256	1595.12	2692.12	2.14	4604	4.75
11 - 15	1.10	489	539.57	1.14	655	744.80	1284.37	1.96	2238	4.58
16 - 20	1.11	553	612.90	1.15	637	740.46	1353.36	2.12	3091	5.59
21 & above	1.80	590	1063.24	0.99	885	876.15	1939.39	2.19	3412	5.78
City herd		3945	4400.32		5196	5929.62	10329.94	1.99	18228	4.62

Table 5.18 : Combined average expenditure per head and average yields  
(Case-study data).

Dairy	1956			1957			1958		
	Average feed costs per head (Rs.)	Overall average yield (seers)	Average yield per animal in milk (seers)	Average feed costs per head (Rs.)	Overall average yield (seers)	Average yield per animal in milk (seers)	Average feed costs per head (Rs.)	Overall average yield (seers)	Average yield per animal in milk (seers)
A	2.06	4.15	6.77	1.86	4.14	6.22	2.15	4.53	6.80
B	1.89	4.23	5.79	1.47	4.00	5.65	-	-	-
C	-	-	-	2.33	4.50	6.75	1.76	3.28	6.00
D	2.27	5.26	6.58	1.97	4.85	6.46	1.90	5.15	6.86
E	-	-	-	1.40	2.93	4.20	1.46	3.53	5.37
F	2.29	5.34	6.45	2.79	5.50	7.19	2.86	5.47	7.44
G	2.31	5.00	7.29	2.30	4.60	6.44	2.54	4.20	6.39
H	2.45	5.81	7.23	2.41	5.38	6.66	1.80	5.12	6.91
I	--	--	-	-	-	-	2.36	5.07	6.60
J	-	-	-	1.63	3.81	6.66	-	-	-

Case-study data are presented in table 5.18 to bring out an association between feed costs and yields. It is clear from this table that dairies B and E were the dairies which had normally fed comparatively lower quantities of total feeds and had consistently obtained lower yields both per animal in milk and overall yields. Dairies F and H, for example, had incurred comparatively higher amount on feeds per animal and had also obtained higher average yields per animal. Generally, therefore, the expenditure on feed and milk yields were positively correlated.

It was, thus noted in this Chapter that the large-sized dairies had obtained better yields and the data presented showed that this was because of (1) better quality of breed maintained in the herd; and (2) better management practices in respect of feed.

## Chapter VI

### COST OF PRODUCTION OF MILK IN POONA

The herd management practices ultimately get reflected in the cost of production of milk. An attempt is, therefore, made in the present chapter to calculate the cost of production per unit of milk on the basis of the data presented in the preceding chapters. This will bring into light the degree of efficiency with which the dairies in the different size groups were operating.

It is initially necessary to pin-point the factors that enter into the calculation of the cost of production of milk and to outline the method to be adopted for this purpose.

It is apparent that the factors that enter into the calculation of the cost of milk production vary with the type of dairying that is practised. Dairying as practised in India or even abroad can be classified into two broad categories. (1) Dairy Farming : This is the most common form of dairying practised in the western countries where milch animals are bred with a view to breeding of cattle of better strain and most of the fodder is grown on the dairy land. Usually this type goes with the system of mixed farming. (2) Dry Lot Dairies : This is a type which

is the subject matter of this study. These dairies are divorced from agriculture and fodder and feed are purchased from outside. The herd is a 'flying herd' and dependence is on purchased replacements. In the U.S.A. such dairies are localised mainly around Los Angeles due to peculiar geographical and other circumstances.<sup>1/</sup> In India such dairies are found in any urban part of the country. Even the system of dairying practised by the farmers in the rural areas is essentially of the above type.

#### 6.1 Unit of Study

Due to the differences in the practices mentioned above, determination of the unit of study becomes of primary importance. Generally, there are three methods which can be followed.<sup>2/</sup>

(1) The Cow basis : Here the unit consists of all the milch animals and the herd bull. Calves and heifers are not considered as a part of the herd. Heifers are transferred to the herd after their first calving. The value of calves at birth is credited to milk production though the development of the young ones after birth is considered as a separate business. Every product of the farm used by the producing herd is charged to milk production at its market value

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<sup>1/</sup> Arthur Shultis and G.E.Gordon, Dairy Farm Management in California, California Agricultural Extension Service, College of Agriculture, Berkeley, Circular 156, 1949, p.9.

<sup>2/</sup> G. Severance & E.Johnson, Cost of Producing Milk and Dairy Farm Organisation in Western Washington, State College of Washington, Bulletin No.173, 1922, p.4.



regardless of the cost of production of such products.

(2) Farm Basis : All the expenses incurred for running the entire farm are charged to the milk production and all the receipts other than for milk or its products including all crops sold are subtracted from the total costs of operating the farm to determine the net cost of producing milk.

(3) Herd Basis : Here, it is assumed that the dairy herd is maintained primarily for the production of milk, so that all the expenses incurred for maintaining a dairy stock of all ages is treated as an expense chargeable to milk production. All receipts other than from the sale of milk and its products including the receipts from the sale of young stock are subtracted from the gross costs to determine the net cost. The production of crops is, however, treated as an independent business and all feed and fodder is charged to the dairy at its market value on the farm.

Of the above methods, the 'cow basis' method seems to be the most logical one as it separates the dairy enterprise from the other enterprises on the farm. One advantage of this method is that the profits or losses incurred in other enterprises on the farm do not unnecessarily inflate or deflate the profits made in the dairy enterprise.

It is, however, difficult to adopt this method for the purposes of our study due to the limitations of the data on

hand. Thus it is impossible to separate the cost incurred on rearing of calves because (1) weaning of the calves was not practised so that correct estimate of the milk consumed by the calves cannot be arrived at, and (2) besides the problem of imputing labour and other costs like overhead charges, the amount of fodder and feed consumed by the calves was not separately known.

For the purposes of this study, therefore, the unit of study is the stable comprising the milch animals and the breeding bulls. The calves are also regarded as a part of the herd since they were kept not with a view to rear them up but because they were considered as complementary for the process of milk production. It was a common experience of the dairymen in Poona that the buffaloes either stopped yielding milk altogether or reduced the flow considerably in the absence of the calves. Therefore, milk consumed by the calves does not appear either on the income side or on the expenditure side. Similarly, no attempt is made to estimate the expenditure incurred on the maintenance of the heifers. The expenditure incurred on calves and heifers is included in the total costs and is regarded as the expenditure required for the annual replacements by rearing. This procedure may be questioned on the grounds that only a very small proportion of the calves become available for annual replacements. This is true, however, this part of expenditure which does not materialise as a capital asset is to be

regarded as a source of waste attributable to the peculiar system of dairying practised.

## 6.2 Factors of Cost

The various items entering into the calculation of the cost of production of milk are discussed under different heads as follows.

(a) Fodder and Feed : There are two important considerations in the consideration of this item of cost (1) the estimation of the feed consumed by the dairy herd in quantitative terms, and (2) estimation of the value of feed consumed. Both of these estimations can be attempted when feed is purchased. The difficulty, however, arises when whole or part of it is produced on the farm. The controversial point is whether to charge the farm produced feed at its market price or at the cost of production on the farm.

It is difficult, it seems, to lay down any general principle in respect of the evaluation of farm produced feed. It is held that it would be reasonable to charge the farm produced feed at the cost of production if milk is the sole production on the farm.<sup>1/</sup> This gives a better picture of the dairy herd in its farm setting since, on such a farm, dairying is not an isolated unit of production.<sup>2/</sup>

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<sup>1/</sup> Cost of production of farm livestock and Dairy produce, Department of Agriculture for Scotland, Miscellaneous Publication No.1, 1937, p.19.

<sup>2/</sup> N. K. Desai, "The Method of Milk Costing in England and Wales", The Indian Journal of Agricultural Economics, (August, 1955), Vol. 10, p.58.

In a system where mixed farming is practised production of fodder may be regarded as a separate enterprise and it would be wrong to deprive this enterprise of the profits based on the market price. In case of purchased fodder the feed cost is arrived at by taking into consideration the purchase prices and also includes the cost of delivery to the dairy premises. As noted earlier, there were a few dairies in the sample which had produced a part of their fodder requirements on the farm. In such cases the operators were unable to give any information regarding either the quantity of the fodder consumed by the dairy herd or its value. Estimates regarding the expenditure on fodder had, therefore, to be arrived at on the basis of the data available from the dairies which had purchased their fodder requirements. Since, however, the study concerns mainly with this type of dairying the procedure followed, it is believed, would not distort the results. Feeds were purchased by all and, therefore, there was no difficulty in estimating the inputs in this respect.

It may be recalled that the total expenditure on feed and fodder for the herd in the stable was calculated in the preceding chapter. To this are added the maintenance expenditure incurred on the dry stock maintained outside. It was estimated in Chapter IV that the number of such dry stock amounted to 46 heads and the rate charged was Rs.30 per head per month. The total per day expenditure, therefore,

Table 6.1 : Daily expenditure on feed and fodder for the total stock.

Size group	Expenditure on fodder & feed Rs.	Expenditure on dry stock		Total feed costs Rs.
		Dry stock maintained outside	Estimated daily expenditure Rs.	
Up to 5	3060.70	-	-	3060.70
6 - 10	2692.12	-	-	2692.12
11 - 15	1284.37	-	-	1284.37
16 - 20	1353.36	-	-	1353.36
21 & above	1939.39	46	46.00	1895.39
Total	10329.94		46.00	10375.94

came to Rs.46 for 46 heads. Table 6.1 summarizes the data in respect of the total expenditure on fodder and feed for the entire herd which includes the dry stock, the growing heifers and the breeding bulls. It may, therefore, be noted that the expenditure on feed as calculated above includes a part of the replacement cost also. Total daily fodder <sup>& feed</sup> expenses amounted to Rs.10375.94 for the entire city herd.

