ECONOMIC ANALYSIS OF DAIRY FARMING IN DRY FARMING AREAS OF TAMILNADU

THESIS SUBMITTED TO THE
NATIONAL DAIRY RESEARCH INSTITUTE, KARNAL
(DEEMED UNIVERSITY)
IN PARTIAL FULFILLMENT OF THE REQUIREMENT
FOR THE DEGREE OF

DOCTOR OF PHILOSOPHY

IN

DAIRYING
(DAIRY ECONOMICS)

By

P. ANBUKKANI

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

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This is to certify that the thesis entitled " ECONOMIC ANALYSIS OF DAIRY FARMING IN DRY FARMING AREAS OF TAMILNADU " submitted by **Mr.P.ANBUKKANI** towards the partial fulfillment of the award of the degree of **DOCTOR OF PHILOSOPHY (DAIRYING)** in **DAIRY ECONOMICS** of the **NATIONAL DAIRY RESEARCH INSTITUTE (DEEMED UNIVERSITY)**, Karnal (Haryana), India, 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.

Vijayalakshmi

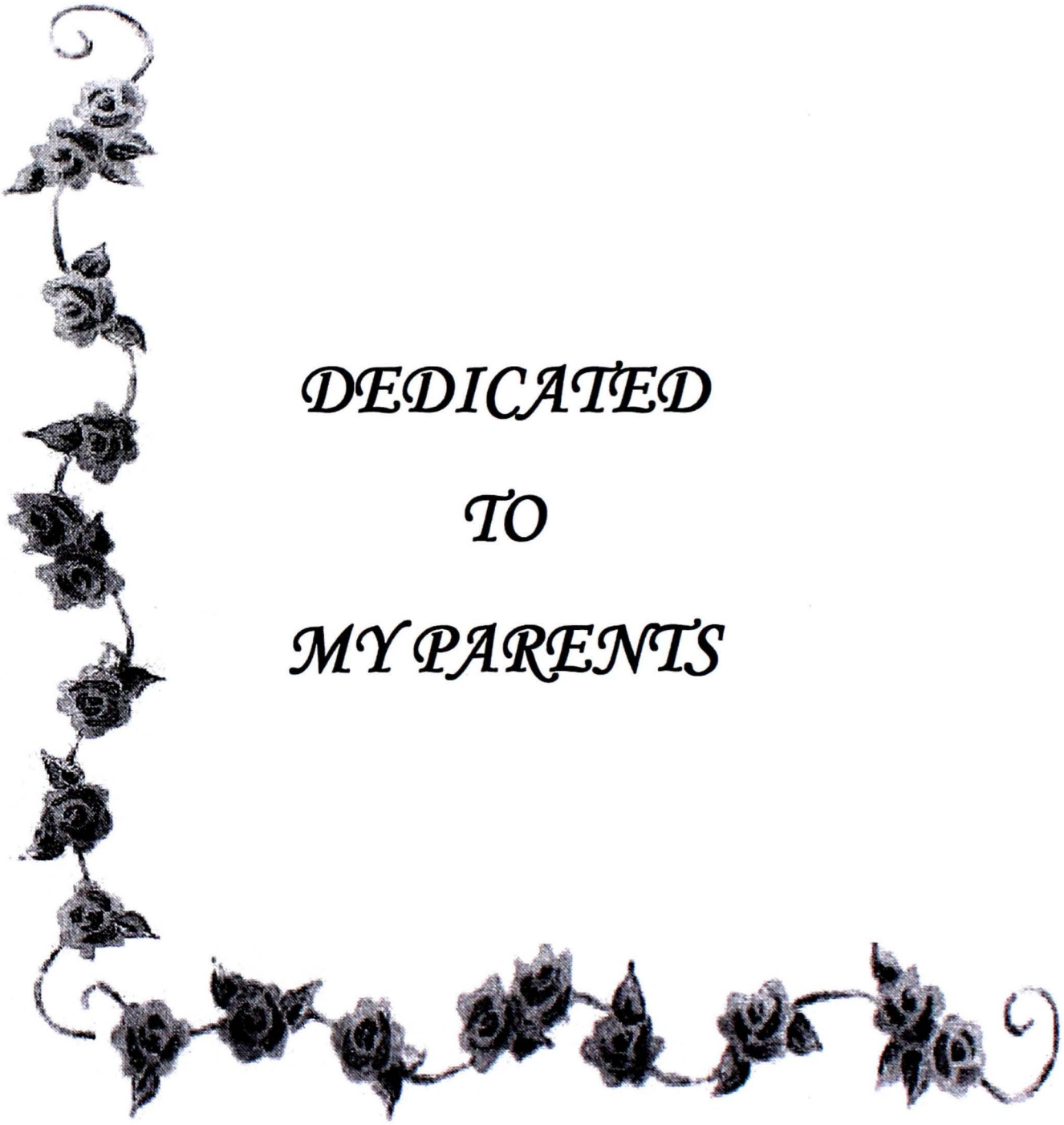
(Dr. VIJAYALAKSHMI)
MAJOR ADVISOR & CHAIRMAN

