

# **PRICING POLICY AND COST OF PRODUCTION OF MILK IN COIMBATORE DAIRY CO-OPERATIVES**



**THESIS SUBMITTED TO THE  
NATIONAL DAIRY RESEARCH INSTITUTE, KARNAL  
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IN PARTIAL FULFILMENT OF THE REQUIREMENT  
FOR THE AWARD OF THE DEGREE OF**

**MASTER OF SCIENCE  
IN  
DAIRYING  
(DAIRY ECONOMICS)**

**By  
P. MOHANDAS KARAM CHAND GANDHI (I. A. S.)**

**DIVISION OF DAIRY ECONOMICS, STATISTICS & MANAGEMENT  
NATIONAL DAIRY RESEARCH INSTITUTE  
(I. C. A. R.)  
KARNAL - 132 001 (HARYANA), INDIA  
2002**

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To

*My Beloved Parents*

# PRICING POLICY AND COST OF PRODUCTION OF MILK IN COIMBATORE DAIRY CO-OPERATIVES

By

**P. MOHANDAS KARAM CHAND GANDHI**

Thesis submitted to the  
National Dairy Research Institute (Deemed University)  
Karnal (Haryana)

In partial fulfillment of the requirement  
for the award of the degree of

**Master of Science**

IN

**DAIRYING**

**(DAIRY ECONOMICS)**

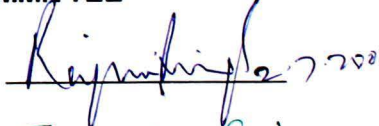
Approved by

  
Dr (Prin Singh Dobria)  
**EXTERNAL EXAMINER**


  
**(K. K. KALRA)**  
**MAJOR ADVISOR**

## MEMBERS, ADVISORY COMMITTEE

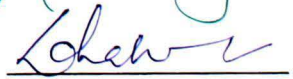
**Dr. Raj Vir Singh**  
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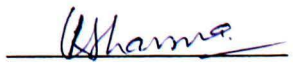
**Prof. Surendra Singh**  
Principal Scientist, DESM Division

  
Surendra Singh

**Dr. D. K. Sharma**  
Principal Scientist, DT Division

  
D. K. Sharma

**Dr. R.C. Sharma**  
Principal Scientist, DCB Division

  
R.C. Sharma

**Dr. K. K. Kalra**  
Principal Scientist

Division of Dairy Economics,  
Statistics and Management  
National Dairy Research Institute  
(Deemed University)  
Karnal -132001. (Haryana)

### **CERTIFICATE**

This is to certify that the thesis entitled "**PRICING POLICY AND COST OF PRODUCTION OF MILK IN COIMBATORE DAIRY CO-OPERATIVES**" submitted by **P. MOHANDAS KARAM CHAND GANDHI** in partial fulfillment of the requirement for award of the degree of **MASTER OF SCIENCE (DAIRYING)** in **DAIRY ECONOMICS** of the National Dairy Research Institute (Deemed University), Karnal (Haryana) is a bonafide research work carried out by him under my supervision and guidance and no part of the thesis has been submitted for any other degree or diploma.



**( K. K. Kalra )**

**MAJOR ADVISOR**

**Date:** June 17, 2002

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**Date: June 17, 2002**



**( P.Mohandas )**

## ABSTRACT

Dairying is one of the fastest growing enterprises in agricultural sector in India, and contributes largest share to agricultural GDP. It has become an organised activity under the roof of co-operatives and contributed nearly 6% to India's GDP which made India to rank first in milk production in the globe. The success story of dairying can be further strengthened, if suitable pricing policy is made favourable to milk producers. Two axis pricing policy which is based on fat and SNF adopted by dairy co-operatives overcomes the lacunae in the earlier methods. Though it encourages crossbreeding programme, it has never taken into account the cost of milk production.

Sixty co-operative members from four co-operative societies of Coimbatore district in Tamil Nadu were considered for this study. A higher average herd size was observed in crossbred cows rearing households. High maintenance cost (Rs/annum/animal) was found in buffaloes. In contrary, crossbred cows earned high net profit. Though buffalo milk fetched higher price than cow milk, the net return per litre was high in crossbred cows owing to their higher productivity. Bulk line cost of cow milk was Rs. 7.96/lit, which covered 83.92% cows and 80% producers. The bulk line cost was lower than the average price realised by both cow and buffalo producers indicating the profitable nature of milk production.

Compared to various agencies, Coimbatore dairy co-operatives have adopted better pricing policy in giving weightage to SNF in milk pricing. The price was given on the basis of total solids covered more than the bulk line cost. Though market rate of Ghee and SMP is important for fixing the pricing of milk, one should also consider the cost of milk production while fixing the price. For this, the bulk line cost should be used as a base line rather than average cost. The cost of milk production should be carried out in each region at specified time interval in order to revise the milk price.

## सारांश

डेयरी भारत के सभी कृषि उत्पादों में सबसे तीव्र वृद्धि करनेवाला व्यवसाय है और कृषि के सकल घरेलू उत्पाद में सबसे बड़ा साझेदार है। यह सहकारिता के व्यवस्थित कार्यक्रमों के छत के नीचे आता है और भारत के सकल घरेलू उत्पाद में ६: का योगदान देता है जिससे कि भारत दुग्धोत्पादन में विश्व में पहले स्थान पर पहुँच गया है डेयरी के सफलता की कहानी को और अधिक मजबूत बनाया जा सकता है यदि दुग्ध उत्पादकों के लिए उपयुक्त मुल्य प्रणाली का निर्माण किया गया जाए। दुग्ध सहकारिए दो घुरियों वाली मुल्य प्रणाली जो कि वसा एवं वसा विहीन ठोस पदार्थ पर आधारित है को अपनाकर पुराने पद्धति में जो कमियाँ हैं उसे दूर किया है। यद्यपि यह संकरण कार्यक्रम को बढ़ावा देती है पर इसने कभी भी दुग्धोत्पादन के खर्च को स्थान नहीं दिया है।

इस अध्ययन हेतू तमिलनाडू में कोयम्बटूर जिले के चार सहकारी समितियों के साठ सहकारी सदस्यों को माना गया। संकरित गायों को पालनेवाले मकान मालिकों के पास अधिक औसत पशु समूह देखा गया। भैंसों में अधिक रख-रखाव खर्च (रूपए वार्षिक पशु) पाया गया। इसके विपरीत गाय के दूध की तुलना में अधिक धनोपार्जन करता है संकरित गायों में शुद्ध वापसी प्रति लीटर उनके अधिक उत्पादकता के कारण अधिक पायी गयी। गाय के दूध का इकट्टा जीवित खर्च ७७९६ रूपये/लीटर पाया गया जो ८३७९२: गायों को और ८०: उत्पादकों को मिलकर है। दोनों गाय और भैंस उत्पादकों के द्वारा यह महसूस किया गया कि इकट्टा जीवित खर्च औसत खर्च से कम था जो कि लाभकारी दुग्धोत्पादन की ओर इंगित करता है।

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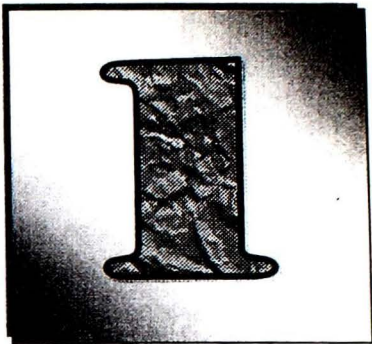
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Chapter



Introduction

# 1. INTRODUCTION

Dairying has been one of the fastest growing enterprises in agricultural sector in our country and contributes largest share to agricultural GDP. It has become an organized activity under the roof of co-operatives and made India as the world leader in milk production with tremendous potential to become a significant force to reckon within global dairy scenario. According to FAO's economic and social development report, India's milk production has increased from a mere 17 mt in 1951 to 77 mt in 1999, which is now 13.5% of world's total milk production. It has played a prominent role not only in household nutrition security but also in developing the rural economy as a whole. Today, milk is a leading agricultural commodity, contributing 6% to India's GDP in 1999-2000 (Kulshreshtha <sup>2001</sup>). The success story of dairy development in India can be further strengthened if suitable pricing policy is made favourable to the nearly 70 million rural milk producers who are not getting any type of incentives and subsidies. Thus, pricing of milk must prove to be an instrument through which the producer recovers his costs and makes profits.

In earlier times, there were inadequate market facilities for milk in the rural areas. Therefore, major share of excess or surplus milk was processed in the form of Ghee and hence, the price of Ghee influenced the pricing policy of milk. Pricing of milk only based on volume/weights led to human manipulation by addition of water. Another dimension in the pricing policy was the price based on the type of milk (buffalo/cow). In this system a minimum standard for each type of milk was adopted for the acceptance or rejection of milk. The milk that met the minimum fat standard was usually paid a flat price without regard to its compositional quality. This system provided no incentives for the production of richer fat milk. It encouraged the adulteration of buffalo milk with water and being sold as cow or mixed milk.

The early Dairy Co-operative Societies in Gujarat started to pay milk only on the basis of fat. This system was considered appropriate in buffalo dominated areas of Gujarat. But it became oppressive in cow-dominated areas such as Karnataka, Kerala and Tamil Nadu, where cow milk with 4% fat fetches only half of the price of buffalo milk with 8% fat. So this emerged as a major impediment to cross breeding programmes that has been going in the country. As a result, Dairy Board of India started to canvas two axis pricing policy for cow milk. The first initiative came in a feasible report prepared by NDDB for the newly planned Bangalore dairy in 1970. This system was considered to give fair price to milk by evaluating its fat and SNF. The analysis based on past data revealed that market valuation of SMP is around  $2/3^{\text{rd}}$  of Ghee value and accordingly the SNF valuation was considered to be  $2/3^{\text{rd}}$  of fat under two axis pricing policy.

Buffalo milk pricing under the co-operative sector is being done on fat basis. Value of per kg fat is used further for valuation of Equivalent Fat Units (EFU), the SNF- fat ratio used in general is 2:3. It is now need of the day that what price should be paid to the farmer's milk so as to know whether milk production from buffalo or cow is profitable for majority of the farmers. Buffalo milk pricing should be such that it must cover the cost of 85 per cent of the total milk produced. It is also equally of much more importance that what weights to SNF and fat should be given so that cow milk production shall be profitable.

Though two axis pricing policy encourages the rearing of cow and cross breeding programmes, yet it shall still take in to account the bulk line cost of milk production, which is most important for dairy development. After successful initiation of Dairy Co-operative Societies, the dairying has become an organized enterprise. Though dairying is a subsidiary unit of agriculture and utilizes mainly its by-products, most of the milk producers began to purchase inputs from markets mainly because of advanced dairy practices. So, the producers are now very eager to know whether the returns from dairying are as expected. Cost of milk production is an important tool for the economic evaluation of dairy enterprise at producer's level and fixing the

procurement price at Dairy Co-operative Society level. A rational pricing policy should provide an incentive to producers and treat dairying as an economic enterprise like other occupation and not merely a subsidiary occupation. Although a good institutional arrangement like CACP (Commission for Agricultural Costs and Prices) has been developed for the formulation of pricing policies for selected *Commodities*, yet no due attention has been given to milk.

This pricing policy concept is true for the entire world, even for India and also the study area of Coimbatore district of Tamil Nadu under present investigation. The state is having 19.24 lakh Dairy co-operative members in our country, which is next to Gujarat in the country. With 8041 Dairy co-operative societies, Tamil Nadu plays a major role in milk production in South India.

Keeping all these in view, the present study entitled " Pricing Policy and Cost of Production of Milk in Coimbatore Dairy Co-operatives" was undertaken in Coimbatore District Dairy Co-operatives of Tamil Nadu with the following objectives.

### **OBJECTIVES**

1. To work out the cost of cow and buffalo milk production for each farm household.
2. To compare bulk line cost with pricing policy adopted by the Dairy Co-operatives.
3. To determine the weights of fat and SNF for two axis pricing policy.

## **ORGANISATION OF THE STUDY**

The study has been presented in five chapters. Chapter 1 deals with introductory part while brief review of cost of milk production, bulk line cost and milk pricing policy have received attention in chapter 2. The next chapter describes the methodology adopted for the study as well as the general features of the study area. The objective wise results obtained and discussions of the results are presented in chapter 4. The last chapter summarises the findings of the study.

Chapter



Review of Literature

## 2. REVIEW OF LITERATURE

Many authors have conducted researches related to cost of milk production, bulk line cost and pricing policy. A glimpse into the past makes a payment for the present and future. In this section the related literature has been reviewed and presented in a chronological order as under:

1. Cost of milk production
2. Bulk line cost
3. Milk pricing policy

### 2.1. COST OF MILK PRODUCTION

Prabakaran (1980) studied production of milk in Trichur taluk of Kerala and found that mean daily milk output per household was 3.22 litres and daily feed cost Rs3.4/-. The amount of milk produced was positively related to feed cost.

Chandrappa (1986) observed in Chitodurga district of Punjab that milk yield was highest in crossbred cows, but net profit was highest from Murrah buffaloes due to higher price for buffalo milk on the basis of fat content. He also reported that the unit cost of production was the lowest for crossbred cows and highest for local cows.