(b) Labour Costs : Here the problem arises firstly, as to whether the labour contributed by the family members should be charged to the milk production or not and secondly, if this labour is to be charged to the milk production, how should it be valued? Generally, the labour contributed by the family members is charged to the milk production. Thus in the United Kingdom, under the Milk Investigation Scheme

"hired labour is charged at its actual cost and unpaid family labour, including that of the farmer and his wife, is charged at the current cost of hired labour".<sup>1/</sup> Charges for management are not included in the cost of milk production. For the purposes of this study also the value of the operator's labour as well as the labour put in by his family members has been calculated on the basis of the current wage rates. It is, however, recognized that this method has serious limitations.<sup>2/</sup> On the one hand, family labour and operator's labour justifies higher rate of assessment than the prevailing market rate on account of the managerial element involved in it. On the other hand, so far as the amount of family labour used depends on the amount of such labour available rather than on the labour requirements, it is an over-valuation of the family labour inputs if charged at the current wage rates. However, for want of a better alternative, the above procedure has been adopted.

Table 6.2 brings out the total expenditure on labour. The average family as well as the hired labour inputs per head of cattle were estimated in Chapter III. Total labour inputs for the herd in the different size groups were arrived at on this basis and were evaluated on the basis of the average rate of payment (table 3.17) made to the hired labour

<sup>1/</sup> N. K. Desai, op.cit., p.61.

<sup>2/</sup> Dairy Farming in the Blackmore Vale, Department of Agricultural Economics, University of Reading, Bulletin XL, 1931, pp.46-47.

Table 6.2 : Daily expenditure on labour.

Size group	Total herd	Average family labour inputs (hours)	Total family labour inputs (hours)	Average hired labour inputs (hours)	Total hired labour inputs (hours)	Average wage rate per month (Rs.)	Average rate per hour (nP.)	Value of		Total (Rs.)
								Family labour (Rs.)	Hired labour (Rs.)	
Up to 5	1763	2.33	4107.8	0.26	458.4	37.5	16	657.25	73.34	730.59
6 - 10	1256	1.27	1595.1	0.26	326.6	42.3	18	287.12	58.79	345.91
11 - 15	655	0.85	556.7	0.45	294.7	49.5	21	116.91	61.89	178.80
16 - 20	637	0.46	293.0	1.11	707.1	47.5	20	58.60	141.42	200.02
21 & above	885	0.29	256.6	0.94	831.9	54.1	22	56.45	183.02	239.47
City herd			6809.2		2618.7			1176.33	518.46	1694.79

in each size group. The total labour charges amounted to Rs.1694.79 per day for the city herd. It may be noted that the slight difference in the estimated payment shown in table 3.18 and the value of the hired labour inputs as shown in table 6.2 is due to the difference in the basis of estimations. The daily payment on the basis of table 3.18 amounted to Rs.559 whereas the figure shown in table 6.2 is Rs.518. The difference of Rs.41 in the two estimates can be regarded as insignificant.

(c) Cost of bull upkeep : Where the dairyman maintains his own bull, the cost of its upkeep has to be charged to the milk production. This includes (1) interest on a fair inventory value of the bull, (2) depreciation, (3) feed and labour, (4) equipment used for his care, shelter, etc. less the credits received. This cost is thus composed of (i) maintenance cost and (ii) ownership cost.

For the purposes of this study, however, the cost of the bull upkeep has not been separately calculated but has been charged to the milk production as a component of the total feed, labour costs required for the maintenance of the entire herd. The ownership cost is included in the item of Miscellaneous costs discussed in a section below.

(d) Replacement Cost of the herd : Replacement cost is the depreciation on the investment in the dairy herd. Depreciation on the herd in case of the dairy enterprise



can be regarded as the cost of maintaining a given quantity of milk supply. Milk supply is affected because a part of the stock goes dry or a part is culled or because of deaths. These animals have to be replaced by freshened animals either by addition to the stock by purchasing, by rearing and/or by salvaging the dry stock. The cost incurred for the addition of the fresh stock is the replacement cost.

As pointed out earlier, no separate data were available either in respect of the cost of salvaging the dry stock or in respect of rearing of heifers. Both these costs are already included in the cost of feed. For the purposes of this study, therefore, replacement means the replacement by purchase only.

Two methods can be followed for arriving at the replacement cost in this respect. These methods are dealt with separately.

(1) The herd is valued at a standard value or at purchase price. If the size or the quality of the herd does not change, this initial valuation remains constant year after year. The cost of replacement, under these circumstances, will be the difference between the cost incurred on bringing the milch animal into the herd and the receipts from the animals leaving the herd. In the case of a purchased stock, therefore, the difference between the outlay made on purchasing the fresh stock and the receipts obtained from

the sale of the discarded stock will give the cost of replacement. This method gets rid of the bias involved in the subjective evaluation of the herd and also guards against any unrealized profits or losses from entering into the calculations. When the replacements are of different quality, a revised standard value is used. Similarly, where the usual size of the herd is increased, the extra animals are valued separately at cost, less a small amount for depreciation.<sup>1/</sup>

(2) This method<sup>2/</sup> recommends the use of a formula based on (a) the initial cost of the animal at the time of purchase, (b) length of useful life in years, (c) salvage value, and (d) death rate. This formula is

$$\frac{\text{Cost}}{\text{Number of years of use}} - \left( \frac{1}{\text{Number of years of use}} - \frac{\text{Death rate per 100}}{100} \right) \times \text{Salvage value}$$

= Depreciation per year, per animal.

Both the above methods are used for the purposes of this study. The first method is used for calculating the replacement cost in case of the case-study dairies. The second method is used for calculating the replacement cost

<sup>1/</sup> Investigation into the Economics of milk production in Scotland, Report No.1, 1945-46, Department of Agriculture for Scotland, (1948), p.33.

<sup>2/</sup> P. T. DixArnold, R. B. Becker, A. H. Spurlock, Management of Dairy Cattle in Florida, University of Florida, Agricultural Experiment Stations, Bulletin 464, 1949, pp.54-55.

in the case of sample data. The results obtained by the use of two methods do not differ much but the use of two methods is dictated by the nature of the data on hand. For example, in respect of the case-study data, the number of years of use of a milch animal was not known whereas the average number of animals replaced annually could be ascertained. Table 6.3 presents the cost of replacement as calculated on the basis of the above-mentioned formula. All the relevant values were noted in Chapter IV. The average replacement cost per year, per animal, is obtained by inserting the relevant values in the formula as illustrated below.

The average purchase price and the average salvage value (sale price) in the first size group came to Rs.493 and Rs.129 respectively. Death rate amounted to about 3 per cent for the entire herd and can be regarded as more or less uniform for all the size groups. The average number of years of use amounted to 2.02. It may be noted that this value is required for arriving at the yearly replacement cost and can be dispensed with for arriving at the replacement cost per animal replaced. This value is, therefore, not directly relevant for the purposes of this study. However, since the yearly replacement cost in the various size groups is by itself of some interest it has been arrived by using the formula noted above. The replacement cost per animal per year in the first size group is calculated as follows.

Table 6.3 : Replacement cost on the animals added by purchase.

Size group	Average purchase price	Average sale price	No. of years of use	Average cost of replacement per year per animal	Replacement cost per animal replaced	Total replacements	Total replacement cost	Cost per day
	(Rs.)	(Rs.)		(Rs.)	(Rs.)		(Rs.)	(Rs.)
Up to 5	493	129	2.02	184.06	371.8	725	269555	738.50
6 - 10	648	166	2.01	244.78	492.0	664	326688	895.03
11 - 15	691	189	1.82	281.49	512.3	300	153690	421.06
16 - 20	397	181	1.96	115.63	226.6	295	66847	183.14
21 & above	841	235	2.45	254.40	623.3	229	142736	391.05
City herd						2213	959516	1628.78

$$\begin{aligned}
 & \frac{\text{Cost} - \text{Salvage value}}{\text{Number of years of use}} + \frac{\text{death rate}}{100} \times \text{Salvage value} \\
 &= \frac{493 - 129}{2.02} + \frac{3}{100} \times 129 \\
 &= \frac{364}{2.02} + 0.03 \times 129 \\
 &= 180.19 + 3.87 \\
 &= 184.06 \quad \text{Cost of replacement per animal, per year}
 \end{aligned}$$

The average yearly replacement cost per animal in the different size groups is thus obtained by inserting the relevant values in the above formula. Instead of applying this average to the entire herd in the respective size groups for arriving at the total yearly replacement cost, this average is applied only to the stock replaced by purchase; since the cost of replacement for the reared-up herd has already been included in the total feed, labour, etc. charges. The cost of replacement per animal is arrived at by multiplying the average replacement cost per year by the number of years of use and the total replacement cost is then estimated on the basis of the number of animals purchased in the different size groups. This is very clearly illustrated in table 6.3. The total yearly replacement cost on the basis of this method came to Rs. 959516 for the entire herd.