(GUIDE)

DEDICATED

TO

MY PARENTS



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Place : Bangalore
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P. Anbukkani

आर्थिक तमिलनाडु की सूखी खेती क्षेत्रों में डेयरी खेती का विश्लेषण

भारत में खेती समुदायों बार मानसून की अनियमितता से प्रभावित हैं. प्रौद्योगिकियों को बारिश की विफलता पर काबू पाने विकसित आमतौर पर खाद्य फसलों के लिए किसानों द्वारा अपनाई गई हैं. चारा फसलों के लिए, गाय और भैंस की नस्लों में सुधार के लिए फ़ीड, प्रौद्योगिकी शुष्क भूमि खेती के लिए उपयुक्त द्वारा प्राप्त पर्याप्त ध्यान नहीं दिया है वैज्ञानिक और नियोजन निकायों. पर काबू पाने के लिए जोखिम है, किसानों को विशेष रूप से मुख्य रूप से रखने के द्वारा अपने खेत गतिविधियों में विविधता बहुत अधिक शुष्क कृषि क्षेत्रों में पशुधन. पशुधन क्षेत्र के सकल घरेलू उत्पाद के प्रतिशत और सकल घरेलू उत्पाद का लगभग एक चौथाई से कृषि और संबद्ध गतिविधियों 4 प्रतिशत से अधिक योगदान देता है. इस क्षेत्र शुष्क और semiarid कृषि क्षेत्र में आय का मुख्य स्रोत है. घाटे फ़ीड और गोजातीय हुई आबादी के लिए चारा आनुवंशिक क्षमता के उपयोग के अंतर्गत प्रजनन कार्यक्रम है जिसमें छह दशकों से बाहर किया जा रहा के बावजूद. हालांकि कुछ कमियों को, किसानों को शुष्क भूमि खेती में नियमित रूप से कृषि आय के लिए डेयरी पशुओं को रखने पर भरोसा करते हैं. तमिलनाडु में कार्यान्वित की सभी कृषि और पशुओं के कार्यक्रम और महत्वपूर्ण भारत में, हरे नीले, सफेद और पीले रंग की क्रांति को प्राप्त करने में योगदान दिया है. Dharmapuri और राज्य की जो एनडब्ल्यू क्षेत्र और तमिलनाडु के पूर्वोत्तर क्षेत्र के अंतर्गत आता है क्रमशः वर्तमान अध्ययन के उद्देश्य के लिए चुना गया जिले के Thiruvannamalai.

नमूना परिवारों पर कुल मिलाकर परिवार का आकार 4.66 व्यक्तियों था. छोटी, मध्यम और बड़े आकार के झुंड श्रेणियों में परिवार का आकार 4.70, 5.02 और 4.26 क्रमशः थे. यह देखा गया है कि परिवार के बारे में 55.53% अनपढ़ थे. 16.2% प्राथमिक शिक्षा आया है, बाकी मैट्रिक पूरी कर ली है. CN घास और घास के मैदान में बरसात के मौसम के दौरान हो हरे चारे की आपूर्ति के एकमात्र स्रोत थे. यह सूखा चारा द्वारा सहारा लिया जाता था. हरा चारा, सूखा चारा की औसत मात्रा और प्रति दिन संसर्ग की संकर नस्ल 15.89, 9.61 और 6.29 किलो था क्रमशः प्रति ध्यान केंद्रित. भैंस में मात्रा में 11.12, 5.98, 5.24 प्रति दिन किलो थे हरा चारा, सूखा चारा और क्रमशः ध्यान केंद्रित. सामान्य में, किसानों फ़ीड पारंपरिक फ़ीड मैदान की घास, पुआल और भूसी.