Anantharam (1983) conducted study in arid area of western Rajasthan and focussed that the feed cost was accounted as a major segment, followed by labour cost in buffalo milk production. The result also revealed that the family labour component of total labour cost was as high as 79%.

Gangwar and Shastri (1988) conducted studies on economics of buffalo performance through out the country. The study revealed wide variation in milk yield, cost of maintenance, cost of milk production and profitability. They reported that milk yields were lowest in the rainy season

although cost of production was highest in this season. Cost of maintenance was relatively higher in Punjab, Haryana and Gujarat states.

Singh *et al.*, (1990) conducted studies on one-hectare land unit at the CCS Haryana Agricultural University in Hissar for determining comparative economics of buffaloes and crossbred cows under mixed farming system. The findings indicated that mixed farming with three cross bred cows was more profitable as compared to mixed farming with three buffaloes mainly due to shorter calving interval, longer milking period and higher milk production in case of crossbred cows.

Ram *et al.*, (1993) in an economic analysis of milk production in rural areas of western UP found that, average maintenance cost and milk yield per day per buffalo was Rs. 15.81 and 4.41 litres respectively. The free availability of sugarcane tops contributed, 9 to 10 % of total maintenance cost. It was also observed that both fixed and variable cost was lower in case of landless cattle owners and marginal farmers compared to small farmers.

Rajendran and Prabhakaran (1993) conducted a study on economics of milk production among various householders in Dharmapuri district of Tamil Nadu. They reported that major share in total investment attributed to milch animals, which was more than 70% followed by buildings (6.25%) and equipment (2.80%). The net returns from cross bred cows were highest followed by buffaloes and desi cows.

Kalra *et al.*, (1995) estimated the maintenance cost of crossbred and local cows as Rs 20.25 and Rs 14.22 per day per animal in their study conducted in rural areas of Haryana. They also found that the milk production of local cow resulted in a net loss of Rs 3.82 per day. It was further observed that the cost of milk production for crossbred and local cows were Rs 3.53/- and Rs 6.92/- respectively.

Shiyani *et al.*, (1995) conducted a study in Sourashtra region of Gujarat. They observed that the daily average cost of keeping cows was Rs. 18.62/- for dairy co-operative members against Rs18.92 for non-

members. Besides these findings they noted that the feed cost alone constituted 2/3<sup>rd</sup> of total cost.

In a study on the cost of milk production at a dairy farm in Nagpur, Gaikwad and Gampawar (1995) concluded that the major expenditure was on feed followed by labour and supervision.

Sangu (1995) in his study in Meerut district of UP worked out the fixed cost for crossbred and Desi cows which constituted to 31 and 25% of the total cost respectively. He also reported that concentrates, green fodder and dry fodder occupied the larger portion in variable cost. In his analysis, the rate of return per rupee invested over the total cost was highest for crossbred cows followed by desi cows.

The contribution of variable cost to total cost was 87.4%. This result was attributed to Baruah *et al.*, (1996), a study conducted in Assam. It was further reported that there was an increase in the fixed cost as the herd size increases and the herd size with 4-6 animals gave maximum return.

Gupta and Agarwal (1996) in a study in Himachal Pradesh showed that the cross bred cows were producing the milk at the lowest cost and the net return was higher for the landless labour, keeping cross bred cows.

In another study, Kumar and Balishter (1996) in Ferozabad district of UP observed that the cost of maintenance of milch animal was Rs10.31/-. They also identified that the dairy farming with crossbred cows was highly remunerative, if the risk factors like infertility and disease incidents kept in check.

Pundir (1996) analysed input structure of milk production in Himachal Pradesh and revealed that variable inputs like green fodder, concentrates and labour accounted 18.1,21.0,18.6 and 25.2 per cent for crossbred cows and 21.3,24.7,10.1 and 31.3 per cent for local cows respectively. Cost of milk production per litre was found to be Rs 3.23 and Rs 4.94 for crossbred and local cows respectively. He concluded that crossbred dairying was the most

suitable enterprise as it gave highest net income per day than local cow during the study period.

Singh and Kairon (1996) observed that the average cost of milk production was Rs 3.34 in Haryana. In the total cost, feed cost accounted for 66 per cent followed by labour cost accounting to about 22 per cent. They also found that the milk producers were conscious about the concentrate feeding.

Panghal *et al.*, (1997) in a comparative study of milk production in different agro climatic regions of Haryana observed that total milk production was less in dry region compared to irrigated region. The operational cost was the major component (68-70%) and labour cost was decreasing with increasing farm size in all the regions. The cost of green and dry fodder was almost equal in irrigated region, which may be due to the availability of green fodder throughout the year.

Ganesh kumar (1997) worked out the cost of milk production as Rs.8.7/- for local cows and Rs.7.27/- for crossbred cows in Villupuram district of Tamil Nadu. He also observed that among the total cost, green fodder and concentrates accounted more in local cows. On the other hand the net return per cow per day was Rs.9.93/- in crossbred cows and Rs.1.88/- in local cows.

Kumaravel (1998) in his survey on economic analysis of milk production and disposal pattern in Virudunagar district of Tamil Nadu concluded that rearing crossbred cows were more profitable than local cows and negative return in case of local cows were largely attributed to their very low yield levels.

Sudheer *et al.*, (1999) conducted a study on comparative economics of milk production in organized sector in Eranakulam district of Kerala and reported that the cost of milk production in unorganized sector was Rs.6.89/- against Rs.6.63/- in organized sector. But the net income was higher in unorganized sector because they sold their milk to the local consumers for a

better price. The organized sector earned Rs.7.80/- per litre of milk against Rs.8.71/- by unorganized sector.

## 2.2. BULK LINE COST

Shiyani *et al.*, (1989) conducted a study on economics of buffalo milk production in Kheda district of Gujarat and reported that bulk line cost was Rs. 2.78 per litre. This bulk line cost covered 85% of the total milk production, 79% of total buffaloes and 76% of producers. The average price per litre of milk was Rs. 2.82, which was higher than the bulk line cost. He finally concluded that the dairying was a profitable enterprise in that region.

Vasani *et al.*, (1992) in their study on cost and returns from buffalo milk production in Rajkot district of Saurashtra region observed that the bulk line cost was Rs 5.05 per litre, which was 7 Ps., lower than the average price realised by the milk producers. It indicated that the buffalo production in the study area was profitable. This bulk line cost covered 85% of total milk production, 83.25% of buffalo and 82.5% of producers.

Raut (1979)<sup>and Singh</sup> suggested that the bulk line cost of production was the relevant for pricing of milk. He considered only efficient producers of milk i.e. those with lower cost of milk production. He calculated bulk line cost of 91 Ps./ kg, which covered 80% of total milk production and 88 Ps./ kg covering 70% of total milk production. He suggested that the study on cost of milk production should be revised for every 5-6 years, when the structure of dairy enterprise may be considered to have undergone a change.

## 2.3 MILK PRICING POLICY

Aneja (1974) suggested two axis pricing for milk and recommended that milk plants should provide price for milk on the basis of compositional quality. He also observed that cost of milk production was not taken into consideration for pricing of milk, mainly because of the absence of reliable data.

Patel (1975) suggested that milk pricing policy should give good incentives to producers for producing more milk. The absence of worthwhile policy of milk pricing led to the negligence of the interest on both producers and consumers. He also suggested that cost of milk production, seasonal variation and general market trend should be taken into account for pricing of milk.

Bhatt (1977) suggested that suitable pricing policy was very important for the successful implementation of crossbred animals. No farmer would be willing to rear crossbred animals unless he was convinced for economic feasibility of fair returns from crossbred animals.

Ray (1978) in a study on pricing of milk suggested that pricing should be based on quality and composition of milk. Pricing on the basis of fat is a simple technique but it gives zero weightage to SNF. Pricing on the basis of total solids puts equal weightage to fat and SNF i.e. same market value for both fat and SNF which seldom happens in practice. He identified two axis pricing policy as a suitable one in pricing the milk which is based on the values of butterfat and SMP (Skim Milk Powder) and concluded that crossbred cows would not be affected by this policy.

<sup>and Singh</sup>  
Raut (1979) found that one of the surest means of enhancing milk production was to provide incentive price to the producers. Finally he concluded that one should consider the cost of milk production while fixing the price of milk.

Patel (1993) suggested that cost of milk production should be taken into account for milk pricing. Hence, the cost study should be conducted on regular basis in different states. He also observed that two-axis pricing policy system encouraged the farmers to rear more cows.

Chapter

3

Methodology

### 3. METHODOLOGY

This chapter mainly deals with a brief description of the study area, sampling plan, collection of data, specification of variables along with analytical framework presented in the following sections

1. Description of the study area
2. Sampling plan
3. Collection of data
4. Analytical framework

#### 3.1. DESCRIPTION OF THE STUDY AREA

Coimbatore district is one of the 30 districts of the state of Tamil Nadu. It is situated at the foothills of Nilgiris mountain range. It has been bestowed with many hill ranges and hillocks. It is completely land locked district with Dindigul district in the south, Nilgiris district in the north, Erode district in the east and facing Kerala state border in the west. The district has one corporation, nine taluks, 19 blocks and 388 panchayats respectively.

##### 3.1.1. Area and Population

The total geographical area of the district is 7469.2sq.km. out of which 1615.42, 3585.48 and 1420.27 sq.km are forest, cultivable and irrigated area respectively. It is located at an altitude of 426.72 m and lies between  $10^{\circ}10'$  and  $11^{\circ}30'$  northern latitude and between  $76^{\circ}49'$  and  $77^{\circ}38'$  eastern longitude. As per 2001 census; the total population of the district is 42.24 lakhs, out of which 21.56 lakhs are males and 20.68 lakhs are females. The density of population is 566/sq.km. The literacy rate is 76.95%. Tamil, Telugu, Kannada, Malayalam and Urdu are the major languages, spoken by people in the district. Some of the socio-economic indicators of Coimbatore district in comparison to Tamil Nadu are indicated in Table 3.1.

**Table 3.1. Socio-economic indicators of Coimbatore district and****Tamil Nadu**

| Sl.No. | Socio-economic indicators                      | Tamil Nadu | Coimbatore |
|--------|--|------------|------------|
| 1      | Population (lakhs)                             | 621.10     | 42.24      |
|        | Decadal growth rate in percentage (1991- 2001) | 11.19      | 20.4       |
| 2      | Literacy rate (%)                              | 73.47      | 76.95      |
|        | Male (%)                                       | 82.33      | 83.82      |
|        | Female (%)                                     | 64.55      | 69.8       |
| 3      | Density (No. of persons/ sq.km.)               | 478        | 566        |
| 4      | Sex ratio (No of females per 1000 males)       | 986        | 959        |

(Source: [www.tn.gov.in](http://www.tn.gov.in))

**3.1.2. Rainfall**

Coimbatore district comes under the high altitude hilly zone of Tamil Nadu, where the normal annual rainfall received is 698.9 mm and the climate as a whole in this district is moderate. In winter season (Jan-Feb) average rainfall received is 27.6 mm and in summer (March-May) it is 153.7 mm. The rainfall received during Southwest monsoon (June-Sep) is 182 mm and during Northeast monsoon (Oct-Dec) is 335.6 mm.

**3.1.3. Soil**

The soil of the district is mainly red loam, red sandy and black. The major portion of the district is covered by red soil.

### **3.1.4. Agriculture**

Agriculture is the prime occupation of the people of Coimbatore district. The principal crops grown in the district are Paddy, Sorghum, Maize and Other Cereals, Pulses, Groundnut, Cotton, Sugarcane, Gingelly, Castor, Banana, Turmeric, Mango, Chillies and Onion are the major horticultural crops grown in the district.

### **3.1.5. Irrigation**

Four major rivers are flowing through the district viz Bhavani, Noyyal, Amaravathi and Aliyar, which benefit the agriculture and dairying activities in the district. Open wells and govt. canals are the major irrigation sources in the district. It has 1,63,615 ha of the net area under irrigation out of which 1,17,669 ha (71.92%) of land is irrigated by wells and 33,282 ha (20.34%) of land is irrigated by govt. canals and 2207 ha (1.35%) of land is irrigated by tanks and the rest 10,457 ha (6.39%) by other sources. The gross area irrigated in the district is 1,81,920 ha. The ratio of net area irrigated to net area sown is about 49.77 % and the ratio of gross area irrigated to gross area sown is slightly higher standing to 51.36 per cent.

### **3.1.6. Animal Husbandry**

Department of Animal husbandry, Coimbatore monitors the development of Animal husbandry activities and dairying in the district. The district has a wide range of veterinary institutional network (Table.3.2).