It may be noted that the replacement costs arrived on

the basis of the formula used and on the basis of the first method noted above do not give very differing results. Replacement cost on the basis of the first method can be arrived at in the following way:

Number of replacement	Average purchase price	Total outlay
2213	x Rs.590	= Rs.1305670

Number of replacement	Average sale price	Total receipts
2213	x Rs.158	= Rs.349654

∴ Total replacement cost = Rs.956016

It can be seen from table 6.3 that the average depreciation (or replacement cost) per year, per animal varied with the size groups and was generally higher in the larger size groups. This was naturally due to the higher purchase price of the imported breed which was maintained in the large-scale dairies. It may be remembered that the average salvaging cost as obtained from the case-study data (noted in Chapter IV) ranged between Rs.350 and Rs.500 per animal. The cost of replacement as shown in table 6.3 was Rs.372 per animal in the first size group, about Rs.500 in the next two size groups and Rs.623 in the last size group. It is, therefore, clear that salvaging was economical only to the large-scale dairies. For the small-scale dairies which mostly maintained animals of local breed, replacement by purchase

was more economical than replacement by salvaging. It may be noted that the total replacement cost as shown in the table is calculated only on the basis of the buffaloes replaced. Replacement cost on the cows replaced by purchase has been left out of account. It may be recalled that sales or deaths in respect of cows were not reported by the sampled dairies and replacement took place, mainly, by home-bred cows. The cost of-replacement of cows added by rearing is already included in the total feed etc. costs. The above procedure is not expected to affect the total costs significantly because (1) replacement by purchase was on minor scale, and (2) cows formed a minor portion of the total herd.

(e) Miscellaneous Expenses : Miscellaneous expenses include a number of items like depreciation on buildings, machinery and breeding bulls, veterinary expenses, rent of the stables, and many other sundry expenses. These charges include also the expenses incurred on the distribution of milk. Some authors do not, however, think that the cost of distribution is a part of the cost of production of milk. According to one author the items which enter into the cost of production include only those incurred up to the point "where the milk passes over the cans".<sup>1/</sup> Where<sup>they</sup> to include the distribution costs in the cost of milk production or not depends on the nature of the dairy business. Costs of distri-

<sup>1/</sup> Investigation into Economics of milk production in Scotland, op.cit., p.31.

-bution can legitimately be regarded as a distinctly separate cost item where the functions of production and those of distribution are thoroughly separated. Under the Indian conditions where the two functions are performed by the producer-retailers, the two costs cannot be conveniently separated. Secondly the costs incurred on distribution are so negligible that an attempt to segregate the two functions will not be very rewarding.

Another controversial item of expense is the interest charges on the money invested in the livestock, stables, machinery and other equipment. Under the Milk Investigation Scheme in the United Kingdom<sup>1/</sup> interest charges on capital (other than farm buildings which are charged as rent or rental value) have not been included in the cost of production. For the purposes of this study, however, all capital investment has been charged at 3 per cent annual rate of interest since it was an item of cash cost in most of the cases where capital was borrowed.

Total miscellaneous expenses are shown in table 6.4. It was not possible to estimate all the miscellaneous items of expenditure since there were not sufficient data available in this respect. The items considered in the table are:

- (1) depreciation on all the investment other than that in

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<sup>1/</sup> N. K. Desai, op.cit., p.61.



Table 6.4 : Total miscellaneous expenses per day.

Size group	(Amounts in Rs.)								
	Total investment	Interest at 3 per cent	Interest charges per day	Investment other than in Milch animals	Depreciation at 15 per cent	Depreciation charges per day	Total stable rent per month	Stable rent per day	Total miscellaneous expenditure per day
Up to 5	822951	24689	67.64	156202	23430.30	64.19	1408.22	46.94	178.77
6 - 10	774141	23224	63.63	115330	17299.50	47.39	658.94	21.96	132.98
11 - 15	395877	11876	32.54	38169	5725.35	15.69	631.39	21.05	69.28
16 - 20	379785	11394	31.22	94995	14249.25	39.04	-	-	70.26
21 & above	719674	21590	59.15	73025	10953.75	30.01	1314.40	43.81	132.97
City herd	3092434	92773	254.18	477121	71658.15	196.32	4012.95	133.76	584.26

the milch animals. This depreciation charge was calculated at a flat rate of 15 per cent per annum; (2) rent of the stables as was estimated in Chapter III; (3) interest charges on all the capital investment including that in the herd.

Other sundry charges such as veterinary charges, cycle repairs and repairs to equipment etc. are left out of account. This is not likely to affect the calculations in any respect because (1) these expenses are insignificant when the total costs are considered, and (2) they are partly compensated for by neglecting the sundry incomes such as from the sale of cowdung or sale of empty gunny bags, the breeding charges received, etc.

Credits other than from the sale of milk were also negligible. Information was collected from the survey regarding the utilization of cowdung. Most of the operators reported that it was either thrown away or given free of charge. Some reported casual sales of cowdung or cowdung cakes but only a few reported that the cowdung was converted into manure. Those who had agriculture as their main or subsidiary occupation could return the manure to the soil but in the rest of the cases no use could be made of the dung. The chief difficulty was in respect of the transport cost involved in removing the dung out of the city limits since it could not be stored within the city boundary. The credits for manure, therefore, can be assumed to be negligible.

The total miscellaneous costs, thus, came to Rs.584.26 per day for the entire herd.

### 6.3 Total Expenditure

Consideration of the above items gives us the total expenditure required for the production of milk in Poona. Table 6.5 summarizes the entire data and also shows the importance of the various items of expenditure. It can be seen from the table that feed was the most important single item of expenditure accounting for about 68 per cent of the total estimated expenditure. Next in order of importance were the replacement and the labour charges.

Table 6.5 : Total costs per day.

Size group	Expenditure on feed and fodder (Rs.)	Expenditure on labour (Rs.)	Replacement cost (Rs.)	Miscellaneous costs (Rs.)	Total costs (Rs.)
Up to 5	3060.70	730.59	738.50	178.77	4708.56
6 - 10	2692.12	345.91	895.03	132.98	4066.04
11 - 15	1284.37	178.80	421.06	69.28	1953.51
16 - 20	1353.36	200.02	183.14	70.26	1806.78
21 & above	1985.39	239.79	391.05	132.97	2748.88
Total	10375.94	1694.79	2628.78	584.26	15283.77
Proportion of the total	67.89	11.09	17.20	3.82	100.00

The above procedure was also followed for arriving at the total yearly expenditure incurred by the case-study dairies for the production of milk. It may be, however,

noted that the case-study data were comparatively more extensive and detailed since ~~it~~<sup>they</sup> were obtained from the account books maintained by the dairy operators. However, the system of account keeping followed by the dairymen in Poona was not scientific and the account books were mainly in the form of personal diaries. Consequently there were some gaps in the data and these had to be filled in by resorting to certain arbitrary procedures. Though adoption of such a procedure is not expected to distort the picture, it is necessary to explain these gaps in the data in some details. Thus, milk yield in some cases had to be derived as yields were not recorded. Yields, in such cases, were derived by taking into consideration the quantity distributed by way of house to house deliveries, milk sold to the casual customers or in the market, milk converted into milk products, milk consumed in the household and the milk that was lost by way of spillage or evaporation, etc. Part of the evening milk had to be stored until next day morning since larger quantities of milk were distributed in the morning than in the evening. Milk left over in the evening had, therefore, to be heated to avoid deterioration. Some quantity of milk was thus lost during the process of heating. Some quantity was also lost by way of spillage at the time of distribution. Total quantity lost by way of spillage and evaporation was assumed to be 2 per cent of the total milk handled. This assumption was based on the observations made

by some of the dairymen who had kept the record of the yield as well as that of the total milk disposed of (which also included the milk consumed in the household). The quantity of milk sold by way of regular household deliveries was available in almost all the cases. Since sale of milk by way of household deliveries was on monthly credit, accurate day-to-day disposals had necessarily to be maintained. In one case where the quantity of this sale was not available it had to be arrived at on the basis of the total receipts and the rates charged. The quantity of milk sold to casual customers was not recorded by any of the dairymen. The milk sold to the casual customer was on the cash basis and, therefore, the daily cash receipts only were recorded. But most of the dairymen under consideration had not recorded the rates charged for such sale. In such cases the quantity was derived on the basis of cash receipts and the rate of sale which the dairymen concerned could quote from his memory. Generally the rates charged to the casual customers were slightly higher than the rates charged for home-delivered milk. In the season of peak prices these rates generally confirmed with the ruling market rates (i.e. the rates prevailing in the milk market). Milk sold in the market had also to be derived by taking into account the receipts obtained and the market rate. Similarly, milk converted into milk products - mostly butter - had to be derived by assuming a certain conversion rate.

As has already been noted elsewhere the quantity of milk that was sold either to the casual customer or in the milk market was very small. In the case of milk products, very few establishments had reported any sales and the quantity involved, in such cases, was insignificant.

Most of these dairies had purchased outside milk. For the estimation of yields, therefore, the quantity of milk that was purchased from outside had to be deducted from the total sales, the amount consumed in the household and the milk lost. Generally the quantity of milk purchased was available in the account books. In one or two cases where only the outlay made on purchased milk was recorded the quantity of milk purchased had to be estimated by arriving at a certain rate of purchase in consultation with the dairymen concerned.

Expenditure on current items of purchase was recorded in the account books and there was no difficulty in arriving at the itemwise break up of the total annual outlay. In some cases, however, only the number of animals that were purchased or sold was available while the purchase and sale prices were not recorded in the account books. In such cases the prices given from memory by the dairymen concerned had to be relied upon.