डेयरी झुंड के समग्र रखरखाव लागत 392.5/day, जिनमें से प्रमुख मद के 234.01 रुपए के लिए फ़ीड लागत लेखा जो कुल लागत 59.62% का योगदान किया गया था. संसर्ग की संकर नस्ल गाय प्रति समग्र रखरखाव लागत / दिन में 51.29 रुपए और अधिक रखरखाव लागत था मध्यम झुंड में देखा - थी 50.44 रु में 47.43 रुपए के बाद बड़े

और 46.13 रु छोटे झुंड में. दूध की बिक्री से आय और खाद प्रति दिन रु 87.87 था 41.37 रुपए का शुद्ध लाभ उपज. संसर्ग की संकर नस्ल गायों उच्च नकदी शेष, यानी, रु लाया 35.80 के रूप में 28.28 रुपए के खिलाफ भैंस के लिए. मध्यम झुंड खेत लगभग सभी महत्वपूर्ण आय से संबंधित चर है. छोटे झुंड किसान की योजनाओं के संबंध में नकारात्मक रिटर्न लाने के लिए रू - 42.72 / दिन की हद तक लागत खिलाओ. मध्यम झुंड रु 4.72 की मामूली सुधार / दिन और बड़े झुंड था रु 89.39/day. With उपलब्ध फ़ीड सामग्री अर्थात् क्षेत्र घास, पुआल और भूसी था फ़ीड लागत में बहुत कम सुधार दर्शाता है. सूखी खेती के क्षेत्र में, डेयरी के लिए एक लाभदायक उद्यम, गैर पारंपरिक फ़ीड सामग्री की आवश्यकता होगी के लिए बनाया के लिए लागत प्रभावी मूल्य पर उपलब्ध है.

कुल मिलाकर बाधाओं समाज, अनियमित आपूर्ति और मवेशियों की उच्च लागत फ़ीड, क्रय शक्ति की कमी से संसर्ग की संकर नस्ल की गायों की पेशकश की खरीद दूध की कम कीमत, दूर एअर इंडिया केन्द्रों, सुधार संसर्ग की संकर नस्ल दुधारू bovines और अच्छी गुणवत्ता fodders की उपलब्धता के गैर उपलब्धता स्थित थे. आर्थिक बाधा अध्ययन क्षेत्र में अन्य बाधाओं की तुलना में बड़ी बाधा थी. खेत परिवार के बारे में 77.70% यौगिक फ़ीड और गंभीर उनके द्वारा सामना करना पड़ा बाधा के रूप में चारे की खेती के लिए उपयुक्त फसलों की कमी की उच्च लागत की सूचना दी. उच्च पशुओं की खरीद मूल्य बाधा के रूप में कृषि परिवारों के 67.57% द्वारा सूचित किया गया. हरे चारे की उपलब्धता और चारा बाजार में ऊंची कीमत 70.95% और खेत के परिवारों की क्रमशः 67.76% की कमी के रूप में माना जाता है.

Abstract

on

Economic analysis of Dairy Farming in Dry Farming areas of Tamil Nadu

Farming communities in India are frequently affected by vagaries of monsoon. Technologies developed to overcome the failure of rainfall are generally adopted by farmers for food crops. For fodder crops, to feed the improved breeds of cows and buffaloes, technology suitable for dry land farming has not received sufficient attention by scientific and planning bodies. To overcome risk, farmers specially diversify their farm activities- mainly by keeping livestock more so in dry farming areas. The livestock sector contributes over 4 per cent to the GDP and about a quarter of a GDP from agriculture and allied activities. This sector is the main source of farming income in the arid and semiarid region. Deficit feed and fodder for bovine population led to under-utilization of the genetic potential in spite of the breeding programme which is being carried out over six decades. Eventhough there are some shortcomings, farmers in dry land farming rely on keeping dairy animals for regular farm income. Tamil Nadu has implemented all agricultural and livestock programme and significantly contributed to achieve green, blue, white and yellow revolution in India. Dharmapuri and Thiruvannamalai districts of the state which comes under NW zone and NE zone of Tamil Nadu respectively were selected. The present study was taken up with the objectives to ascertain the socioeconomic characteristics of dairy farmers, to analyze the cost management and identify constraints faced by the dairy farmers.