**Table 3.2. Veterinary institutions in Coimbatore district (1999-2000)**

| <b>Sl.No.</b> | <b>Veterinary institutions</b>         | <b>Numbers</b> |
|---------------|--|----------------|
| 1.            | Poly clinics                           | 1              |
| 2             | Clinical Centres                       | 1              |
| 3             | Hospitals                              | 15             |
| 4             | Dispensaries                           | 40             |
| 5             | Mobile dispensaries (Panchayats union) | 19             |
| 6             | Mobile units (district)                | 2              |
| 7             | Sub centres                            | 124            |

(Source: Department of veterinary service, Tamil Nadu)

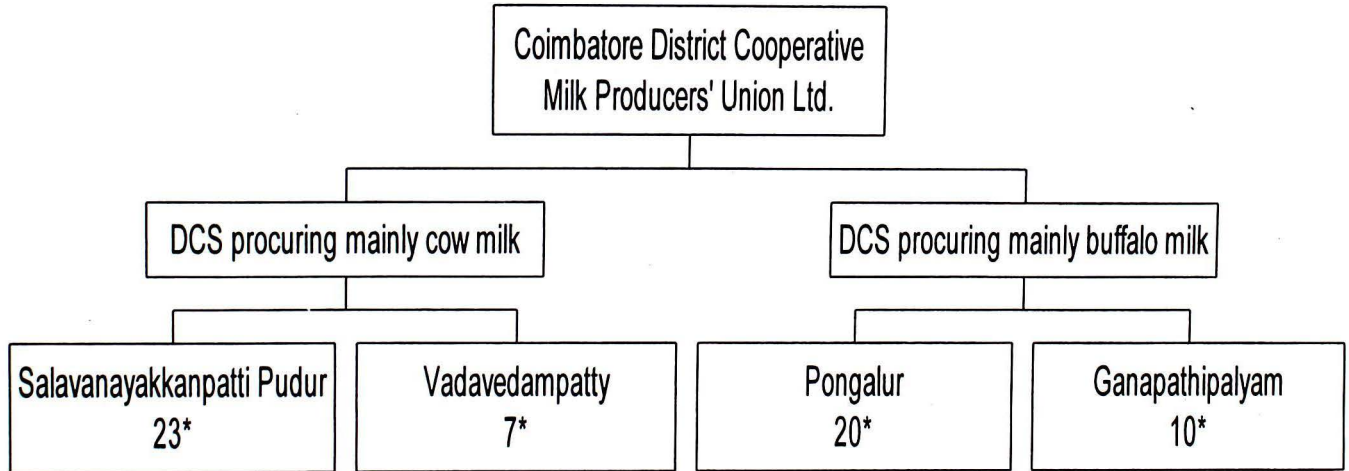
### **3.1.7. Co-operative Movement**

The major breakthrough in the dairy development came in 1972, when the Dairy Development Corporation was formed under companies' act of 1956 for implementing massive dairy development programme called "Operation Flood-I". The corporation gave technical guidelines on total package of milk production, procurement, processing and marketing to various districts including Coimbatore. Dairying was improved much better during this period, thanks to NDDB for its technical assistance and guidance through operation flood programme. Subsequently in 1978 the government has adopted a three tier system in the form of Milk Producers' Cooperative Society at the village level; Union of Producers Societies at the District level and Federation at the state level to take the responsibility in implementing Operation Flood programmes.

## **3.2. SAMPLING PLAN**

Commensurate with the objectives of the study, Coimbatore district was purposively selected mainly because of the fact that it has vast network

Fig.1. Sampling Plan



DCS – Dairy Co-operative Societies

\* Indicates No. of respondents selected

of Dairy Cooperative Societies. Moreover the researcher belongs to this area and knows local languages and socio-economic norms of the people, which were highly useful in data collection.

### **3.2.1. Selection of Dairy Cooperative Societies**

There are 523 Dairy Cooperative Societies in the Coimbatore district co-operative milk producers' union Ltd. Out of these, two Dairy Cooperative Societies procuring mainly cow milk and two Dairy Cooperative Societies procuring mainly buffalo milk were selected randomly.

### **3.2.2. Selection of Members Household**

Information on complete population of all the regular milk producing members (those who are supplying the milk to Dairy Cooperative Societies regularly, but need not throughout the year) in selected Dairy Cooperative Societies were considered along with their herd size based on milch animal. They were classified according to different herd size with a view in studying various economic aspects of dairying. Cumulative square root method of stratification was followed to categorize the producers. They were grouped in to 3 categories viz., small (1-3 animals), medium (4-5 animals) and large ( $\geq 6$  animals). Altogether 60 members household (comprising 30 each from crossbred cow and buffalo maintaining families) were randomly selected from almost all categories of households based on proportional random sampling (Table 3.3). Simple Random Sampling without replacement was employed for selecting the member households in each category.

**Table 3.3. Distribution of sample households among different categories of members**

| SI.No | Dairy Co-operative Societies | Small | Medium | Large | Total |
|-------|------------------------------|-------|--------|-------|-------|
| 1.    | Salavanayakkanpatti Pudur    | 17    | 4      | 2     | 23    |
| 2.    | Vadavedampatty               | 5     | 1      | 1     | 7     |
| 3.    | Pongalur                     | 15    | 5      | 0     | 20    |
| 4.    | Ganapathipalayam             | 8     | 2      | 0     | 10    |
|       | Total                        | 45    | 12     | 3     | 60    |

**Table 3.4. Distribution of milch animals among selected households**

| Particulars | Dairy Co-operative Societies | Small         | Medium        | Large         | Total        |
|-------------|------------------------------|---------------|---------------|---------------|--------------|
| Crossbred   | 1. Salavanayakkanpatti Pudur | 31            | 16            | 12            | 59           |
|             | 2. Vadavedampatty            | 13            | 4             | 9             | 26           |
| Buffalo     | 3. Pongalur                  | 29            | 9             | -             | 38           |
|             | 4. Ganapathipalayam          | 11            | 8             | -             | 19           |
|             | Total                        | 84<br>(59.15) | 37<br>(26.06) | 21<br>(14.79) | 142<br>(100) |

(Figures in parenthesis indicate percentage to the total animals)

### **3.3. DATA COLLECTION**

The data for the investigation were collected from both Primary and Secondary sources.

#### **3.3.1. Primary Data**

The primary data were collected from the selected members household by conventional survey method on a well structured, pre-tested schedule through personal interview. This covered various aspects of dairy enterprise like occupation, family size, sex, education, operational holding, herd size, type of animals, dairy equipment, value of cattle shed. Quantity of various inputs and outputs along with their money values, family and hired labour used along with prevailing wage rate and other related miscellaneous expenditures were also collected. To meet the requirement of the objectives of the study, information on all the aspects were collected as per the schedule.

#### **3.2.2. Secondary Data**

Secondary data regarding total area of the district, population, agro climatic features, land use pattern, cropping pattern, cropping intensity, livestock population were collected from District Animal Husbandry department, District Statistical Office, Department of Agricultural Extension etc. Number of milk producers' cooperative societies, infrastructure facilities of dairy development, fat, lactometer readings of the selected members household for the past and concurrent period were collected from Coimbatore District Cooperative Milk Producers' Union Ltd. and respective Cooperative societies.

### **3.4. ANALYTICAL FRAME WORK**

In this section, the methodology for estimating the cost of milk production, bulk line costing and determining the weightage for valuation of SNF-fat in milk have been described

### 3.4.1. Estimating the Cost of Milk Production

The cost items were broadly classified into two types, namely fixed cost and variable cost for estimating the total cost of milk production.

#### 3.4.1.1. Fixed Cost

Fixed costs are those expenditures, which will be incurred irrespective of the size of production. It includes interest on fixed capital, depreciation and insurance cost. The fixed costs were apportioned based on Standard Animal Unit (SAU) given by Patel. The conversion coefficients are,

| Particulars               | Conversion coefficients |
|---------------------------|-------------------------|
| Adult crossbred cow       | 1.4                     |
| Adult local cow           | 1                       |
| Adult buffalo             | 1.3                     |
| Draught animals           | 1.0                     |
| Crossbred heifer > 1 year | 0.75                    |
| Local heifer > 2 year     | 0.75                    |
| All calves > 1year        | 0.50                    |
| All calves < 1year        | 0.33                    |

#### Interest on Fixed Capital

It is the payment for use of fixed capital. It comprised the value of cattle shed, equipment, machinery and milch animal. The interest rates on fixed capital were calculated at the bank lending rate of 10.5 per cent per annum.

## Depreciation

It is the loss in the value of given assets as a result of the use, wear and tear, accidental damage and time obsolescence irrespective of the change in the general price of the item. It includes depreciation on permanent cattle shed, machinery and equipment and milch animals. This was calculated by using the parameters developed by Rao (1991) and Patel (1979).

**The depreciation rate for various items took into account were**

| Sl.No. | Items   | Depreciation rate (%)         |
|--------|---|-------------------------------|
| 1.     | Pucca cattle shed and stores*                                   | 2                             |
| 2.     | Kaccha cattle shed and stores*                                  | 5                             |
| 3.     | Milch animal up to 3 <sup>rd</sup> lactation**                  | Nil                           |
| 4.     | Milch animal of 4 <sup>th</sup> and 5 <sup>th</sup> lactation** | 10                            |
| 5.     | Milch animal $\geq 6^{\text{th}}$ lactation**                   | Double the rate               |
| 6.     | Equipment and machinery   | As per productive life period |

\* Rao (1991)

\*\* Patel (1979)

## Insurance Cost

It was calculated @ 4.5 per cent per annum for crossbred cows, as only these animals were insured in the study area.

### 3.4.1.2. Variable Cost

It includes feed cost, labour cost, veterinary and breeding cost and miscellaneous cost.

## **Feed Cost**

It was worked out for various categories of households by multiplying the average value of quantities for green fodder, dry fodder, and concentrate fed per animal with their respective market prices. Average quantity fed per animal in the whole year was taken in to account to calculate feed cost.

## **Labour Cost**

It included permanent, family and hired labour employed for milk production and was computed on the basis of prevailing wage rate. The time devoted by child and female labour was converted into standard man-hour.

2 male = 3 female

1 male = 2 children

## **Veterinary and Breeding Cost**

The charges for natural services, artificial insemination and treatment of milch animals were calculated for various breeds under different categories of households based on their respective charges.

## **Miscellaneous Expenses**

It includes cost of repairs, electricity tariff, water charges, purchase of buckets, ropes, chains, broomsticks, etc.

## **Interest on Working Capital**

It was not computed, as there was regular income flow from the sale of milk. (Grover *et al.*, 1992)

### **3.4.1.3. Total Cost**

It was calculated for different categories of households by adding total fixed cost and total variable cost.

#### **3.4.1.4. Net Cost**

Net cost for various breeds under different categories of households was calculated by subtracting dung value from gross cost.

#### **3.4.1.5. Total Return**

It was calculated by multiplying the quantity of milk with current market price.

#### **3.4.1.6. Cost of milk production**

The cost of milk production (Rs./lit) has been worked out from the cost and returns table of milch animals by dividing individual cost components by their respective total cost involved. For this calculation the respective average milk production in each household was taken.

#### **3.4.2. Estimation of Bulk Line Cost**

Bulk line cost is that level of cost which covered / reflected bulk line (i.e. 85<sup>th</sup> percentile) of milk production. It should be used as a base line for any decision making on pricing and hence, it covered bulk of the milk produced in the study area. The bulk line cost for crossbred cow and buffalo separately estimated at 85<sup>th</sup> percentile level of production was compared with the Coimbatore Dairy Co-operatives rate. This is of use to know the profitability of dairying in the study area. For working out bulk line cost, the total cost of milk production per litre was worked out for each milk producing household separately. The estimated total cost was arranged in ascending order for each household along with its quantity of milk produced and herd size maintained. Cumulative total of milk production for each household as per ascending order of its respective cost was made. The cost, which reflected 85<sup>th</sup> percentile of the cumulative milk production, was considered as the bulk line cost. The bulk line cost in this manner was calculated separately for cow and buffalo milk.

### **3.4.2.1. Pricing of Milk Produced By Each Household**

Pricing of milk at dairy co-operative societies level was done on the basis of two axis pricing policy (i.e.) considering the both fat and SNF. Fat was estimated using Gerber method. Lactometer readings and modified Richmond's formula was used to estimate the SNF in milk.

Coimbatore dairy co-operatives pay Rs.163.43/kg fat for buffalo milk and Rs.73.08/kg Total Solids (TS) for cow milk. The societies were provided with ready reckoner to find out the price of milk for its corresponding fat and SNF.

In pricing the cow milk, societies adopted a system that paid on the basis of per kg TS. For each 0.1 unit increase in fat/SNF, 7 paise get added to the rate of milk.

In pricing the buffalo milk, for every 0.1 unit increase in fat has received 16 paise more compared to only 3 paise in SNF.

Fat and SNF of milk from selected member households milk were noted down from the records maintained by respective dairy co-operatives. Average of these fat and SNF were used to find out the milk price for each household, taking into account all the seasons.

### **3.4.3 Determination of weights of SNF and fat for two axis pricing**

There was no uniform pattern followed throughout the country to give weightage to SNF-fat value, while fixing the price of milk. Generally, the dairy plants fix their own SNF-fat weights, fat rates to attract higher milk procurement. The pricing of buffalo milk by the dairy plants in organized sector is being done on the basis of per kg fat rate.

Cow milk normally has been paid by Equivalent Fat Units (EFU) basis. The analysis based on past data revealed that market valuation of SMP is around  $\frac{2}{3}$ <sup>rd</sup> of Ghee value and accordingly the SNF valuation was considered to be  $\frac{2}{3}$ <sup>rd</sup> of fat under two axis pricing policy. It is of prime

importance to know, how much weightage should be given to SNF and fat, so that cow milk production become profitable.

In order to reveal the significant difference between the milk price based on different weights used for SNF and their coverage of cost of milk production, different systems of weightage were used.