There was one more gap in the data. The dairymen who had not maintained any record of yield had also not maintained

any record regarding the animals that were in milk and the animals that were dry during different months. Such data were necessary for the calculation of average yield or the cost of maintenance of a milch animal, etc. All these dairymen had, however, kept a list showing the dates on which different animals were covered and the dates on which they were freshened. The average number of animals that were in milk or that were dry during different months could be arrived at on the basis of this list by assuming a certain lactation period for a cow or a buffalo. It was assumed that an average buffalo or a cow gave milk for 10 months. Such an assumption was not far from the truth and was, further, determined on the basis of consultations with the dairymen concerned. Thus for each establishment a list was prepared of the animals that were in milk and that were dry by following the above procedure. This list was modified by taking into account the animals that were purchased, animals that were sold and the animals that had died. Here also it was believed that the procedure which had to be followed in view of the insufficiency of the data was not likely to give a distorted picture and could, therefore, be justified.

Tables 6.6 and 6.7 present the case-study data showing the total expenditure and the proportionate share of each item respectively. Data for the three years, 1956, 1957 and

Table 6.6 : Total expenditure on different items during 1956-58.  
(Case-study data)

Item of expenditure	1956					
	(Amounts in Rs.)					
	D a i r i e s					
	A	B	D	F	G	H
Fodder	16278.06	7220.89	3695.61	8928.20	8643.09	6197.13
Concentrates	32353.97	9998.07	7344.40	17691.27	16629.24	11078.59
Dry stock	4125.00	725.40	1411.12	2609.80	4474.50	2417.37
<u>Total on feed &amp; fodder</u>	52757.03	17944.36	12451.13	29229.27	29746.83	19693.09
Labour	8042.59	3212.85	1719.00	5317.00	4009.00	2531.75
Replacement	7964.00	6648.00	2689.00	4000.00	7370.00	6971.00
Miscellaneous	4203.38	2579.38	1568.20	3847.57	2539.79	2612.24
<u>Total expenditure</u>	72967.00	30384.59	18427.33	42393.84	43665.62	31808.08
Credits other than from milk	1100.00	795.43	375.00	780.00	795.00	500.00
Net costs	71867.00	29589.16	18052.33	41613.84	42870.62	31308.08

(Continued)



Table 6.6 : (Continued)

Item of expenditure	1 9 5 7								
	(Amounts in Rs.)								
	D a i r i e s								
	A	B	C	D	E	F	G	H	J
Fodder	16866.72	5472.80	1957.73	3941.64	10766.53	13395.94	7031.48	8575.72	1177.62
Concentrates	31174.36	9671.98	2829.15	8872.76	12516.88	17623.31	17412.65	12681.65	2982.97
Dry stock	2950.00	444.50	310.00	1600.21	190.00	3462.11	5000.00	1613.11	-
<u>Total on feed &amp; fodder</u>	50991.08	15589.28	5096.88	14414.61	23473.41	34481.36	29444.13	22870.48	4160.59
Labour	6496.90	3256.80	815.25	2131.17	6421.00	5473.50	4488.00	2921.33	1740.00
Replacement	7964.00	7704.00	588.00	4040.00	7854.00	5600.00	8070.00	4313.00	140.00
Miscellaneous	6598.79	2336.80	639.79	2057.09	3892.03	3145.30	2427.29	3298.27	249.17
<u>Total expenditure</u>	72050.77	28886.88	7139.92	22642.87	41640.44	48700.16	44429.42	33403.08	6289.76
Credits other than from milk	1282.00	501.00	103.00	408.00	596.00	780.00	795.00	556.00	350.00
Net costs	70768.77	28385.88	7036.92	2234.87	41044.44	47920.16	43634.42	32847.08	5939.76

(Continued)

Table 6.6 : (Continued)

Item of expenditure	1958							
	(Amounts in Rs.)							
	D a i r i e s							
	A	C	D	E	F	G	H	I
Fodder	18047.77	2016.64	4032.21	9687.59	12274.36	7566.84	7699.43	3712.74
Concentrates	38603.88	2105.58	8702.90	11958.07	19239.21	19986.24	9991.39	5476.80
Dry stock	2300.00	365.00	1137.71	153.50	3895.98	4967.42	2730.01	2013.07
<u>Total on feed &amp; fodder</u>	58951.65	4487.22	13872.82	21799.16	35409.55	32520.50	20420.83	11202.61
Labour	7783.42	800.00	2241.91	6626.25	5674.00	4149.62	2817.61	1438.34
Replacement	7964.00	675.00	4040.00	7854.00	4442.00	8070.00	6762.00	1821.00
Miscellaneous	5828.17	300.91	2153.22	3657.96	3101.88	3047.98	3661.15	2597.10
Total expenditure	80527.24	6263.13	22307.95	39937.37	48627.43	47788.10	33661.59	17059.05
Credits other than from milk	1320.00	175.00	410.00	805.00	780.00	825.00	650.00	400.00
Net costs	79207.24	6088.13	21627.95	39132.37	47847.43	46963.10	33011.59	16659.05

Table 6.7 : Proportionate expenditure incurred on the various items.

Year & Dairies	Items of expenditure				Total
	Feed	wages	Replac- ment	Miscella- neous	
<u>1956</u>					
A	72.31	11.02	10.91	5.76	100.00
B	59.05	10.57	21.89	8.49	100.00
D	67.57	9.33	14.59	8.51	100.00
F	68.94	12.54	9.44	9.08	100.00
G	68.12	9.18	16.88	5.82	100.00
H	61.91	7.96	21.92	8.21	100.00
All dairies	67.53	10.36	14.87	7.24	100.00
<u>1957</u>					
A	70.77	9.02	11.05	9.16	100.00
B	53.97	11.27	26.67	8.09	100.00
C	71.39	11.42	8.23	8.96	100.00
D	63.67	9.41	17.84	9.08	100.00
E	56.38	15.42	18.86	9.34	100.00
F	70.80	11.24	11.50	6.46	100.00
G	66.28	10.10	18.16	5.46	100.00
H	68.47	8.75	12.91	9.87	100.00
J	66.16	27.66	2.22	3.96	100.00
All dairies	65.70	11.06	15.16	8.08	100.00
<u>1958</u>					
A	73.21	9.67	9.89	7.23	100.00
C	71.65	12.77	10.78	4.80	100.00
D	62.19	10.05	18.11	9.65	100.00
E	54.59	16.59	19.66	9.16	100.00
F	72.83	11.66	9.13	6.38	100.00
G	68.06	8.68	16.89	6.37	100.00
H	60.66	8.37	20.09	10.88	100.00
I	65.68	8.43	10.67	15.22	100.00
All dairies	67.09	10.64	14.05	8.22	100.00

1958 are given wherever possible. These data also show that the most important item of expenditure was feed which accounted for as much as 50 to 70 per cent of the total expenditure. The expenditure on replacement varied between 10 and 20 per cent of the total expenditure. It may be noted that the proportionate expenditure on the Miscellaneous items was somewhat higher than that obtained from the sample data. The reasons for this were already noted in the preceding section.

It is necessary to explain the case-study data in more details. The size of these dairies has already been considered elsewhere. Dairy 'A' was a very old concern whose size was now stabilized. Dairies 'D' and 'I' were comparatively new concerns. In fact, dairy 'I' was started in the year 1957. Dairies 'H' and 'I' were expanding establishments though the size of the rest of the dairies had remained somewhat stationary during the last few years. All these dairies had engaged outside hands though the owners also had participated in the day-to-day routine work. There were no family members occupied in the establishments though they had contributed their labour for such minor work like heating the milk, sale of milk to casual customers, etc. The contribution in this respect was very negligible and is, therefore, left out of account. Most of the dairies were operated independently whereas dairies 'B' and 'F' were partnership concerns, the partners being brothers living in

a joint family. As was mentioned earlier the labour of the operators has been regarded as an item of cost and the figures included under the 'Labour Charges' include payments made to the hired labour as well as the value of the operator's own labour. The value of the operator's labour is calculated at the rate of Rs.60 per month, per head for full-time work. Almost all the operators worked full-time. The operator of dairy 'J', however, worked only part-time and the valuation of his labour is done accordingly.

Most of the items of expenditure mentioned in table 6.6 were considered separately in the foregoing chapters. Thus, labour charges (excluding the value of the operator's own labour) were considered in Chapter III, dry stock maintenance expenditure was considered in Chapter IV, expenditure on feed and fodder was considered in Chapter V. It may be noted in connection with the dry stock maintenance expenditure that data only in respect of dairies C, D, F, G, and H were considered in Chapter IV. Table 6.6 takes into account the relevant data in respect of all the dairies. The whole set of data was not considered in Chapter IV because, in the case of the dairies excepting those mentioned above, data in respect of the number of drystock salvaged were not available so that data only regarding the drystock expenditure could not serve any purpose in that chapter. Dry stock maintenance data in respect of all dairies are, however, included in table 6.6 and are merged in the 'expenditure on

feed and fodder'. Considerations for this were similar to those mentioned in connection with the sample data. It may be mentioned, even at the cost of repetition, that separate data in respect of all dry stock expenditure were not available. Some of the dairies had maintained their entire dry stock in the stable itself. In rest of the cases, though most of the dry stock was entrusted to the farmers in the neighbouring villages, a few dry animals were also maintained in the stable. It was, therefore, not possible to segregate the expenditure on dry stock. Since most of the expenditure on salvaging of dry stock consisted of expenditure on feed and fodder, this expenditure is merged with the expenditure on feed.

The only important item of cost which was not considered anywhere else is the replacement cost. The relevant data for the year 1957 are presented in table 6.8 to illustrate the method adopted for the calculation of replacement cost. For working out this item of cost, the average number of animals annually replaced by each dairy was first ascertained. The average size of the herd as shown in the table was arrived at by estimating the number of animals owned in each month and then by averaging out for a period of one or more years. This was necessary because the size of the herd in all the dairies fluctuated with sale and purchase of stock and was never constant. It must be remembered that the stock was never replaced at one time or season so that the size of

the herd was in no case stable over a short period.