Overall family size on the sample households was 4.66 persons. The size of the family in small, medium and large herd size categories were 4.70, 5.02 and 4.26 respectively. It was observed that about 55.53 % of families were illiterate. 16.2 % have undergone primary education, the rest have completed matriculation. CN grass and field grass grown during rainy season were the only source of supply of green fodder. It was supplemented by dry fodder. The average quantities of green fodder, dry fodder and concentrates per crossbred per day was 15.89, 9.61 and 6.29 kg respectively. In buffalo, the quantities were 11.12, 5.98, 5.24 kg per day green fodder,

dry fodder and concentrates respectively. In general, farmers feed conventional feeds-field grass, straw and bran.

The overall maintenance cost of dairy herd was Rs 392.5/day, of which major item was the feed cost accounting for Rs 234.01 which contributed to 59.62 % of total cost. The overall maintenance cost per crossbred cow/ day was Rs 51.29 and the higher maintenance cost was seen in the medium herd - Rs 50.44 followed by Rs 47.43 in large and Rs 46.13 in small herd. Income from sale of milk and manure was Rs 87.87 per day yielding a net profit of Rs 41.37. Crossbred cows brought higher cash balances, i.e., Rs 35.80 as against Rs 28.28 for buffalo. The medium herd farm has almost all variables significantly related to income. Small herd farmer's plans bring negative returns with respect to feed cost to the extent of Rs – 42.72 / day. Medium herd had marginal improvement of Rs 4.72 / day and large herd had Rs 89.39/day.With available feed materials namely field grass, straw and bran shows very little improvement in feed cost. In dry farming area, for dairy to be a profitable enterprise, non-conventional feed materials need to be made available at cost effective price.

Overall constraints were Low price of milk offered by societies, Irregular supply and high cost of cattle feed, lack of purchasing power to buy crossbred cows, distantly located A-I centers, Non availability of improved crossbred milch bovines and availability of good quality fodders. Economic constraint was the major constraint compared to other constraints in the study area. About 77.70 % of the farm family reported high cost of compound feed and lack of suitable crops for fodder cultivation as the serious constraint faced by them. High purchase price of cattle was reported as constraint by 67.57% of farm families. Green fodder availability and high price in fodder market were considered as constraints for 70.95 % and 67.76 % of farm families respectively.

Finally, there is a need to develop dairy farming in dry farming areas as an income generating enterprise, to make available non-conventional feed materials at cost effective price, to encourage farmers to rear drought resistant fodder crops and a need to increase the procurement price of milk.

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CHAPTER 1

INTRODUCTION

1.0 INTRODUCTION

Farming communities in India are frequently affected by insufficient, untimely and uncertain monsoon. Administrators, backed by scientific communities have implemented various steps to collect and conserve rainwater, to utilize ground water sources, storing the runaway river water by dams etc. All these efforts could irrigate only 36 per cent of net sown area in the country covering 47 million hectare. The rest of the cultivable land is dependant on monsoons for agricultural production. Technology developed for dry farming has brought out various steps in improving tillage practices, small water reservoirs, developing crop variety that grows quickly after sowing, short duration crop etc. Choice of the farmers in the adopting technology generally lies in food crop cultivation. Though improved varieties for fodder crops are propagated, adopting by farming communities is very negligible. To overcome risk, farmers specially, diversify their farm activities–mainly by keeping livestock, more so in dry farming areas. The livestock sector contributes over 4 per cent to the GDP and about a quarter of a GDP from agriculture and allied activities. This sector is the main source of farming income in the arid and semiarid regions. Deficit feed and fodder for bovine population led to under-utilization of the genetic potential aimed at by breeding programme which is being carried out over six decades. In spite of this entire shortcoming, farmers in dry land farming rely on keeping dairy animals for regular farm income.

Among all the livestock production, milk production has increased from 17 million tons in 1950-51 to about 102 million tons in 2007-08*. The dairy farm technology developed for irrigated area cannot be adopted successfully in dry farming areas. Land based feeds and fodder are the conventional feeding practices followed by all the farmers. As a result of increased demand for conventional source of feeds and fodder the prices of feeds and fodder increase by leaps and bounds.