Coimbatore dairy co-operative has been paying cow milk on the basis of total solid. Different plants using different SNF-fat weightages for valuation of EFU as basis of two axis pricing policy. Some plants use 2/3<sup>rd</sup> weightage system to SNF while others use 42/58, 45/55, 3/4 and equal weightage system.

To find out the influence of different weights on cow milk price the Coimbatore co-operative rates and bulk line costing was used as base. Effort was made to estimate the milk price received by the producers with existing rate in Coimbatore, but with different weightages (2/3<sup>rd</sup>, 42/58, 45/55 etc.) given by co-operative, private and public plants. In order to reveal the significant difference between the price received by producers with different weightages and cost of milk production, 't' test was employed.

$$t = \frac{(\bar{x}_1 - \bar{x}_2)}{S} \times \sqrt{\frac{n_1 n_2}{n_1 + n_2}}$$

$$S = \sqrt{\frac{(n_1 - 1) s_1^2 + (n_2 - 1) s_2^2}{n_1 + n_2 - 2}}$$

Where,

$\bar{x}_1$  &  $\bar{x}_2$  – mean value of price/cost of cow milk

S – Pooled standard deviation

$s_1^2$ ,  $s_2^2$  – Variance of  $x_1$  and  $x_2$  variables

$n_1$ ,  $n_2$  – Respective total observations of  $x_1$  &  $x_2$  variables.

### **3.4.2.1. Pricing of Milk Produced By Each Household**

Pricing of milk at dairy co-operative societies level was done on the basis of two axis pricing policy (i.e.) considering the both fat and SNF. Fat was estimated using Gerber method. Lactometer readings and modified Richmond's formula was used to estimate the SNF in milk.

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There was no uniform pattern followed throughout the country to give weightage to SNF fat value, while fixing the price of milk. Generally, the dairy plants fix their own SNF-fat weights, fat rates to attract higher milk procurement. The pricing of buffalo milk by the dairy plants in organized sector is being done on the basis of per kg fat rate.

Cow milk normally has been paid by Equivalent Fat Units (EFU) basis. The analysis based on past data revealed that market valuation of SMP is around  $2/3^{\text{rd}}$  of Ghee value and accordingly the SNF valuation was considered to be  $2/3^{\text{rd}}$  of fat under two axis pricing policy. It is of prime

importance to know, how much weightage should be given to SNF and fat, so that cow milk production become profitable.

In order to reveal the significant difference between the milk price based on different weights used for SNF and their coverage of cost of milk production, different systems of weightage were used.

Coimbatore dairy co-operative has been paying cow milk on the basis of total solid. Different plants using different SNF-fat weightages for valuation of EFU as basis of two axis pricing policy. Some plants use 2/3<sup>rd</sup> weightage system to SNF while others use 42/58, 45/55, 3/4 and equal weightage system.

To find out the influence of different weights on cow milk price the Coimbatore co-operative rates and bulk line costing was used as base. Effort was made to estimate the milk price received by the producers with existing rate in Coimbatore, but with different weightages (2/3<sup>rd</sup>, 42/58, 45/55 etc.) given by co-operative, private and public plants. In order to reveal the significant difference between the price received by producers with different weightages and cost of milk production, 't' test was employed.

$$t = \frac{(\bar{x}_1 - \bar{x}_2)}{S} \times \sqrt{\frac{n_1 n_2}{n_1 + n_2}}$$

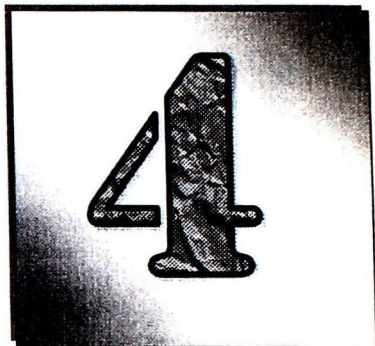
$$S = \sqrt{\frac{(n_1 - 1) s_1^2 + (n_2 - 1) s_2^2}{n_1 + n_2 - 2}}$$

Where,

- $\bar{x}_1$  &  $\bar{x}_2$  – mean value of price/cost of cow milk
- S – Pooled standard deviation
- $s_1^2$ ,  $s_2^2$  – Variance of  $x_1$  and  $x_2$  variables
- $n_1$ ,  $n_2$  – Respective total observations of  $x_1$  &  $x_2$  variables.

The test of significance as reported above was used to determine whether pricing policy should use the concept of average cost of production or bulk line cost of production. The test of significance was also used to determine the significant difference between cost and prices received for cow milk by different SNF-fat weightages. The average cost reflects mean values of all the different/ varying values of cost of milk produced by different households. If the average cost is lower than the average price, it does not necessarily mean that dairying in a particular area is remunerative enterprise.

Chapter



Results et  
Discussion

## 4. RESULTS AND DISCUSSION

In the light of the objectives of this study, the collected data were analysed. The results of this data analysis have been presented under three sections. The first section deals with the cost and return of milk from different categories of dairy household members. The next section describes the bulk line cost. Finally, comparison of pricing of milk has been done with different weightage SNF-fat ratios.

Before discussing the results of the present investigation, the information compiled on socio-economic profile of the sample households has been discussed below

### 4.1. Socio-economic profile of sample households

The decision making process and profitability of dairy enterprise largely depends upon the socio-economic features of the dairy farmers. The data collected from 60 households spread over three categories, namely small, medium and large represented a cross-section of milk producers in the study area. An attempt was made as under to analyse the important socio-economic particulars of sample households:

#### 4.1.1. Family size and educational status

Family size is an important factor that influences the scale of dairy enterprise because it is more labour intensive than other enterprises.

The educational standard of the farmer gives better response to adopt improved technology to diversify farm business and to earn more. This is especially true with dairy enterprise, which ensures a better quality of management input than traditional crop farming. Thus, the availability to take effective managerial decision depends upon the level of education of the head of the households. As the family head takes the major decisions, their

education status was taken into consideration in the present study and is presented in Table 4.1 along with family size.

The overall average family size was observed to be 4.18 persons per household. A close look at the table revealed that about 45 per cent of the family head were illiterate, 16.67 per cent were educated upto primary level, 26.67 per cent were upto metric level, 8.33 per cent were upto secondary level and remaining 3.33 per cent were degree holders.

#### **4.1.2. Composition of the herd**

The number of wet animals with the milk producers affects the economy of dairy enterprise. Therefore, the milch animals maintained by the sample households were classified into wet, dry heifers and young stock. The average number of animals within each category of sample household is presented in Tables 4.2 and 4.3. In order to have a valid comparison, different species among sample households were converted into Standard Animal Unit.

On an average, crossbred rearing households maintained 2.84 heads of milch animals, 1.31 heifers and 2.27 young stock with an average herd size per household of about 6.42 in number.

Buffalo rearing households maintained 1.90 herds of milch animals, 1.27 heifers and 1.79 young stock with an average herd size per household of about 4.96 in number. On an average, 5.71 SAU was found in crossbred cows compared to only 3.52 in buffalo category. In total herd size, milch animals occupied the major share in both cow and buffalo category.

The cow herd size was 4.48, 8.25 and 14 for small, medium and large category of farm households, whereas buffalo herd size was 4.03 and 10.25 for small and medium farm households, respectively. This herd size included wet, dry heifers and young stock animals.

**Table 4.1. Family size and educational status of sample households**

| Particulars                  | Farm category according to herd size |            |            |             |
|------------------------------|--------------------------------------|------------|------------|-------------|
|                              | Small                                | Medium     | Large      | Overall     |
| <b>1. Family size</b>        | 4.20                                 | 4.22       | 3.67       | 4.18        |
| <b>2. Educational status</b> |                                      |            |            |             |
| i. Illiterate                | 22 (45.83)                           | 4 (44.45)  | 1 (33.33)  | 27 (45.00)  |
| ii. Primary                  | 8 (16.67)                            | 2 (22.22)  | -          | 10 (16.67)  |
| iii. Metric                  | 13 (27.08)                           | 2 (22.22)  | 1 (33.34)  | 16 (26.67)  |
| iv. Secondary                | 4 (8.33)                             | -          | 1 (33.34)  | 5 (8.33)    |
| v. Degree                    | 1 (2.09)                             | 1 (11.11)  | -          | 2 (3.33)    |
| vi. Total                    | 48 (100.00)                          | 9 (100.00) | 3 (100.00) | 60 (100.00) |

(Figures in parenthesis indicate percentage to total)

**Table 4.2. Average crossbred cow herd size per sample household**

| SI.No. | Particulars          | Farm category according to herd size |                  |                   |                  |
|--------|----------------------|--------------------------------------|------------------|-------------------|------------------|
|        |                      | Small                                | Medium           | Large             | Overall          |
| 1.     | Wet animals          | 1.64                                 | 2.60             | 5.33              | 2.17             |
| 2.     | Dry animals          | 0.36                                 | 1.40             | 1.67              | 0.67             |
| 3.     | Milch animals        | 2.00<br>(41.32)                      | 4.00<br>(48.48)  | 7.00<br>(50.00)   | 2.84<br>(44.24)  |
| 4.     | Heifers              | 1.11<br>(22.93)                      | 1.25<br>(15.15)  | 2.00<br>(14.29)   | 1.31<br>(20.40)  |
| 5.     | Young stock          | 1.73<br>(35.75)                      | 3.00<br>(36.37)  | 5.00<br>(35.71)   | 2.27<br>(35.36)  |
| 6.     | Herd size            | 4.84<br>(100.00)                     | 8.25<br>(100.00) | 14.00<br>(100.00) | 6.42<br>(100.00) |
| 7.     | Standard Animal Unit | 3.98                                 | 8.14             | 14.28             | 5.71             |

(Figures in parenthesis indicate percentage to total)

**Table 4.3. Average buffalo herd size per sample household**

| Sl.No. | Particulars          | Farm category according to herd size |                   |       |                  |
|--------|----------------------|--------------------------------------|-------------------|-------|------------------|
|        |                      | Small                                | Medium            | Large | Overall          |
| 1.     | Wet animals          | 1.35                                 | 3.25              | -     | 1.60             |
| 2.     | Dry animals          | 0.19                                 | 1.00              | -     | 0.30             |
| 3.     | Milch animals        | 1.54<br>(38.21)                      | 4.25<br>(41.46)   | -     | 1.90<br>(38.31)  |
| 4.     | Heifers              | 1.09<br>(27.05)                      | 1.75<br>(17.07)   | -     | 1.27<br>(25.60)  |
| 5.     | Young stock          | 1.4<br>(34.74)                       | 4.25<br>(41.46)   | -     | 1.79<br>(36.09)  |
| 6.     | Herd size            | 4.03<br>(100.00)                     | 10.25<br>(100.00) | -     | 4.96<br>(100.00) |
| 7.     | Standard Animal Unit | 2.79                                 | 10.25             | -     | 3.52             |

(Figures in parenthesis indicate percentage to total)

### **4.1.3. Investment pattern**

The pattern and magnitude of investment in fixed asset in dairy enterprise are the important indicators of the income generating capacity of the milk producers. Therefore, investment made in cattle shed, stores and milch animals per household was worked out for different categories of households.

The Table 4.4 presents the investment pattern on fixed assets per household maintaining crossbred cow. It revealed that the total investment on fixed assets per crossbred cow in dairy enterprise was Rs.9962.56, out of which 85.47 per cent was on milch animals, 9.46 per cent on cattle shed and stores and 5.07 per cent on dairy equipment and machinery. A category-wise comparison revealed that investment on milch animals and cattle shed were highest in medium category producers followed by large and small category producers.

Table 4.5 revealed the investment pattern on fixed assets for buffalo keeping by various categories of milk producers. The total investment for an average producer was 8438.54, of which a sizeable 90.28 per cent on dairy milch animals, 7.54 per cent on dairy building and 2.18 per cent on equipment and machinery. A category-wise comparison revealed that the total fixed investment per milch animal was highest in medium category producers followed by small category producers. Thus, the major part of total investment goes to animal, followed by dairy buildings and dairy equipment and machinery.

Information on feed and fodder given to milch animal in different categories of farm households has been given in Annexure-II.

### **4.1.4. Production performance of milch animals**

Milk yield is the main outcome in dairy enterprise and has economic significance in the production process to the milk producers. The yield potential depends upon a number of factors like breed, stage and order of

lactation, quantity and quality of feed and fodder fed, management etc. The average milk yield per animal per year is presented in Table 4.6.

The overall average milk yield per animal per year was 1054.86 litres for buffaloes and 1318.24 litres for crossbred cows. The yield of crossbred cows was higher than that of the buffaloes. It was evident from the Table that the crossbred cow maintained by medium category producers yielded more milk compare to others, which may be due to better feeding.

#### **4.2. Cost and return analysis**

With a view to evaluate relative performance of milch animals in various categories of households, cost and return analysis was carried out. An attempt was, therefore, made to examine the extent of expenditure incurred and revenue generated in maintaining milch animals. The total cost was divided into two major groups, i.e., variable and fixed cost. Variable costs included expenditure on green fodder and dry fodder, concentrates, labour and miscellaneous charges. The interest on working capital was not included in the variable cost, because dairy enterprise generates regular flow of income. Fixed costs included depreciation and interest on fixed assets like cattle shed and stores, dairy machinery and equipment and milch animals. It included insurance charges of the animals also.