In case of the dairies where the number of outgoing stock and the number of incoming stock matched during a period of one year the problem of ascertaining the number of replacements did not arise. In the case of the dairies where there were wide fluctuations in the herd size, the number of animals that were replaced was arrived at by taking into consideration the sale and purchase transactions for two or three years. This procedure had to be adopted in order to avoid a distorted account which would have obtained by considering the data for any single year in isolation. Thus, if a dairy purchased a part of its stock in the month of December in a particular year and disposed of its dry stock in the following month of January, its size would unnecessarily record an abnormal increase in one year and abnormal decrease in the following year if, further no replacements took place at all in that year. Data for dairy 'E' will further illustrate the complications involved in considering each calendar year separately. This dairy had 37 milch animals in the beginning of 1957 but had subsequently added to its herd-size by purchasing 13 animals during the course of the year. Sales, during the same year had amounted to 6 animals so that there were 44 animals at the end of the year. The purchases and sales during the following year were 9 and 16 respectively so that at the end of 1958, the size of the herd was the same as was in the beginning of

the previous year. The size of the herd in such a case, had to be regarded constant for the calculation of the replacement cost. It was thus found that the size of the herd was constant in most of the cases, the only exceptions being dairies 'H' and 'I'.

In the case of these dairies which had a constant herd-size, the replacement cost was arrived at by regarding the difference between the total outlay made on the purchase of fresh stock and the receipts obtained from the sale of discarded stock as the cost of replacement. Receipts from the outgoing stock were averaged out on the total number of animals that were disposed of and the animals that had died. In the case of those dairies where the herd-size was increasing the procedure adopted was not totally different from the one stated above, but the additional purchases were valued after assuming a certain rate of depreciation.

Table 6.8 gives the proportions of animals that were replaced by the dairies, the average rates of purchase and sale together with the cost of replacement per animal sold during 1957. The purchase price in the case of dairies 'D', 'F' and 'G' was higher because most of the purchases were made on the basis of instalment purchase. The purchase price in the cases of dairies 'C' and 'J' was very low because the stock purchased, in the case of the former, consisted of buffaloes which had already done some four to



five lactations whereas in the case of the latter it was of indigenous breed. Average value of the outgoing stock depended on a number of factors already noted elsewhere. It can be seen from table 6.8 that excepting the dairies 'C' and 'J', the cost of replacement ranged between Rs.700 and Rs.850 per animal replaced. As was noted earlier, the cost of salvaging a dry animal ranged between Rs.350 and Rs.500. The cost of replacement per animal was, therefore, as much as 75 per cent to 100 per cent higher than the cost of salvaging a dry animal.

Miscellaneous expenses amounted to 5 to 10 per cent of the total expenditure and need not be considered in details. Credits other than milk were very negligible and are also shown in table 6.6. These credits were deducted from the total expenditure for the calculation of the net cost of production per seer of milk. The breakup of this cost as between the four items of expenditure was arrived at on the basis of their share in the gross expenditure as shown in table 6.7.

#### 6.4 Cost of Production

The assumption underlying the following discussion may be noted here. It is assumed that the milk yields reported by the dairymen and also those derived on the basis of the records kept by the dairymen were of uniform quality. This assumption is necessary because it was not possible to collect

Table 6.8 : Cost of replacement during 1957. (Case-study data)

D a i r i e s									
	A	B	C	D	E	F	G	H	J
Opening stock	75	29	6	20	46	34	35	25	7
(a) Value Rs.	58950	18850	3300	16000	38410	30158	29995	19630	3050
Purchases	11	9	2	5	11	7	10	11	1
@ Price Rs.	830	956	550	1000	825	1021	1008	763	200
(b) Total outlay Rs.	9130	8604	1100	5000	9075	7147	10080	8393	200
(A=a+b) Total Rs.	68080	27454	4400	21000	47485	37305	40075	28023	3250
Outgoing stock	11	9	2	5	11	7	10	6	1
@ Price Rs.	106	100	256	192	111	221	201	175	60
(c) Total receipts Rs.	1166	900	512	960	1221	1547	2010	875	60
Additional purchases-	-	-	-	-	-	-	-	5	-
(d) Value Rs.	-	-	-	-	-	-	-	3205	-
Closing stock	75	29	6	20	46	34	35	30	7
(e) Value Rs.	58950	18850	3300	16000	38410	30158	29995	22835	3050
(B=c+d+e) Total Rs.	60116	19750	3812	16960	39631	31705	32005	23710	3110
(A-B) Replacement cost Rs.	7964	7704	588	4040	7854	5600	8070	4313	140
Proportion of animals replaced (%)	15	31	33	25	24	20	28	24	14
Replacement cost per animal replaced Rs.	724	856	294	808	714	800	807	718	140

any data in respect of the quality of milk produced. This assumption will not hold good in respect of the milk sold because of the prevalence of the practice of adulteration. However, for the purposes of the calculation of the cost of production we are concerned only with the milk yields. The fact of adulteration will be taken account of while considering the incomes of the dairymen.

Table 6.9 presents the cost of production per seer of milk in case of the five size groups in the sampled dairies. The average cost of production for the entire Dairy Industry in Poona came to 84 nP. It can be seen that the cost of production was the highest in the first size group and was lower in the higher size groups. The cost of production was exceptionally low in the 4th size group, and this was because the lower feed costs and the lower cost of replacement. It may be remembered here that the results for this group were slightly distorted due to one dairyman in the sample belonging to this group who was a dealer in dry stock. There was no depreciation on the stock in this case; on the other hand there were profits made on the sale of the dry stock.

Generally, however, it can be seen that the cost of production moved inversely with the size group, i.e. with the quality of the herd since quality of the herd was better in the higher size groups. Another significant point to be

Table 6.9 : Cost of production per seer of milk produced.

Size group	Total yield (seers)	Cost per 100 seers				Total cost (Rs.)	Cost per seer (Rs.)	Sale price (nP.)
		Feed cost (Rs.)	Labour cost (Rs.)	Replacement cost (Rs.)	Miscellaneous cost (Rs.)			
Up to 5	4883	62.68	14.96	15.12	3.66	96.42	0.96	74
6 - 10	4604	58.47	7.51	19.44	2.89	88.31	0.88	73
11 - 15	2238	57.39	7.99	18.81	3.09	87.28	0.87	70
16 - 20	3091	43.79	6.47	5.92	2.27	58.45	0.58	71
21 & above	3412	58.18	7.02	11.46	3.90	80.56	0.81	79
City herd	18228	56.92	9.30	14.42	3.20	83.85	0.84	74

noted is the level of cost of feed and labour per 100 seers in the first size group. In fact, the cost of production in this group was higher because of these two items of cost.

The item of the cost of feed needs some comments. It may be recalled that this item also includes the cost of replacement in case of the salvaged and reared up animals. It may also be remembered that salvaging practices were confined mainly to the last two size groups whereas the first two size groups disposed of their stock as soon as it became dry. Disposal of the dry stock thus increased the replacement cost considerably in the smaller size groups. Salvaging of drystock, on the other hand, increased the cost of feed in the large size dairies since the dry stock had to be fed during the dry period. The interdependence between the expenditure on feed and the replacement cost may thus be noted. This relationship between the two items of cost can be better appreciated when it is realized that a dairy can incur proportionately smaller expenditure on feed by disposing of a greater number of dry animals though this disposal consequently increases the cost of replacement. The interdependence between these two items of cost, however, is affected by other factors which independently influence the feed and the replacement costs. Thus, expenditure on feed can be proportionately greater even with a high replacement cost if the rate of feeding is excessively high and the dry stock is disposed of at a much lower price as

compared to the price of replacement, or if there are a larger number of deaths in the herd. Also, where the cost of salvaging is separately available and where it is merged in the replacement cost, there would be no such relationship between the two items of cost as stated above.

Since salvaged costs have been merged into the feed costs it would be better to consider both these items of costs together. It can be seen that the combined feed and replacement cost for the first size group came to Rs.83 per 100 seers of milk produced. In the rest of the cases it was Rs.78, Rs.76 and Rs.69 per 100 seers of milk produced in the second, third and the fifth size groups respectively. The figures for the fourth size group may be neglected for the reasons mentioned earlier. The difference in the combined feed and replacement cost as between the first and the last size group is very marked.

Table 6.10 presents the cost of production in case of the case-study data. The cost of production in these dairies varied from 61 nP. to 74 nP. per seer during 1956. This variation in the years 1957 and 1958 was from 61 nP. to 83 nP. and from 57 nP. to 87 nP. respectively. The average cost of production for the case-study dairies during 1956 came to 66 nP. per seer. During 1957 and 1958, this average was 64 nP. and 68 nP. respectively. Out of the total cost per seer, approximately 44 nP. was the cost on feed, 7 nP. was

Table 6.10 : Net cost of production per 100 seers of milk and its itemwise break up.

Year & items	d a i r i e s										Total	
	A	B	C	D	E	F	G	H	I	J		
<u>1956</u>												
Net cost	71867.00	29589.16	-	18052.33	-	41613.84	42870.62	31308.08	-	-		235301.03
Total yield	106210	40001	-	28895	-	68132	63993	46723	-	-		353954
Cost per 100 seers	68	74	-	62	-	61	67	67	-	-		66
Feed cost	50	44	-	42	-	42	46	41	-	-		44
Labour cost	7	8	-	6	-	8	6	5	-	-		7
Replacement cost	7	16	-	9	-	6	11	15	-	-		10
Miscellaneous cost	4	6	-	5	-	5	4	5	-	-		5
<u>1957</u>												
Net cost	70768.77	28385.88	7036.92	2234.87	41044.44	47920.16	43634.42	32847.08	-	-	5939.76	279812.30
Total yield	113351	41287	9924	35227	49306	68247	58754	51158	-	-	9730	436984
Cost per 100 seers	62	69	71	63	83	70	74	64	-	-	61	64
Feed cost	44	37	51	40	47	50	49	44	-	-	41	42
Labour cost	6	8	8	6	13	8	7	6	-	-	17	7
Replacement cost	7	18	6	11	16	8	13	8	-	-	1	10
Miscellaneous	5	6	6	6	7	4	4	6	-	-	2	5
<u>1958</u>												
Net cost.	79207.24	-	6088.13	21627.95	39132.37	47847.43	46963.10	33011.59	16659.05	-	-	290536.86
Total yield	124030	-	8420	37495	52850	67921	53664	57854	24096	-	-	426330
Cost per 100 seers	64	-	72	58	74	70	87	57	69	-	-	68
Feed cost	47	-	52	36	41	51	59	35	45	-	-	45
Labour cost	6	-	9	6	12	8	8	5	6	-	-	7
Replacement cost	6	-	8	10	14	6	15	11	7	-	-	10
Miscellaneous cost	5	-	3	6	7	5	5	6	11	-	-	6

the cost of labour, 10 nP. was the replacement cost, and 5 nP. was the miscellaneous expenditure.

It may be noted that the cost of production as obtained for the case-study data was much lower than that obtained for the sample survey data. This may be partly due to the nature of the data in the respective cases. The data for the case-study dairies were more exhaustive and were obtained for a period of one full year. In case of the sample data, estimates are arrived at on the basis of the data obtained for a day or a week. Furthermore, case-study dairies were typical commercial dairies managed by literate persons who had a greater sense of economic calculus.

Even after taking into consideration the above qualifications the cost of production of milk in Poona, as estimated above, appears to be too high when compared with the sale price obtained. It is clear from table 6.9 that the average operator in the city was not able to cover the costs at the prevailing level of prices. Even the large-scale producers in the sample produced at a loss. It is, therefore, clear that the dairies in Poona had to adulterate their milk in order to be able to make a living. Table 6.11 indicates the extent of adulteration necessary for enabling the dairy operator to earn the average wage rate for the labour put in by himself and his family members together with the interest on the investment at the rate of 3 per cent per annum. It



Table 6.11 : Cost of production with different degrees of adulteration.

Size group	Total costs	Actual yield	Yield with adulteration of				(Cost in Rs. & yield in seers)				Average rate of sale (nP.)
			30%	20%	15%	5%	Cost per 100 seers under				
			(1)	(2)	(3)	(4)	(1)	(2)	(3)	(4)	
Up to 5	4708.56	4883	6348	5860	5615	-	74.17	80.35	-	-	74
6 - 10	4066.06	4604	5985	5525	5295	-	67.94	73.59	-	-	73
11 - 15	1953.51	2238	2909	2685	2574	-	67.15	72.76	-	-	70
16 - 20	1806.78	3091	4018	3709	3555	-	-	-	-	-	71
21 & above	2748.88	3412	4436	4094	3924	3583	-	-	-	76.72	79
Total city herd	15283.77	18228	23696	21873	20963	20050	64.50	69.87	72.91	76.23	74

can be seen that the average dairyman in the first size group would have to adulterate to the extent of 30 to 32 per cent whereas adulteration required in the second and the third size groups would be between 20 and 30 per cent. Adulteration required in the last size group is below 5 per cent. This inference corroborates the earlier observation made in Chapter I that addition of 10 to 30 per cent of water was a common practice among the milkmen in Poona. It may be noted that even this much adulteration would be just sufficient to enable the operators to earn only their wages and a small rate of return on the capital invested by them.

#### 6.5 Incomes of the dairy operators

The discussion in the preceding section regarding the cost of production of milk gives a background for arriving at the returns from this industry since dairy incomes are the result of receipts from the sale of milk in relation to expenses incurred for the production. It may be remembered that while calculating the incomes it would be necessary to assume the level of adulteration mentioned in table 6.11.

The following method is followed for arriving at the incomes of the dairy operators. On the expenditure side are included all the expenses required for the maintenance of the dairy herd such as feed and fodder, labour charges (exclusive of any allowance for the unpaid labour of the

operator or of his family members) and the depreciation on livestock, buildings and implements. They do not include any interest on borrowings of the operators nor interest on the operators' own investment and capital. The income from the business is, thus, the 'family income' which comprises of the returns to the capital invested by the operator as well as the remuneration obtained for his own and for his family's labour. Tables 6.12 and 6.13 give the details in this respect. Gross receipts are the receipts obtained from the sale of milk plus sundry incomes. In the case of the sample data sundry incomes were neglected and, therefore, the receipts mentioned in the table include only the receipts obtained from the sale of milk. Percentage of adulteration for the first three groups is assumed to be 30. In the last size group it is assumed to be 5 per cent. Family income is arrived at by deducting the Cash costs and the Depreciation charges from the Gross receipts. Returns to management and labour are arrived at by deducting the Interest charges from the Family income. Similarly, returns to Management and Capital are arrived at by deducting the Value of the Family Labour from the Family income. Returns to Management are arrived at by deducting Gross costs (i.e. all Cash costs and Depreciation plus the imputed costs like the value of the Family Labour and the Interest charges) from the Gross receipts. It may be remembered that since the values of Family Labour and Interest charges are imputed,

Table 6.12 : Family income and returns to capital and labour in different size groups.

Size group	Percentage of water added	(A)	Cash costs + Depreciation				(B)
		Gross receipts	Feed cost	Hired labour cost	Replacement cost	Miscellaneous expenditure (exclusive of interest)	Total
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Up to 5	30	4697.52	3060.70	73.34	738.50	111.13	3983.67
6 - 10	30	4369.05	2692.12	58.79	895.03	69.35	3715.29
11 - 15	30	2036.30	1284.37	61.89	421.06	36.74	1804.06
16 - 20	Nil	2194.61	1353.36	141.42	183.14	39.04	1716.96
21 & above	5	2830.25	1985.39	183.02	391.05	73.82	2633.28
City herd	15	15512.62	10375.94	518.46	2628.78	330.08	13853.26
	(C)	(D)	(E)	(F)	(G)	(H)	
	Family income (A-B)	Value of family labour	Returns to Management & Capital (C-D)	Interest on Investment	Returns to Management and Labour (C-F)	Returns to Management A - (B+D+F)	
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	
Up to 5	713.85	657.25	56.60	67.64	646.21	-11.04	
6 - 10	653.76	287.12	366.64	63.63	590.13	303.01	
11 - 15	232.24	116.91	115.33	32.54	199.70	82.79	
16 - 20	477.65	58.60	419.05	31.22	446.43	387.83	
21 & above	196.97	56.45	140.52	59.15	137.82	81.37	
City herd	1659.36	1176.33	483.03	254.18	1405.18	228.85	

**Table 6.13 :** Monthly average family income per establishment and the average rate of return to Capital in different size groups

Size group	No. of units	Family Income			Returns to Management & Labour			Returns to Management & Capital			
		Per day	Per month	Av. per unit per month	Per day	Per month	Av. per unit. per month	Per day	Per year	Total investment	Annual rate
		Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
Up to 5	510	713.85	21415	42	646.21	19386	38	56.60	20659	822951	2.51
6 - 10	163	653.76	19613	120	590.13	17704	109	366.64	133824	774147	17.29
11 - 15	50	232.24	6967	139	199.70	5991	120	115.33	42095	395877	10.63
16 - 20	35	477.65	14329	409	446.43	13393	383	419.05	152953	379785	40.27
21 & above	24	196.97	5909	246	137.82	4135	172	140.52	51290	719674	7.13
City herd	782	1659.36	49781	64	1405.13	42155	54	483.03	176306	3092434	5.70

the level of costs allowed for these items influence the level of returns to management. The level of Family income is, however, not affected by the level of the imputed values and, therefore, is a more reliable measure of incomes.

Table 6.13 shows the monthly average family income per establishment in different size groups. It can be seen that this varied from Rs.42 in the minimum to Rs.409 in the maximum as between different size groups. The average family income in the Industry came to Rs.64. Only the dairies in the first size group (accounting for 65 per cent of the total establishments in Poona) had earned an income below this average. Average returns to management and labour came to Rs.54. The average rate of return to management and capital came to about Rs.5.70 per cent, per annum.

It may be noted that the above estimations have been arrived at on certain assumptions regarding the extent of adulteration prevailing in the different size groups. Actually the incomes might have been more or less than those indicated above depending on the extent of adulteration resorted to. The above calculations merely show a general trend in respect of the efficiency of the smaller and the larger units. One more point may be noted. The difference in the incomes as between the different size groups was not purely due to the difference in the cost of production; it was partly due to the difference in the sale price obtained. This was

highest in the last size group though it did not differ much in the rest of the size groups. (Table 6.9)

Tables 6.14 and 6.15 give the monthly family incomes for the dairies in the case studies. Table 6.14 refers to the income derived from the sale of milk produced in the stable only. Table 6.15 takes into account the income derived from the sale of purchased milk as well as from the sale of produced milk. The incomes in the case-study dairies were very high as compared to those obtained for the highest size groups. This was mainly because of the lower cost of production. The average income for the case-study dairies on the basis of the data presented in table 6.14 came to Rs.429 and it came to Rs.483 on the basis of the data presented in table 6.15. The difference between these two sums, i.e. Rs.54, was the average margin earned on the sale of outside milk.