The information on cost and return per milch animal and per litre have been discussed in following two sub-sections, respectively.

##### **4.2.1. Cost and returns per milch animal**

On an average, the annual total cost per crossbred cow and buffalo was about Rs.10,231.01 and Rs.11,340.55, respectively (Tables 4.7 and 4.8). The proportion of variable cost to the gross cost was 89.47 per cent for crossbred cow and 93.11 per cent for buffalo. While the fixed cost were lower for buffalo (6.89%) as compared to the crossbred cows (10.53%). It may be due to good quality animal as well as more investment on cattleshed maintained by crossbred cow rearing households. Item-wise cost revealed

**Table 4.4. Investment pattern of different category of farm households having crossbred cows (Rs. / household)**

| SI.No. | Investment                    | Farm category according to herd size |                      |                      |                     |
|--------|-------------------------------|--------------------------------------|----------------------|----------------------|---------------------|
|        |                               | Small                                | Medium               | Large                | Overall             |
| 1.     | Milch animals                 | 8443.18<br>(90.22)                   | 8625.00<br>(83.72)   | 8559.52<br>(78.49)   | 8514.71<br>(85.47)  |
| 2.     | Cattle shed and stores        | 570.45<br>(6.10)                     | 1400.00<br>(13.59)   | 1285.71<br>(11.79)   | 942.35<br>(9.46)    |
| 3.     | Dairy equipment and machinery | 344.68<br>(3.68)                     | 277.56<br>(2.69)     | 1059.52<br>(9.72)    | 505.50<br>(5.07)    |
|        | Total                         | 9358.31<br>(100.00)                  | 10302.56<br>(100.00) | 10904.75<br>(100.00) | 9962.56<br>(100.00) |

(Figures in parenthesis indicate percentage to total)

**Table 4.5. Investment pattern of different category of farm households having buffaloes (Rs. / household)**

| SI.No. | Investment                    | Farm category according to herd size |                     |       |                     |
|--------|-------------------------------|--------------------------------------|---------------------|-------|---------------------|
|        |                               | Small                                | Medium              | Large | Overall             |
| 1.     | Milch animals                 | 7456.25<br>(90.95)                   | 8000.00<br>(88.85)  | -     | 7618.42<br>(90.28)  |
| 2.     | Cattle shed and stores        | 556.25<br>(6.79)                     | 823.53<br>(9.15)    | -     | 635.96<br>(7.54)    |
| 3.     | Dairy equipment and machinery | 185.68<br>(2.26)                     | 180.59<br>(2.00)    | -     | 184.16<br>(2.18)    |
|        | Total                         | 8198.18<br>(100.00)                  | 9004.12<br>(100.00) | -     | 8438.54<br>(100.00) |

(Figures in parenthesis indicate percentage to total)

**Table 4.6. Average milk yield per animal for different categories of farm households**

(Litres/animal/ annum)

| Particulars   | Farm category according to herd size |         |         |         |
|---------------|--------------------------------------|---------|---------|---------|
|               | Small                                | Medium  | Large   | Overall |
| Crossbred cow | 1278.41                              | 1440.00 | 1407.41 | 1318.24 |
| Buffalo       | 1058.97                              | 1028.13 | -       | 1054.86 |

**Table 4.7. Cost and Returns per crossbred cow**

(Rs./ Animal/ Year)

| Sl.No. | Particulars                           | Farm category according to herd size |          |          |          |          |          |          |          |
|--------|---------------------------------------|--------------------------------------|----------|----------|----------|----------|----------|----------|----------|
|        |                                       | Small                                |          | Medium   |          | Large    |          | Overall  |          |
|        |                                       | Rs.                                  | Per cent | Rs.      | Per cent | Rs.      | Per cent | Rs.      | Per cent |
| 1.     | Green fodder                          | 978.86                               | 9.70     | 1127.13  | 10.20    | 922.64   | 9.49     | 1006.28  | 9.84     |
| 2.     | Dry fodder                            | 2542.56                              | 25.20    | 2317.75  | 20.97    | 2304.23  | 23.69    | 2481.26  | 24.25    |
| 3.     | Concentrate                           | 3186.08                              | 31.57    | 4375.17  | 39.59    | 3884.88  | 39.95    | 3462.47  | 33.84    |
| 4.     | Total feed cost (1+2+3)               | 6707.50                              | 66.47    | 7820.05  | 70.76    | 7111.75  | 73.13    | 6950.01  | 67.93    |
| 5.     | Labour cost                           | 2101.52                              | 20.83    | 1794.58  | 16.24    | 1115.28  | 11.47    | 1951.74  | 19.08    |
| 6.     | Miscellaneous expenditure             | 259.04                               | 2.57     | 226.40   | 2.05     | 244.69   | 2.52     | 252.16   | 2.46     |
| 7.     | Total variable cost (4+5+6)           | 9068.05                              | 89.87    | 9841.03  | 89.04    | 8471.72  | 87.11    | 9153.91  | 89.47    |
| 8.     | Total Fixed Cost                      | 1022.68                              | 10.13    | 1210.75  | 10.96    | 1253.38  | 12.89    | 1077.09  | 10.53    |
| 9.     | Total cost (7+8)                      | 10090.73                             | 100.00   | 11051.78 | 100.00   | 9725.10  | 100.00   | 10231.01 | 100.00   |
| 10.    | Value of dung                         | 776.52                               | 7.70     | 856.25   | 7.75     | 893.52   | 9.19     | 818.17   | 8.00     |
| 11.    | Net cost (9-10)                       | 9314.21                              | 92.30    | 10195.53 | 92.25    | 8831.58  | 90.81    | 9412.83  | 92.00    |
| 12.    | Quantity of milk produced (lit/ year) | 1278                                 | 12.67    | 1440     | 13.03    | 1407     | 14.47    | 1318     | 12.88    |
| 13.    | Average price (Rs./ litre)            | 8.80                                 | -        | 8.92     | -        | 8.88     | -        | 8.83     | -        |
| 14.    | Total return (12x13)                  | 11246.40                             | 111.45   | 12844.80 | 116.22   | 12494.16 | 128.47   | 11634.42 | 113.72   |
| 15.    | Net profit (14-11)                    | 1932.19                              | 19.15    | 2649.27  | 23.97    | 3662.58  | 37.66    | 2221.59  | 21.71    |
| 16.    | Average herd size                     | 2.00                                 | -        | 4.00     | -        | 7.00     | -        | 2.84     | -        |

**Table 4.8. Cost and Returns per buffalo**

(Rs./ Animal/ Year)

| Sl.No. | Particulars                           | Farm category according to herd size |          |          |          |       |          |          |          |
|--------|---------------------------------------|--------------------------------------|----------|----------|----------|-------|----------|----------|----------|
|        |                                       | Small                                |          | Medium   |          | Large |          | Overall  |          |
|        |                                       | Rs.                                  | Per cent | Rs.      | Per cent | Rs.   | Per cent | Rs.      | Per cent |
| 1.     | Green fodder                          | 2402.57                              | 20.94    | 2258.44  | 21.79    | -     | -        | 2311.68  | 20.38    |
| 2.     | Dry fodder                            | 2505.63                              | 21.84    | 1821.35  | 17.57    | -     | -        | 2414.39  | 21.29    |
| 3.     | Concentrate                           | 3123.22                              | 27.22    | 3417.54  | 32.97    | -     | -        | 3205.80  | 28.27    |
| 4.     | Total feed cost (1+2+3)               | 8031.42                              | 70.00    | 7497.33  | 72.33    | -     | -        | 7931.87  | 69.94    |
| 5.     | Labour cost                           | 2552.48                              | 22.25    | 1870.63  | 18.05    | -     | -        | 2504.90  | 22.09    |
| 6.     | Miscellaneous expenditure             | 117.74                               | 1.03     | 154.89   | 1.49     | -     | -        | 122.69   | 1.08     |
| 7.     | Total variable cost (4+5+6)           | 10701.63                             | 93.27    | 9522.84  | 91.88    | -     | -        | 10559.46 | 93.11    |
| 8.     | Total Fixed Cost                      | 771.71                               | 6.73     | 842.12   | 8.12     | -     | -        | 781.09   | 6.89     |
| 9.     | Total cost (7+8)                      | 11473.34                             | 100.00   | 10364.96 | 100.00   | -     | -        | 11340.55 | 100.00   |
| 10.    | Value of dung                         | 800.01                               | 6.97     | 565.63   | 5.46     | -     | -        | 783.75   | 6.91     |
| 11.    | Net cost (9-10)                       | 10673.33                             | 93.03    | 9799.34  | 94.54    | -     | -        | 10556.80 | 93.09    |
| 12.    | Quantity of milk produced (lit/ year) | 1059                                 | 9.23     | 1028     | 9.92     | -     | -        | 1055     | 9.30     |
| 13.    | Average price (Rs./ litre)            | 11.23                                | -        | 11.13    | -        | -     | -        | 11.22    | -        |
| 14.    | Total return (12x13)                  | 11892.57                             | 103.65   | 11441.64 | 110.39   | -     | -        | 11833.58 | 104.35   |
| 15.    | Net profit (14-11)                    | 1219.24                              | 10.63    | 1642.30  | 15.84    | -     | -        | 1276.78  | 11.26    |
| 16.    | Average herd size                     | 1.54                                 | -        | 4.25     | -        | -     | -        | 1.90     | -        |

that the feed and fodder constituted about 68 per cent for crossbred cows and 70 per cent for buffaloes. The expenditure on concentrates alone recorded the highest share among the feed cost, while human labour charge was major one among variable cost. The concentrates alone shared 34 and 28 per cent of gross cost in crossbred cow and buffalo, respectively. The proportion of expenditure on labour was about 19 and 22 per cent of the gross cost for the crossbred cow and buffalo, respectively, which decreased with an increase in herd size.

It was observed that the maintenance cost per crossbred cow per annum ranged from minimum Rs.9,725 in large farms to maximum Rs.11,152 in medium farms makes an overall Rs.10,231 on the sample households. The average annual maintenance cost of a buffalo worked out to nearly at Rs.111,64. The proportion of variable cost was higher in small category producers as compared to other category of households. The expenditure on human labour was highest in small category producers for both crossbred cows and buffaloes. But fixed cost was higher on the large category producers compared to medium and small category producers. It may be due to large overhead cost incurred by large category producers such as depreciation and interest on fixed capital assets like milch animals and cattle shed.

It is interesting to observe that overall net profit per annum from crossbred cows was approximately Rs.2222, ranged from Rs.1932 in small category producers to Rs.3663 in large category producers. While from buffaloes, net profit was higher in medium category producers (Rs.1642) as compared to small category producers (Rs.1219). The reason for the higher net profit from crossbred cow is mainly attributed to its higher productivity than buffaloes (Table 4.6). As the herd size increases, the net profit also increased due to the economy of scale. Thus, it may be concluded that only with higher productivity with better marketing avenue (i.e. better price) milch animals could become viable proposition and generate reasonably good income. In view of high human labour absorption in dairy enterprise, any effort to

encourage dairying with high yielding milch animals will provide an opportunity for greater family labour income.

#### **4.2.2. Cost and return per litre of milk**

Cost of milk production per litre is another important economic indicator, which can help the farmer in taking important management decisions. Therefore, per unit cost of milk production was calculated and is presented in Tables 4.9 and 4.10.

The cost of milk production for crossbred cows has been given in Table 4.9. It could be observed that net cost was Rs.7.18. It varied from Rs.6.27 on large category producers to Rs.7.32 on small category producers. The cost of milk production for buffaloes was Rs.9.90 per litre. The cost of milk production per buffalo was the lowest on medium and highest on small category producers.

The highest cost of milk production in buffalo could be mainly attributed to their lowest milk production in comparison to crossbred cows during the year. It was also noted that feed was the major component of production cost followed by labour for all categories of households and for different types of milch animals.

After evaluating the cost incurred and returns received from the milk production, the analysis for bulk line cost and the pricing of milk based on the pricing policy of Coimbatore Dairy Co-operatives have been described in the next section.