It must, however, be mentioned that the incomes earned by the operators might have been less than those shown in the tables on account of the following factors: (1) It was assumed that the dairies were free of any debts and all the investment was from owned capital. It is likely, at least in the case of the large-scale dairies, that much of this investment was borrowed and, that too, at a much higher rate of interest than the one assumed in the above calculations. (2) Gross receipts were arrived at by taking into

Table 6.14 : Monthly average family incomes, Case-study data for ten dairies, 1957. (Derived only from the sale of milk produced in the stable)

Dairies	Sales	Average rate obtained (nP.)	Receipts (Rs.)	Sundry receipts (Rs.)	(A)
					Gross receipts (Rs.)
A	111082	74	82201	1282	83483
B	40462	78	31560	501	32061
C	9726	100	9726	103	9829
D	34523	79	27273	408	27681
E	48320	80	38656	596	39252
F	66882	77	51499	780	52279
G	57579	81	46639	795	47434
H	50135	81	40609	556	41165
*I	23614	75	17710	400	18110
J	9535	75	7151	350	7501
Total			353024	5771	358795

	Cash costs + Depreciation				(B)
	Feed cost (Rs.)	Labour cost (Rs.)	Replacement cost (Rs.)	Miscellaneous costs (Rs.)	Total (Rs.)
A	50991.08	5776.90	7964.00	4748.79	69481
B	15589.28	1816.80	7704.00	1736.80	26847
C	5096.88	515.25	588.00	539.79	6740
D	14414.61	1411.17	4040.00	1557.09	21423
E	23473.41	5701.00	7854.00	2692.03	39720
F	34481.36	4033.50	5600.00	2195.30	46310
G	29444.13	3768.00	8070.00	1497.29	42779
H	22870.48	2201.33	4313.00	2678.27	32063
*I	11202.61	713.34	1821.00	2297.10	16039
J	4160.59	1440.00	140.00	149.17	5890
Total	211724.43	27382.29	48094.00	20091.63	307292

	(C) Family income (A-B)	(D) Value of operator's labour	(E) Returns to Management and Capital (C-D)	(F) Interest charges	(G) Returns to Management & Labour (C-F)	(H) Returns to Management (B+D+F)	(I) Average family income per month
	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.	Rs.
A	14002	720	13282	1850	12152	11432	1167
B	5214	1440	3774	600	4614	3174	434
C	3089	720	2369	100	2989	2269	257
D	6258	720	5538	500	5758	5038	521
E	-468	720	-1188	1200	-1668	-2388	-
F	5969	1440	4529	950	5019	3579	497
G	4655	720	3935	930	3725	3005	388
H	9102	720	8382	620	8482	7762	758
*I	2071	720	1351	300	1771	1051	173
J	1611	300	1311	100	1511	1211	134
Total	51503	8220	43283	7150	44353	36133	429

\* Data for 1958.



Table 6.15 : Monthly average, family incomes (derived from the sale of milk produced as well as from the sale of purchased milk) : Case-study data, 1957.

Dairies	(a) Gross receipts Rs.	(b) Cash costs + Depreciation + purchase of milk Rs.	(c) Family income (a-b) Rs.	(d) Value of labour Rs.	(e) Returns to management and Capital (c-d) Rs.	(f) Interest charges per year Rs.	(g) Returns to Management & labour (c-f) Rs.	(h) Returns to Management (a-(b+d+f)) Rs.	Family income per month Rs.
A	83483	69481	14002	720	13282	1850	12152	11432	1167
B	38731	32429	6302	1440	4862	600	5702	4262	525
C	9915	6802	3113	720	2393	100	3013	2293	259
D	29304	22560	6744	720	6024	500	6244	5524	562
E	48264	47523	741	720	21	1200	-459	-1179	62
F	60021	52770	7251	1440	5811	950	6301	4861	604
G	50854	45407	5447	720	4727	930	4517	3797	454
H	43695	33997	9698	720	8978	620	9078	8358	808
*I	22274	19388	2886	720	2166	300	2586	1866	240
J	8707	6923	1784	300	1484	100	1684	1384	149
Total for all dairies	395248	337280	57968	8220	49748	7150	50818	42598	483

\* Data for 1958.

consideration the total quantity of milk sold and the average rate of sale. Actually, these receipts might have been less on account of the unrecovered dues or bad debts. It was noticed from the accounts kept by the case-study dairies that about 8 per cent of the total dues or approximately one month's charges remained in arrears over a period of a year. It is, therefore, likely that the average income of the operator was somewhat less than the one calculated above.

## Chapter VII

### SUMMARY AND CONCLUSIONS

Various aspects of the dairy industry in Poona were analysed in the preceding chapters. The present chapter summarizes the main points brought out by the preceding chapters and also discusses their implications.

It was noted that production of milk in Poona was carried on by a considerable number of small units scattered over the different wards of the city and situated in close proximity to operator's dwelling houses. Large-size units, i.e. those maintaining 16 or more milch animals constituted only about 8 per cent of the total number of stables though they had maintained about 30 per cent of the milch animals. It may be noted that the size of a dairy generally indicated the degree of commercialisation as was clear from the data for the different size groups showing the proportion of the family labour and wage labour employed, the proportion of milk retained for household consumption and the proportion of units where dairying was pursued as the main occupation. The majority of the units were, therefore, non-commercial family concerns.

It was found that a large proportion of these units (about 46 per cent) were inherited and were, therefore,

having a long standing in the trade. As much as 73 per cent of the total concerns were originally started as a side-line activity where investment was confined to a few heads of milch animals and, it is worth noting that inspite of the long standing which most of them had, a large proportion of these concerns still continued to be small-scale units.

Milk was sold mainly to the regular household customers. Out of the total milk sold by the dairies in the city as much as 84 per cent was retailed by way of regular house to house deliveries and the remaining was either disposed of in the milk market or sold to the casual customers. Conversion of milk into milk products was not reported. Purchase of outside milk was insignificant and almost all the milk sold comprised of stable produced milk. Average rate of sale amounted to 74 nP. per seer.

Investment in the industry was mostly confined to the dairy herd. Thus nearly 85 per cent of the total investment was absorbed by the investment in the herd alone. The next important item was stable buildings which accounted for nearly 13 per cent of the total investment. About 59 per cent of the total units owned their stables and the rest had hired them. Investment in machinery and equipment was insignificant. Average investment per establishment came to Rs.3954 and that per milch animal came to Rs.631. Investment per milch animal was higher in the large-size groups.

Out of the total reported investment, 77 per cent was in the form of owned capital. However, the proportion of units which could not finance their investment on their own came to about 57 per cent. The average borrowings per reporting unit came to Rs.1605, i.e. about 41 per cent of the average investment.

The industry gave employment to 1703 workers. However, about 32 per cent of them were partially employed workers. Family labour constituted as much as 75 per cent of the total labour force of which 27 per cent were females.

Wage labour received its payment in cash though employment on cash and board basis was not uncommon. The average monthly wage rate in case of a fully employed worker amounted to Rs.47.20. Average payment in case of a partially employed worker amounted to Rs.11.59 per month.

Data in respect of herd management practices revealed that the herd consisted mostly of buffaloes though a few cows were also maintained in the herd. It was found that out of the total buffaloes about 61 per cent consisted of imported breed and most of these were maintained by the last two size groups. Indigenous breed predominated in the smaller size groups.

Nearly 80 per cent of the total herd was in milk whereas the rest was dry. The proportion of milkers in the herd was

higher in the smaller size groups than in the larger size groups indicating that the practice of salvaging was mainly confined to larger units. It was noted that about 3050 animals replaced annually only 750 were from salvaged dry stock whereas the remaining were fresh additions either from rearing or from purchases. Rearing, as in the case of salvaging, was on meagre scale mostly because of the lack of adequate facilities. Nearly 97 per cent of the fresh additions came from purchases. Thus out of the total stock that was annually replaced, nearly 170 came from reared up stock, 750 were brought in by salvaging the dry stock, about 1000 were imported and about 1200 were purchased locally. This inflow was approximately matched by an outflow on account of (1) Deaths and (2) Sales. Out of the total buffaloes replaced annually about 130 were replaced on account of deaths and about 2240 were replaced on account of sales. The most frequently reported reason for sale was the dry state of the animal. Most of the animals were thus maintained only for one lactation period. The average period for which the buffaloes were maintained came to 2.22 years after which it was sold to the farmers in the neighbouring village<sup>s</sup> or to the traders in which case the animal<sup>usually</sup> met its fate in the slaughter house. Nearly 50 per cent of the animals sold were thus withdrawn from the city herd either due to slaughter or due to their retention by the farmers in the rural areas who purchased the dry stock from the

city stables.

The average yield per buffalo in milk came to 4.84 seers whereas it came to 2.61 seers in the case of cows. The overall average was still lower, i.e. 3.97 seers in the case of buffaloes and 1.81 seers in the case of cows. The yields were correlated with the size groups and were higher in the larger size groups. This was mainly because of two factors (1) the larger herds were composed of superior imported herds, and (2) larger herds had followed a better feeding standard - especially in case of concentrates. The concentrate inputs per head in the largest size group, for example, were as much as twice as large as those in the smallest size groups. The relationship between the concentrate inputs and the output of milk also showed that the ration available to the herd in the small size groups for production purposes was less than the standard prescribed by the experts.