#### **4.3. Bulk line cost and existing pricing policy**

The details of bulk line costing of cow milk production along with pricing of milk are given in table 4.11. This table revealed the cost per litre for thirty milk producing households and were arranged in ascending order. The cost per litre ranged from Rs. 5.37 to Rs. 8.94. The bulk line cost in between this lower and upper range earmarked at 85th percentile of milk production ranked for 24th farm household in serial order was Rs. 7.96 per litre exactly. The

**Table 4.9. Cost of per litre milk production for crossbred cow**

(Rs./ litre)

| Sl.No. | Particulars                 | Farm category according to herd size |          |        |          |       |          |         |          |
|--------|-----------------------------|--------------------------------------|----------|--------|----------|-------|----------|---------|----------|
|        |                             | Small                                |          | Medium |          | Large |          | Overall |          |
|        |                             | Rs.                                  | Per cent | Rs.    | Per cent | Rs.   | Per cent | Rs.     | Per cent |
| 1.     | Green fodder                | 0.77                                 | 9.69     | 0.82   | 10.55    | 0.65  | 9.47     | 0.77    | 9.82     |
| 2.     | Dry fodder                  | 2.01                                 | 25.28    | 1.61   | 20.73    | 1.64  | 23.70    | 1.90    | 24.39    |
| 3.     | Concentrate                 | 2.49                                 | 31.36    | 3.09   | 39.76    | 2.76  | 39.94    | 2.62    | 33.51    |
| 4.     | Total feed cost (1+2+3)     | 5.27                                 | 66.34    | 5.52   | 71.04    | 5.05  | 73.11    | 5.29    | 67.72    |
| 5.     | Labour cost                 | 1.65                                 | 20.79    | 1.25   | 16.10    | 0.79  | 11.47    | 1.50    | 19.18    |
| 6.     | Miscellaneous expenditure   | 0.21                                 | 2.60     | 0.16   | 2.02     | 0.17  | 2.52     | 0.19    | 2.49     |
| 7.     | Total variable cost (4+5+6) | 7.12                                 | 89.72    | 6.93   | 89.17    | 6.02  | 87.10    | 6.98    | 89.40    |
| 8.     | Total Fixed Cost            | 0.82                                 | 10.28    | 0.84   | 10.83    | 0.89  | 12.90    | 0.83    | 10.60    |
| 9.     | Total cost (7+8)            | 7.94                                 | 100.00   | 7.77   | 100.00   | 6.91  | 100.00   | 7.81    | 100.00   |
| 10.    | Value of dung               | 0.62                                 | 7.82     | 0.67   | 8.58     | 0.63  | 9.18     | 0.63    | 8.06     |
| 11.    | Net cost (9-10)             | 7.32                                 | 92.18    | 7.10   | 91.42    | 6.27  | 90.82    | 7.18    | 91.94    |
| 12.    | Average price               | 8.80                                 | 110.81   | 8.92   | 114.79   | 8.88  | 128.54   | 8.83    | 113.04   |
| 13.    | Net return                  | 1.48                                 | 18.62    | 1.82   | 23.36    | 2.61  | 37.72    | 1.65    | 21.10    |

**Table 4.10. Cost of per litre milk production for buffalo**

( Rs./ litre )

| Sl.No. | Particulars                 | Farm category according to herd size |          |        |          |       |          |         |          |
|--------|-----------------------------|--------------------------------------|----------|--------|----------|-------|----------|---------|----------|
|        |                             | Small                                |          | Medium |          | Large |          | Overall |          |
|        |                             | Rs.                                  | Per cent | Rs.    | Per cent | Rs.   | Per cent | Rs.     | Per cent |
| 1.     | Green fodder                | 2.08                                 | 19.40    | 2.21   | 21.86    | -     | -        | 2.13    | 19.81    |
| 2.     | Dry fodder                  | 2.37                                 | 22.13    | 1.78   | 17.60    | -     | -        | 2.28    | 21.21    |
| 3.     | Concentrate                 | 2.98                                 | 27.78    | 3.32   | 32.92    | -     | -        | 3.02    | 28.13    |
| 4.     | Total feed cost (1+2+3)     | 7.43                                 | 69.31    | 7.31   | 72.38    | -     | -        | 7.54    | 70.14    |
| 5.     | Labour cost                 | 2.45                                 | 22.83    | 1.82   | 18.06    | -     | -        | 2.36    | 21.99    |
| 6.     | Miscellaneous expenditure   | 0.11                                 | 1.05     | 0.15   | 1.48     | -     | -        | 0.12    | 1.09     |
| 7.     | Total variable cost (4+5+6) | 9.99                                 | 93.20    | 9.28   | 91.91    | -     | -        | 10.02   | 93.23    |
| 8.     | Total Fixed Cost            | 0.73                                 | 6.80     | 0.82   | 8.09     | -     | -        | 0.74    | 6.89     |
| 9.     | Total cost (7+8)            | 10.72                                | 100.00   | 10.09  | 100.00   | -     | -        | 10.75   | 100.00   |
| 10.    | Value of dung               | 0.75                                 | 7.00     | 0.55   | 5.45     | -     | -        | 0.85    | 7.91     |
| 11.    | Net cost (9-10)             | 9.97                                 | 93.01    | 9.54   | 94.55    | -     | -        | 9.90    | 92.13    |
| 12.    | Average price               | 11.23                                | 104.70   | 11.13  | 110.25   | -     | -        | 11.21   | 104.30   |
| 13.    | Net return                  | 1.25                                 | 11.69    | 1.58   | 15.70    | -     | -        | 1.31    | 12.16    |

dairy co-operatives made payment to the milk producers for their cow milk on the basis of per kg total solids (TS) in milk (i.e. Rs. 73.08 /kg TS)

Every litre of cow milk supplied by each farm household to the co-operative society was ascertained and its payment was calculated by using total solids. The prices so estimated have been listed in the Table 4.11 along with respective cost per litre

The bulk line cost Rs. 7.96/lit covered 85 per cent of milk production, 83.92 per cent of cow and 80 per cent of producers. Perusal of data in this indicated that the pricing policy of Coimbatore dairy co-operatives was such that it covered the cost of milk production up to 95.50 percentile. This was of 28<sup>th</sup> milk producing household and 95 per cent of total herd size population in the selected sample households.

It indicated that the pricing policy already adopted by the dairy co-operatives is in the interest of milk producers for making their dairy enterprise profitable even at that level of milk production, which exceeded the bulk line level.

The same method was followed for bulk line costing in buffalo milk production. This is given in Table 4.12 and 4.13. The cost/lit ranged from Rs. 7.56 to Rs. 11.94 and the bulk line cost in this range stood to Rs.10.39/lit exactly. This covered the total herd size of buffaloes maintained by 80 per cent of the milk producers in the sample households.

Pricing of buffalo milk by the dairy co-operatives was made on fat basis. For every 1 per cent increase in fat or SNF, payment increase by 17 and 3 paise respectively. Using such a policy, the price of buffalo milk supplied by each household to the society was ascertained.

Per kg fat cost at producers level was calculated in order to make an easy comparison between cost and price. The cost was arranged in ascending order for estimating the bulk line cost. The bulk line cost was

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Rs. 146.41 per kg of fat, which seems to be less when compared to the price paid by the societies (Rs. 163.43/kg fat)

Comparison of bulk line cost and milk pricing indicated that pricing policy adopted by the dairy co-operatives made the dairying, profitable even at 94.41th level of production made through 94.74 herd size by 97 per cent of farmers.

Although, crossbred cow and buffalo rearing was found to be profitable in the study area, crossbred cow was a better choice than buffalo, mainly because of its higher net return. This was due to its higher productivity and better payment made by the co-operative societies.

#### 4.4 **Determination of weights of fat and SNF for two axis pricing policy**

The comparison of bulk line cost with the pricing policy adopted by the dairy co-operatives in the preceding section revealed that the payment made to the cow milk producers was based on total solids. It fetched them higher prices even beyond bulk line cost of production. In other words the total solids rate was much higher even when the payment to the buffalo milk producers is made on per kg fat rate basis with marginal variation according to marginal fat/SNF percentage variation in milk.

Generally the valuation of cow milk is derived from the per kg fat rate made to farmers. The derivation of cow milk pricing is based on fat and SNF contents therein giving certain weights to SNF. SNF is valued at 2/3rd, 42/58th, 45/55th, 3/4th or 1:1 value of the fat by different plants. These different weights to SNF and fat were considered for derivation of ratio for equivalent fat units from the pricing of buffalo milk, which is based on per kg fat rate.

If SNF and fat weights were arbitrarily selected, the cow milk production may gain or loose, at a situation even buffalo milk production is profitable. The milk price estimated according to SNF-fat weightages followed differently by different plants have been listed in the Table 4.14 along with the

**Table 4.11. Pricing and Bulk line costing for cow milk**

| Milk producers | Cost (Rs. /lit) | Herd size (Dry+Wet) |                   |     | Milk produced  |                   |        | Price (Rs./lit) |
|----------------|-----------------|---------------------|-------------------|-----|----------------|-------------------|--------|-----------------|
|                |                 | Size                | Per cent to total | CP* | Quantity (lit) | Per cent to total | CP*    |                 |
| 1              | 5.37            | 4                   | 5                 | 5   | 5950           | 5.19              | 5.19   | 9.00            |
| 2              | 5.41            | 2                   | 2                 | 7   | 2800           | 2.44              | 7.63   | 8.93            |
| 3              | 6.14            | 9                   | 11                | 18  | 12500          | 10.90             | 18.53  | 9.00            |
| 4              | 6.20            | 2                   | 2                 | 20  | 2700           | 2.35              | 20.89  | 8.86            |
| 5              | 6.28            | 2                   | 2                 | 22  | 2500           | 2.18              | 23.07  | 8.71            |
| 6              | 6.31            | 6                   | 7                 | 29  | 8400           | 7.33              | 30.40  | 8.71            |
| 7              | 6.37            | 6                   | 7                 | 36  | 8600           | 7.50              | 37.90  | 8.93            |
| 8              | 6.42            | 2                   | 2                 | 39  | 2400           | 2.09              | 39.99  | 8.71            |
| 9              | 6.46            | 4                   | 5                 | 44  | 5800           | 5.06              | 45.05  | 9.08            |
| 10             | 6.70            | 2                   | 2                 | 46  | 3000           | 2.62              | 47.67  | 8.93            |
| 11             | 6.78            | 2                   | 2                 | 48  | 2750           | 2.40              | 50.07  | 8.86            |
| 12             | 6.86            | 3                   | 4                 | 52  | 4000           | 3.49              | 53.55  | 9.08            |
| 13             | 7.01            | 2                   | 2                 | 54  | 2500           | 2.18              | 55.73  | 8.79            |
| 14             | 7.11            | 2                   | 2                 | 56  | 2500           | 2.18              | 57.92  | 8.64            |
| 15             | 7.17            | 3                   | 4                 | 60  | 3750           | 3.27              | 61.19  | 8.71            |
| 16             | 7.25            | 2                   | 2                 | 62  | 2500           | 2.18              | 63.37  | 8.71            |
| 17             | 7.32            | 2                   | 2                 | 65  | 2750           | 2.40              | 65.77  | 8.79            |
| 18             | 7.35            | 4                   | 5                 | 69  | 5750           | 5.02              | 70.78  | 8.86            |
| 19             | 7.42            | 1                   | 1                 | 71  | 1150           | 1.00              | 71.78  | 8.86            |
| 20             | 7.43            | 3                   | 4                 | 74  | 4250           | 3.71              | 75.49  | 8.93            |
| 21             | 7.55            | 1                   | 1                 | 75  | 1500           | 1.31              | 76.80  | 8.79            |
| 22             | 7.56            | 2                   | 2                 | 78  | 2250           | 1.96              | 78.76  | 8.57            |
| 23             | 7.94            | 2                   | 2                 | 80  | 2600           | 2.27              | 81.03  | 8.71            |
| 24             | 7.97            | 4                   | 5                 | 85  | 5800           | 5.06              | 86.09  | 8.86            |
| 25             | 8.02            | 1                   | 1                 | 86  | 1250           | 1.09              | 87.18  | 8.79            |
| 26             | 8.17            | 2                   | 2                 | 88  | 1800           | 1.57              | 88.75  | 8.64            |
| 27             | 8.37            | 4                   | 5                 | 93  | 5500           | 4.80              | 93.55  | 8.79            |
| 28             | 8.51            | 2                   | 2                 | 95  | 2400           | 2.09              | 95.64  | 8.79            |
| 29             | 8.94            | 2                   | 2                 | 98  | 2500           | 2.18              | 97.82  | 8.86            |
| 30             | 8.94            | 2                   | 2                 | 100 | 2500           | 2.18              | 100.00 | 8.86            |
| Total          |                 | 85                  | 100               |     | 114650         |                   |        | 9.00            |
| Average        | 7.18            |                     |                   |     | 3821.67        |                   |        | 9.13            |

\* Cumulative Percentage

**Table 4.12. Pricing and Bulk line costing for buffalo milk- I**

| Sl.No. of Producers | Cost (Rs./lit) | Herd size (Dry + Wet) |            |        | Milk produced  |            |        | Price (Rs/lit) |
|---------------------|----------------|-----------------------|------------|--------|----------------|------------|--------|----------------|
|                     |                | Size                  | % to total | CP*    | Quantity (lit) | % to total | CP*    |                |
| 1                   | 7.56           | 1.00                  | 1.75       | 1.75   | 1200           | 2.03       | 2.03   | 10.41          |
| 2                   | 7.58           | 2.00                  | 3.51       | 5.26   | 1600           | 2.71       | 4.74   | 10.90          |
| 3                   | 7.98           | 2.00                  | 3.51       | 8.77   | 1900           | 3.22       | 7.96   | 10.87          |
| 4                   | 8.38           | 4.00                  | 7.02       | 15.79  | 3750           | 6.35       | 14.32  | 11.53          |
| 5                   | 8.52           | 5.00                  | 8.77       | 24.56  | 5500           | 9.32       | 23.63  | 11.07          |
| 6                   | 8.54           | 4.00                  | 7.02       | 31.58  | 4250           | 7.20       | 30.83  | 10.71          |
| 7                   | 8.75           | 2.00                  | 3.51       | 35.09  | 2250           | 3.81       | 34.65  | 11.42          |
| 8                   | 8.84           | 2.00                  | 3.51       | 38.60  | 2250           | 3.81       | 38.46  | 11.88          |
| 9                   | 9.00           | 3.00                  | 5.26       | 43.86  | 3000           | 5.08       | 43.54  | 11.36          |
| 10                  | 9.04           | 4.00                  | 7.02       | 50.88  | 4050           | 6.86       | 50.40  | 11.20          |
| 11                  | 9.04           | 3.00                  | 5.26       | 56.14  | 3250           | 5.51       | 55.91  | 11.01          |
| 12                  | 9.40           | 1.00                  | 1.75       | 57.89  | 900            | 1.52       | 57.43  | 10.87          |
| 13                  | 9.46           | 1.00                  | 1.75       | 59.65  | 1250           | 2.12       | 59.55  | 11.75          |
| 14                  | 9.51           | 2.00                  | 3.51       | 63.16  | 1850           | 3.13       | 62.69  | 11.78          |
| 15                  | 9.60           | 2.00                  | 3.51       | 66.67  | 1950           | 3.30       | 65.99  | 11.07          |
| 16                  | 9.64           | 1.00                  | 1.75       | 68.42  | 950            | 1.61       | 67.60  | 11.07          |
| 17                  | 9.68           | 1.00                  | 1.75       | 70.18  | 1150           | 1.95       | 69.55  | 11.26          |
| 18                  | 9.68           | 1.00                  | 1.75       | 71.93  | 950            | 1.61       | 71.16  | 11.23          |
| 19                  | 10.09          | 1.00                  | 1.75       | 73.68  | 1000           | 1.69       | 72.85  | 11.23          |
| 20                  | 10.16          | 1.00                  | 1.75       | 75.44  | 1150           | 1.95       | 74.80  | 11.42          |
| 21                  | 10.17          | 1.00                  | 1.75       | 77.19  | 1300           | 2.20       | 77.00  | 11.04          |
| 22                  | 10.30          | 1.00                  | 1.75       | 78.95  | 1150           | 1.95       | 78.95  | 11.23          |
| 23                  | 10.38          | 3.00                  | 5.26       | 84.21  | 3000           | 5.08       | 84.03  | 11.10          |
| 24                  | 10.40          | 2.00                  | 3.51       | 87.72  | 2100           | 3.56       | 87.59  | 11.42          |
| 25                  | 10.46          | 1.00                  | 1.75       | 89.47  | 1125           | 1.91       | 89.50  | 11.39          |
| 26                  | 10.61          | 1.00                  | 1.75       | 91.23  | 1250           | 2.12       | 91.61  | 11.20          |
| 27                  | 10.76          | 2.00                  | 3.51       | 94.74  | 1650           | 2.80       | 94.41  | 11.94          |
| 28                  | 11.29          | 1.00                  | 1.75       | 96.49  | 1250           | 2.12       | 96.53  | 10.87          |
| 29                  | 11.44          | 1.00                  | 1.75       | 98.25  | 1050           | 1.78       | 98.31  | 11.26          |
| 30                  | 11.94          | 1.00                  | 1.75       | 100.00 | 1000           | 1.69       | 100.00 | 10.87          |
| Total               |                | 57.00                 | 100.00     |        | 59025          |            |        |                |

\* Cumulative Percentage

**Table 4.13. Pricing and Bulk line costing for buffalo milk- II**

| Sl.No | Cost (Rs./lit) | Fat % | SNF% | Price (Rs./lit) | Fat cost (Rs./kg) | Herd size (Dry+Wet) |            |        | Milk produced |            |        |
|-------|----------------|-------|------|-----------------|-------------------|---------------------|------------|--------|---------------|------------|--------|
|       |                |       |      |                 |                   | Size                | % to total | CP*    | Qty (lit)     | % to total | CP*    |
| 1     | 7.56           | 6.50  | 9.11 | 10.41           | 111.36            | 1.00                | 1.75       | 1.75   | 1200          | 2.03       | 2.03   |
| 2     | 7.58           | 6.80  | 9.14 | 10.90           | 116.14            | 2.00                | 3.51       | 5.26   | 1600          | 2.71       | 4.74   |
| 3     | 7.98           | 6.80  | 9.04 | 10.87           | 116.72            | 2.00                | 3.51       | 8.77   | 1900          | 3.22       | 7.96   |
| 4     | 8.38           | 7.18  | 9.00 | 11.53           | 117.60            | 4.00                | 7.02       | 15.79  | 3750          | 6.35       | 14.32  |
| 5     | 8.52           | 6.88  | 9.06 | 11.07           | 118.78            | 5.00                | 8.77       | 24.56  | 5500          | 9.32       | 23.63  |
| 6     | 8.54           | 6.69  | 8.99 | 10.71           | 122.49            | 4.00                | 7.02       | 31.58  | 4250          | 7.20       | 30.83  |
| 7     | 8.75           | 7.12  | 9.15 | 11.42           | 123.06            | 2.00                | 3.51       | 35.09  | 2250          | 3.81       | 34.65  |
| 8     | 8.84           | 7.37  | 9.13 | 11.88           | 126.53            | 2.00                | 3.51       | 38.60  | 2250          | 3.81       | 38.46  |
| 9     | 9.00           | 7.06  | 9.00 | 11.36           | 127.29            | 3.00                | 5.26       | 43.86  | 3000          | 5.08       | 43.54  |
| 10    | 9.04           | 6.97  | 9.04 | 11.20           | 129.68            | 4.00                | 7.02       | 50.88  | 4050          | 6.86       | 50.40  |
| 11    | 9.04           | 6.94  | 8.91 | 11.01           | 129.74            | 3.00                | 5.26       | 56.14  | 3250          | 5.51       | 55.91  |
| 12    | 9.40           | 6.84  | 9.04 | 10.87           | 130.45            | 1.00                | 1.75       | 57.89  | 900           | 1.52       | 57.43  |
| 13    | 9.46           | 7.33  | 9.23 | 11.75           | 130.45            | 1.00                | 1.75       | 59.65  | 1250          | 2.12       | 59.55  |
| 14    | 9.51           | 7.31  | 9.28 | 11.78           | 137.42            | 2.00                | 3.51       | 63.16  | 1850          | 3.13       | 62.69  |
| 15    | 9.60           | 6.94  | 9.11 | 11.07           | 138.53            | 2.00                | 3.51       | 66.67  | 1950          | 3.30       | 65.99  |
| 16    | 9.64           | 6.91  | 9.14 | 11.07           | 138.81            | 1.00                | 1.75       | 68.42  | 950           | 1.61       | 67.60  |
| 17    | 9.68           | 7.01  | 9.17 | 11.26           | 138.88            | 1.00                | 1.75       | 70.18  | 1150          | 1.95       | 69.55  |
| 18    | 9.68           | 6.99  | 9.13 | 11.23           | 139.13            | 1.00                | 1.75       | 71.93  | 950           | 1.61       | 71.16  |
| 19    | 10.09          | 6.96  | 9.08 | 11.23           | 142.14            | 1.00                | 1.75       | 73.68  | 1000          | 1.69       | 72.85  |
| 20    | 10.16          | 7.10  | 9.20 | 11.42           | 143.74            | 1.00                | 1.75       | 75.44  | 1150          | 1.95       | 74.80  |
| 21    | 10.17          | 6.88  | 9.02 | 11.04           | 146.33            | 1.00                | 1.75       | 77.19  | 1300          | 2.20       | 77.00  |
| 22    | 10.30          | 6.96  | 9.10 | 11.23           | 146.37            | 1.00                | 1.75       | 78.95  | 1150          | 1.95       | 78.95  |
| 23    | 10.38          | 6.94  | 9.19 | 11.10           | 146.39            | 3.00                | 5.26       | 84.21  | 3000          | 5.08       | 84.03  |
| 24    | 10.40          | 7.10  | 9.19 | 11.42           | 146.46            | 2.00                | 3.51       | 87.72  | 2100          | 3.56       | 87.59  |
| 25    | 10.46          | 7.08  | 9.10 | 11.39           | 146.49            | 1.00                | 1.75       | 89.47  | 1125          | 1.91       | 89.50  |
| 26    | 10.61          | 6.98  | 9.05 | 11.20           | 149.92            | 1.00                | 1.75       | 91.23  | 1250          | 2.12       | 91.61  |
| 27    | 10.76          | 7.41  | 9.32 | 11.94           | 152.36            | 2.00                | 3.51       | 94.74  | 1650          | 2.80       | 94.41  |
| 28    | 11.29          | 6.80  | 9.00 | 10.87           | 162.62            | 1.00                | 1.75       | 96.49  | 1250          | 2.12       | 96.53  |
| 29    | 11.44          | 7.00  | 9.20 | 11.26           | 166.33            | 1.00                | 1.75       | 98.25  | 1050          | 1.78       | 98.31  |
| 30    | 11.94          | 6.80  | 9.00 | 10.87           | 174.42            | 1.00                | 1.75       | 100.00 | 1000          | 1.69       | 100.00 |

\* Cumulative Percentage

**Table 4.14. Milk pricing according to different SNF-fat weightage**

| Milk producers | Cost/lit (Rs.) | Milk composition |       | Milk pricing on the basis of SNF-Fat weightage |        |        |      |        |      |
|----------------|----------------|------------------|-------|--|--------|--------|------|--------|------|
|                |                | Fat %            | SNF % | CDC*   | 40/60* | 42/58* | 3/4* | 45/55* | 1:1* |
| 1.             | 5.37           | 4.3              | 8.5   | 9.00   | 7.28   | 7.64   | 7.80 | 8.22   | 8.56 |
| 2.             | 5.41           | 4.3              | 8.4   | 8.93   | 7.23   | 7.59   | 7.75 | 8.17   | 8.49 |
| 3.             | 6.14           | 4.3              | 8.5   | 9.00   | 7.26   | 7.62   | 7.78 | 8.20   | 8.54 |
| 4.             | 6.20           | 4.1              | 8.5   | 8.86   | 7.11   | 7.47   | 7.63 | 8.05   | 8.39 |
| 5.             | 6.28           | 4.0              | 8.4   | 8.71   | 6.99   | 7.34   | 7.50 | 7.92   | 8.26 |
| 6.             | 6.31           | 4.0              | 8.4   | 8.71   | 7.00   | 7.35   | 7.51 | 7.93   | 8.28 |
| 7.             | 6.37           | 4.2              | 8.5   | 8.93   | 7.21   | 7.57   | 7.73 | 8.15   | 8.49 |
| 8.             | 6.42           | 4.0              | 8.4   | 8.71   | 6.96   | 7.31   | 7.47 | 7.89   | 8.24 |
| 9.             | 6.46           | 4.4              | 8.5   | 9.08   | 7.36   | 7.71   | 7.87 | 8.30   | 8.63 |
| 10.            | 6.70           | 4.2              | 8.5   | 8.93   | 7.21   | 7.57   | 7.73 | 8.15   | 8.49 |
| 11.            | 6.78           | 4.2              | 8.4   | 8.86   | 7.14   | 7.49   | 7.65 | 8.07   | 8.41 |
| 12.            | 6.86           | 4.4              | 8.5   | 9.08   | 7.34   | 7.69   | 7.85 | 8.28   | 8.60 |
| 13.            | 7.01           | 4.1              | 8.4   | 8.79   | 7.10   | 7.45   | 7.61 | 8.03   | 8.38 |
| 14.            | 7.11           | 4.0              | 8.3   | 8.64   | 6.99   | 7.34   | 7.49 | 7.91   | 8.25 |
| 15.            | 7.17           | 4.0              | 8.4   | 8.71   | 7.04   | 7.39   | 7.55 | 7.97   | 8.32 |

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\* Weightage used by different plants

Contd.,

**Table 4.14. Milk pricing according to different SNF-fat weightage (Contd..)**

| Milk producers | Cost/lit (Rs.) | Milk composition |       | Milk pricing on the basis of SNF-Fat weightage |        |        |      |        |      |
|----------------|----------------|------------------|-------|--|--------|--------|------|--------|------|
|                |                | Fat %            | SNF % | CDC*   | 40/60* | 42/58* | 3/4* | 45/55* | 1:1* |
| 16.            | 7.25           | 4.0              | 8.4   | 8.71   | 6.99   | 7.34   | 7.50 | 7.92   | 8.27 |
| 17.            | 7.32           | 4.1              | 8.5   | 8.79   | 7.10   | 7.46   | 7.62 | 8.04   | 8.39 |
| 18.            | 7.35           | 4.2              | 8.4   | 8.86   | 7.16   | 7.51   | 7.67 | 8.09   | 8.42 |
| 19.            | 7.42           | 4.2              | 8.4   | 8.86   | 7.14   | 7.50   | 7.65 | 8.07   | 8.40 |
| 20.            | 7.43           | 4.3              | 8.4   | 8.93   | 7.24   | 7.60   | 7.76 | 8.18   | 8.51 |
| 21.            | 7.55           | 4.0              | 8.5   | 8.79   | 7.06   | 7.42   | 7.58 | 8.01   | 8.36 |
| 22.            | 7.56           | 3.8              | 8.4   | 8.57   | 6.88   | 7.23   | 7.39 | 7.81   | 8.17 |
| 23.            | 7.94           | 4.1              | 8.3   | 8.71   | 7.02   | 7.37   | 7.53 | 7.94   | 8.28 |
| 24.            | 7.97           | 4.2              | 8.4   | 8.86   | 7.16   | 7.51   | 7.67 | 8.09   | 8.43 |
| 25.            | 8.02           | 4.1              | 8.4   | 8.79   | 7.09   | 7.45   | 7.61 | 8.03   | 8.37 |
| 26.            | 8.17           | 4.0              | 8.3   | 8.64   | 6.92   | 7.27   | 7.43 | 7.84   | 8.18 |
| 27.            | 8.37           | 4.2              | 8.3   | 8.79   | 7.16   | 7.51   | 7.67 | 8.08   | 8.41 |
| 28.            | 8.51           | 4.1              | 8.4   | 8.79   | 7.09   | 7.45   | 7.60 | 8.02   | 8.36 |
| 29.            | 8.94           | 4.2              | 8.6   | 8.86   | 7.26   | 7.62   | 7.78 | 8.21   | 8.56 |
| 30.            | 8.94           | 4.1              | 8.5   | 8.86   | 7.12   | 7.47   | 7.63 | 8.06   | 8.40 |

CDC- Coimbatore Dairy Co-operatives

\* Weightage used by different plants

costs of cow milk production of each household. EFU rates on 40/60 weightage used by some plants, covered 55th percentile of milk production of the rural households. It doesn't cover the bulk line cost and thus makes cows milk production not profitable. Pricing according to 42/58 weightage used by another set of plants covered the cost of 75th percentile of production which is below the bulk line production. Even 3/4 weightage has not proved to be correct basis for two axis pricing policy under the given situation as it covered only cost of 77th percentile of production. But 45/55 SNF-fat weightage proved to be a very fruitful basis as it covered the cost of 87 percentile production of cow milk in the sample farm households, and SNF-fat weightage of 1:1 is covering even still higher percentile level (i.e. 89%).