The management practices followed by the dairies in the different size groups ultimately were reflected in the cost of production of milk. Average cost of production for the entire industry in Poona came to 84 nP. This was highest in the first size group and was lower in the higher size groups. It was found that this cost in the case of all the size groups excepting the fourth size group was higher than the average sale price. It was, therefore, clear that the

average dairy operator in Poona had to adulterate the milk in order to be able to make a living. The extent of adulteration necessary for enabling the dairy operator in Poona to earn the average wage rate for the labour put in by himself and his family members together with the interest on the investment at the rate of 3 per cent per annum came to about 15 per cent. The extent of adulteration necessary in the various size groups ranged between 5 per cent in the minimum to 35 per cent in the maximum. This inference corroborated the official data presented in the introductory chapter in respect of the extent of adulteration prevailing in the city.

Any opportunity for bringing about a reduction in the cost of production is, therefore, of vital interest both to the consumer and to the individual dairy operator. It was noticed that the comparatively more economical herds were the larger herds which had high milk production per milch animal. It was also noted that the two most important factors which influenced the milk production were (1) better feeding practices, and (2) better breed. The data, especially in respect of the case-study dairies, showed that the lower cost of production was associated with these two factors. This would, therefore, mean investment in better quality of herd and greater expenditure on feed and fodder per animal. The relationship between feed cost per animal and lower cost of production may be noted from the data presented in Chapter V



and Chapter VI. It can be realized that lower cost of production was not related with low cost per animal since in such cases, yields per animal also tended to be low. Thus, where the feed cost per animal was lower the yield also was lower resulting in higher cost of production. There was, therefore, no relationship between lower feed cost per animal and lower cost of production.

The association between higher average yield and imported breeds was also noted. However, investment in the imported breeds was costly and, in the absence of the lack of rearing facilities, would involve higher replacement cost per animal. It was noticed from the case-study data that cost of replacement per animal was as much as 100 per cent higher than the cost of salvaging a dry animal indicating that a considerable saving could be made by salvaging the dry animals instead of disposing them of as was usually done by most of the dairymen. It was noted that only about 25 per cent of the total replacements came from salvaged stock and the rest were fresh additions mostly by purchase. Salvaged stock constituted such a low proportion of the total replacements mainly because most of the dry stock was disposed of due to the lack of salvaging facilities. The frequently reported reasons for the sale of milch animals were (1) that the operators could not afford to lock up their capital in dry stock on which there were no returns during the dry period; (2) that there was not enough space

to accommodate both the milking and the dry animals; and (3) that the dry period was often too lengthy so that salvaging became unprofitable. It was, thus, essentially the problem of non-availability of capital and facilities for maintaining dry stock on adequate scale. It is, therefore, clear that provision of adequate salvaging and credit facilities alone would enable the dairy operators in Poona to maintain a better quality of herd. The third reason mentioned above, however, would indicate a scope for the improvement of herd management practices and the provision of breeding facilities on a wider scale.

It must be noted that even with the adequate provision of the required facilities, such as pointed out above, the dairymen in Poona would not be able to import the high quality of breed indefinitely since it is already becoming scarce in the breeding tracts themselves and the respective State Governments have started imposing restrictions on the export of milch cattle. This raises the question of rearing facilities since rearing was costly and often impossible due to lack of adequate facilities.

The sale of good quality buffaloes at the end of a lactation period and the non-availability of the calves of the best quality herds for replacement purposes constitutes a constant drain on the milch animal resources. The provision of salvaging and rearing facilities along with the

adequate credit facilities would stop this drain and also would help the operators in Poona to build a high producing herd. This would help to lower the cost of production by increasing the average yield and by bringing about a reduction in the cost of replacement.

Any scheme for rehabilitating the city stables in colonies outside the proper city area would succeed to the extent to which it helps to lower the price of milk. The removal of the stables from the city would undoubtedly help to eliminate the danger to environmental hygiene in the city. But it must also be realized that the consumer is primarily interested in getting a supply of pure and hygienic milk at a reasonably low price. There are reasons to believe that this objective would not be achieved merely by physically shifting the stables outside the city boundaries. This would, on the contrary, increase the price of milk due to (1) greater distribution costs, (2) increase in the transport cost of feed and fodder, and (3) greater labour charges. This last item needs some comments. It was noted that production of milk in Poona was being carried on by a number of small-scale family concerns where dairying was a side-line activity and about 75 per cent of the total labour force consisted of family workers. Most of the operators, during the course of the survey, expressed an opinion that it would be inconvenient for them to leave the city along with the stable since dairying was only a side-line activity. The family labour

would not, therefore, be available in most of the cases and this would increase the wage-payment considerably.

Any plan for shifting the stables to a colony situated away from the heart of the city must, therefore, aim at an economically efficient system of production. Such a plan would have to be an integrated one incorporating such schemes as the provision of salvaging, rearing, insemination and breeding, etc. facilities; the advancement of credit facilities; the supply of cheaper cattle feeds; and the distribution of milk by a co-operative or governmental agency.

APPENDICES



Details about the employment & man hour inputs

Name of the worker	Type of work done					
	Tending the herd	Milking	Cleaning the stables etc.	Distribution of milk	Keeping the accounts and other work	Emoluments

- (1) Where is the stable located?
- (2) Is it owned? If so, give the date and cost of construction:
- (3) If it is taken on rent, state the terms:
- (4) Is there any prosecution case filed by the Corporation?
- (5) Is there any special arrangement for storing the cattle dung? How is the dung utilized?

C. Information regarding the herd

<u>Type of animal</u>	<u>Total number</u>	<u>Present condition</u>			<u>Other information</u>
		<u>In milk</u>	<u>Dry</u>	<u>In-calf</u>	
Buffaloes					
Cows					
Others					

- (1) What arrangements do you have for rearing up the calves?
- (2) What arrangement do you have for breeding of stock?

Particulars regarding the animals in milk-----  
Name \_\_\_\_\_Date of calving \_\_\_\_\_  
Length of dry period \_\_\_\_\_  
Present yield (per day) \_\_\_\_\_  
Approximate length  
of lactation \_\_\_\_\_  
Whether in-calf? \_\_\_\_\_  
(State the period) \_\_\_\_\_  
-----Particulars regarding the dry animals-----  
Name \_\_\_\_\_Date of calving \_\_\_\_\_  
Date of going dry \_\_\_\_\_  
Total milk yield  
for this lactation \_\_\_\_\_  
Whether in-calf \_\_\_\_\_  
Whether on the  
salvage farm? \_\_\_\_\_  
-----Give the details regarding the arrangement made for  
maintaining the dry animals:Detailed information regarding the animals owned-----  
Name of animal \_\_\_\_\_

Breed \_\_\_\_\_

Place &amp; date of purchase \_\_\_\_\_

Purchase price \_\_\_\_\_

From whom purchased \_\_\_\_\_

Lactation &amp; age \_\_\_\_\_

Number of lactations  
since purchase \_\_\_\_\_Number of calves  
reared up \_\_\_\_\_  
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E. General InformationInventory

Type of equip- ment	Date of purchase	Purchase price	Length of service	Annual expenditure on repairs
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(1) Information regarding sale and purchase transaction of milch cattle:

(2) General difficulties experienced in the business:

(3) Are you willing to shift your dairy outside the city limits if proper facilities are made available?

E. General InformationInventory

Type of equip- ment	Date of purchase	Purchase price	Length of service	Annual expenditure on repairs
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(1) Information regarding sale and purchase transaction of milch cattle:

(2) General difficulties experienced in the business:

(3) Are you willing to shift your dairy outside the city limits if proper facilities are made available?

Appendix II : Nutritive values\* of the selected Indian feeding stuffs

Name	Place	Digestible nutrients per 100 lb. dry material				Digestible nutrients per 100 lb. raw material		Nutri- tive ratio
		Crude protein	Carbo- hydra- tes	Ether extract	Total	T.D.N.	Digestible crude pro- tein	
Cotton-seed	Lyalpur	12.49	34.65	18.50	88.77	80.00	11.24	6.1
Gram	Punjab	11.96	64.80	3.14	83.83	74.50	10.76	6.0
Coconut-cake (expeller)	Cochin	22.81	42.12	8.20	83.81	75.40	20.53	2.7
Groundnut cake	Bangalore	46.39	14.59	7.97	78.92	71.00	41.75	0.7
Gram husk	"	0.00	59.59	0.77	61.33	55.20	0.00	0.0
Wheat-bran	"	11.80	58.00	2.28	74.93	67.40	10.62	5.4
Rice-bran	Madras	6.76	35.15	10.00	64.40	58.00	6.08	8.5

(\* "Nutritive Values of Indian Cattle Foods and the feeding of animals" by K.C.Sen, I.C.A.R. Bulletin 25, pp.26-30.)

Appendix IIINutrients required for maintenance of  
adult cattle per head per day\*

Live weight (lb)	Digestible crude protein (lb)	Total Digestible nutrients (lb)
200	0.128	1.72
300	0.203	2.55
400	0.273	3.34
500	0.338	4.09
600	0.339	4.80
700	0.458	5.47
800	0.516	6.15
900	0.570	6.80
1000	0.625	7.47
1100	0.652	8.11
1200	0.733	8.75

Nutrients required for production per pound of milk,  
to be added to the maintenance allowance\*

Fat per cent in milk	Digestible crude protein	Total Digestible nutrients
3.0	0.040	0.269
4.0	0.045	0.316
5.0	0.051	0.363
6.0	0.057	0.411
7.0	0.063	0.458
8.0	0.069	0.506
9.0	0.075	0.553
10.0	0.081	0.602
11.0	0.086	0.650

(\*The Nutritive Values of Indian Cattle Foods and the  
feeding of animals" by K. C. Sen, I.C.A.R. Bulletin 25,  
p.6.)

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