For evaluation of pricing policy for buffalo milk and determination of the weight of SNF-Fat for two axis pricing policy, it is very imperative and most important to find out whether the fat rates payment for buffalo milk cover its bulk line cost of production. After ascertaining this fact, it is equally of great importance to know what weights should be given to SNF and fat, so that pricing of cow milk covers its bulk line cost, and dairying either through buffalo or crossbred cow rearing becomes remunerative.

Table 4.15 reveals the mean value and variance of cow milk price on the basis of different SNF-Fat weightage. The first sight at this table shows that price at different weightage system covers the entire cost of milk production. This covers only the average number of milk producers and not majority of them. So, in order to find the significant difference between the different weightages of SNF & Fat and cost of milk production, 't'-test was employed and the results are shown in table 4.16. It was found that, there exists a significant variation between prices based on different weightage system and cost of milk production except at 2/3<sup>rd</sup> weightage. Differences also seen between prices received at different weightage system, which means that, as we increase the weightage, the prices improve significantly. Even though, there was significant difference between prices obtained through different weightages and cost of milk production, we can not come to a conclusion whether it covers majority of farmers. So in order to ascertain

this, bulk line cost should be calculated and has to be used while formulating the milk pricing policy.

Under the present investigation at Coimbatore Dairy Co-operative the fat rates actually paid for buffalo milk was Rs.163.43/, which is higher than the bulk line cost. The rates fixed for cow milk, based on total solids also cover the cost beyond the bulk line.

All the above results indicate that the pricing policy adopted by dairy societies of Coimbatore district proved to be beneficial to the farmers because it covered majority of them. This is because, they not only consider market rate of SMP and Ghee, but also the cost of milk production while fixing the price for milk.

**Table 4.15. Mean and variance of cow milk price on the basis of different SNF-Fat weightage and cost of milk production**

| SI.No. | Particulars                    | Mean (Rs.)    | Variance |
|--------|--------------------------------|---------------|----------|
| 1      | Coimbatore Dairy Co-operatives | 8.825 ± 0.023 | 0.016    |
| 2      | 2/3 *                          | 7.121 ± 0.022 | 0.015    |
| 3      | 42/58 *                        | 7.475 ± 0.023 | 0.015    |
| 4      | 45/55 *                        | 8.054 ± 0.023 | 0.016    |
| 5      | 3/4 *                          | 7.634 ± 0.022 | 0.015    |
| 6      | 1/1 *                          | 8.825 ± 0.023 | 0.016    |
| 7      | Cost of milk production        | 7.177 ± 0.017 | 0.086    |

\* SNF- Fat Weightage.

**Table 4.16. Test of significance of cow milk pricing on the basis of different SNF-Fat weightage and cost of milk production**

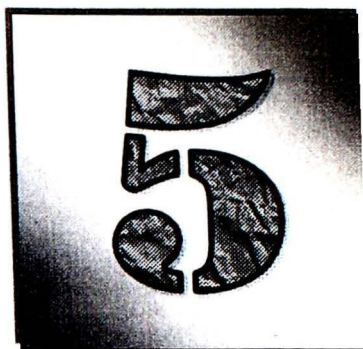
| Sl.No. | SNF-fat weightage              | Coimbatore Dairy Co-operatives | 2/3                | 42/58     | 3/4       | 45/55     | 1/1     |
|--------|--------------------------------|--------------------------------|--------------------|-----------|-----------|-----------|---------|
| 1      | Coimbatore Dairy Co-operatives | -                              |                    |           |           |           |         |
| 2      | 2/3                            | 53.16***                       | -                  |           |           |           |         |
| 3      | 42/58                          | 41.81***                       | 11.18***           | -         |           |           |         |
| 4      | 3/4                            | 36.76***                       | 16.15***           | -4.98***  | -         |           |         |
| 5      | 45/55                          | 23.59***                       | 29.10***           | -17.93*** | 12.96***  | -         |         |
| 6      | 1/1                            | 13.41***                       | 40.59***           | -29.10*** | -10.60*** | -23.98*** | -       |
| 7      | Cost of milk production        | 9.62***                        | 0.33 <sup>NS</sup> | 1.74**    | 5.12***   | 2.67***   | 7.12*** |

\*\*\* Significant at 1% level

\*\* Significant at 10% level

NS- Non significant

Chapter



Summary et

Conclusions

## 5. SUMMARY AND CONCLUSIONS

Dairying is one of the fastest growing enterprises in agricultural sector in our country, and contributes largest share to agricultural GDP. Subsequent to India becoming the world's largest milk producer, tenth five year plan has envisaged a higher growth rate for the dairy sector during the plan period. Under the changing global trade scenario India is made to compete with the major players in the international dairy trade, which makes dairying a profitable enterprise. In this context, to strengthen Indian dairy industry farmers should be given incentives, which will stand as a source of inspiration and motivate them to go for higher production. This can be achieved by focussing our attention at the grass root level. The building block of dairying is to know whether the price paid to the farmer covers the cost of milk production.

Dairy federations and plants pay the farmers on the basis of fat contents for buffalo milk and on SNF and fat contents for cow milk, but it is not known whether it covers the bulk line cost of milk production. Hence, a rational pricing policy should provide adequate incentives to producers and must transform dairying in to an economic enterprise. Therefore the pricing policy for milk, like the agricultural crops, requires due attention as it is becoming a major source of livelihood for millions of small and marginal farmers.

Keeping the above discussion in view, the present study was taken for investigation in Coimbatore district of Tamil Nadu with the following objectives.

1. To work out the cost of cow and buffalo milk production for each farm household.
2. To compare bulk line cost with pricing policy adopted by the dairy co-operatives.

3. To determine the weights of fat and SNF for two axis pricing policy.

There were 523 dairy co-operative societies in the Coimbatore district milk producers' co-operative union Ltd. Out of these, two co-operative societies each procuring mainly cow milk and mainly buffalo milk were selected randomly. From each category comprising of two societies, 30 member farm households were randomly selected. Data were collected from the respondents through personal interview method using pre-tested schedule. Secondary data were collected from appropriate sources. Suitable statistical methods and analytical tools were used for analysis and interpretation of the results.

The decision making process and profitability of dairy enterprise largely depends upon the socio-economic features of the dairy farmers. Family size is an important factor that influences the scale of dairy enterprise, because it is more labour intensive. The overall average family size was observed to be 4.18 persons per household.

The number of milch animals in the farm households affects the economy of dairy enterprise. Crossbred rearing households maintained 2.84 heads of milch animals and the herd size was 4.84, 8.25 and 14 for small, medium and large categories of farm households respectively. Whereas, buffalo herd size was 4.03 for small farm households and 10.25 for medium households. On an average, 5.71 SAU was found in crossbred cows compared to only 3.52 in buffalo category. In total herd size, milch animals occupied the major share in both cow and buffalo category.

The pattern and magnitude of investment in fixed assets in dairy enterprise were the important indicators of income generation. The analysis on investment pattern revealed that the major part of total investment goes to animal, followed by dairy buildings and dairy equipment and machinery for all the category of farmers and for both crossbred cows and buffaloes.

Milk yield is the main outcome in dairy enterprise and has economic significance in the production process to the milk producers. The productivity of crossbred cows was higher than that of the buffaloes with an average milk

yield of 1318.24 litres for crossbred cows per animal per year and 1054.86 litres for buffaloes.

In order to evaluate the relative performance of milch animals in various categories of households, cost and return analysis was carried out. It was found that the annual cost per crossbred cow and buffalo was Rs. 10,231.01 and Rs. 11,340.55 respectively. The maintenance cost per crossbred cow per annum ranged from Rs. 9725 to a maximum of Rs. 11,152.

Overall net profit per annum from crossbred cows was Rs.2222, which, ranged from Rs.1932 in small category producers to Rs.3663 in large category producers. While from buffaloes, net profit was higher in medium category producers (Rs.1642) as compared to small category producers (Rs.1219). The reason for the higher net profit from crossbred cow was mainly attributed to its higher productivity than buffaloes. As the herd size increases, the net profit also increased due to the economy of scale. Thus, it may be concluded that only with higher productivity with better marketing avenue (i.e. better price) milch animals could become viable proposition and generate reasonably good income

Cost of milk production per litre is also an important factor in decision making. The average net cost was found to be Rs.7.18 for crossbred cow milk and Rs. 9.90 for buffalo milk. The high cost of milk production for buffaloes was mainly due to its low productivity compared to crossbred cows.

Results of the cost and returns analysis revealed that, in the study area, crossbred cow rearing was more profitable than buffalo rearing.

Bulk line cost is very important for formulating milk pricing policy. The price of milk should cover the bulk line cost, which includes majority of farmers. The cost per litre of cow milk ranges from Rs. 5.37 to Rs. 8.94 for individual milk producers. The bulk line cost in this range covers 85th percentile of milk production, which is Rs. 7.96/litre.

The cow milk price given to each farm household was ascertained based on total solids while buffalo milk was paid based on fat rate. Bulk line

cost analysis showed that the cow milk prices paid were covering 95.5 percentage of milk production and more than 95% of the total herd size population of sample households. Whereas, for buffaloes it covered 94.41 percent level of production made through 94.74 percent herd size maintained by 97 percent of the farmers.

The two axis pricing policy is based on fat & SNF percentage. It is very important to know what weights should be given to SNF and fat, so that pricing of cow milk covers its bulk line cost, and dairying either through buffalo or crossbred cow rearing becomes remunerative. Different plants follow different weightage systems to derive equivalent fat units. Although arbitrary weightage systems were followed, 1:1 SNF-Fat weightage was the most profitable for the producers as it covered 89 percentage of production of cow milk, followed by 45/55 SNF-Fat weightage method. Coimbatore dairy co-operative societies follow fat system for paying buffalo milk, @ Rs. 163.43 per kg fat which was higher than the bulk line cost. The rates fixed for cow milk based on total solids also covered the cost beyond the bulk line.

Therefore, pricing policy adopted by dairy co-operatives proved to be beneficial to the farmers because, it covered majority of them. This is mainly because, they not only consider the market rate of SMP and Ghee, but also the cost of milk production while fixing the price for the milk.

Based upon the present investigation, it is suggested for policy implications that the dairy federations and other plants of the country fix up the rate on per kg fat basis so that it covers the bulk line cost of buffalo milk production. The SNF-fat weightage derived from buffalo milk fat rate, which is used for cow milk pricing should be such that it covers bulk line cost. In other words, for the formulation of pricing policy, the bulk line cost should be considered. Different weights to SNF-fat in the range between 2/3rd to 1:1 may be considered for finding out the rates for per kg equivalent fat unit. The most appropriate SNF-fat weightage suggested should take care of the interests of both the producers and the dairy plants.

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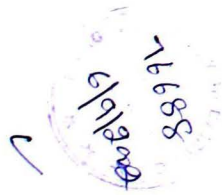
Annexure



## Quantity of feed and fodder per milch animal for different categories of farm households

(Kg./ day)

| Category of households | Crossbred cow |             | Buffalo    |             |
|------------------------|---------------|-------------|------------|-------------|
|                        | Dry fodder    | Concentrate | Dry fodder | Concentrate |
| Small                  | 13.07         | 1.92        | 13.12      | 1.97        |
| Medium                 | 11.25         | 3.20        | 10.15      | 1.94        |
| Large                  | 11.97         | 2.85        | -          | -           |
| Overall                | 12.66         | 2.22        | 12.16      | 1.97        |


  
 16/6/88  
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 VERIFIED  
 Manjeet Singh  
 Signature