**Economic survey of India 2007-08-page no 173*

There are vast areas of untapped feed sources available as by-products from agro – industrial production. Very less attention is given for bringing out unconventional feed which can be distributed in the form of feed blocks, pellets, etc. among farmers. The present study plans to know the economics of dairy farming in dry farming areas and whether there is any possibility to reduce cost of maintaining dairy animals with existing management practices. Tamil Nadu is one of the states in India which is fast developing in all the aspects of state economy- agriculture and allied activities, industrial production, trade and commerce and human resource development. This state is actively participating in India's green and white revolution. The concept of co-operative societies in dairy is a great success in dairy industry. The inter-linked democratic structure of dairy industry enables the milk procurement by dairy plants to grow steadily. Of late, private business men have also started dairies in Tamil Nadu. There are 19 dairy co-operative milk producers union supporting 18 dairies under the brand name of Aavin. Private dairies also are taking equal participation in procuring and processing milk. Currently, there are more than 30 dairies in the state*.

The role of farmers in dry farming area is remarkable in dairy field. To guard against risk and uncertainty in farm enterprise, farmers adopt improved breeding technologies. To know the current state of dairy farming, two agro- climatic zones were selected. This study was undertaken in rural area of Dharmapuri and Tiruvannamalai districts of Tamil Nadu.

There is a need to bring out the economics of dairy farming in a diversified farming situation of Dharmapuri and Tiruvannamalai districts. Dairy farming is given importance in the dry farming areas because of organized milk production, processing, distribution through cooperative sector and private sectors. In view of this success, it is very much needed to know the economics of dairy farming in diversified economy. Since, improved dairy farming takes much of farm resources; it is very much relevant to bring out the existing situation and the bottlenecks for improved dairy farming.

**Dairy India 2007*

Furthermore, quantifying income contributed by sale of milk, animals etc. will depict the economic significance of dairy enterprise mobilization of farm resources. While bringing out the cost of milk production, the question is always put forth whether farmers can reduce the cost of production.

If so, what are the constraints faced by the farmers in cost management? Since there is no systematic study on dairy farming in dry farming area, the proposed study has significance and hopes to serve useful information for policy makers.

The proposed study encompasses the following objectives,

1. To ascertain the socio-economic characteristics and resource structure of dairy farmers in the study area.
2. To study the economic aspects of dairy farming on different categories of farm.
3. To analyze the cost management in dairy farming.
4. To identify constraints faced by the dairy farmers.

Organization of the Study

The study has been presented into six chapters. The first chapter presents about the introduction of the project, which involves a brief appraisal present scenario of the study area and specification of the problem. The second chapter provides the review of literature related to this study. In the third chapter, methodology of the present study has been given in detail in terms of tools and techniques used for data analysis. The fourth chapter throws light on the background of the study area. The next chapter deals with results in the form of the tables and discussion. The last chapter carries the summary and conclusion which were deduced from the results of the study. In the end, relevant bibliography and annexure have been given.

CHAPTER 2

REVIEW OF LITERATURE

2.0 REVIEW OF LITERATURE

The review of relevant studies conducted over time and space helps researchers to comprehend the findings and the analytical approach employed in the study. Hence, pertinent literature, largely drawn from studies of the recent past, is reviewed. For the sake of convenience and clarity, the relevant reviews are presented under following heads.

- Socio-economic characteristics and resource structure of dairy farmers.
- Economic aspects of dairy farming on different categories of farms
- Analyzing the cost management in dairy farming
- Constraints faced by the dairy farmers

2.1. Socio-economic characteristics and resource structure of dairy farmers

Agricultural and animal production in developing countries is distributed among innumerable small sized farms, in contrast to developed countries, where they are concentrated with large farms. Farmers, irrespective of the category, plan their production process with the existing accessible resources- physical, financial and human resources, on which they have a control. The level of usage of these resources and the value attached depend on the environment (geographical, economic, social and political) in which they operate. In India, apart from farms being small in size they are placed in heterogeneous socio-cultural atmosphere. Hence it is important to understand heterogeneous socio-economic profile of farming community and identifying the influential social and economic factors which promote or which stand as formidable constraint for tapping up the potential farm /dairy production. Also Quantum of farm resources available with farmers accessed by them and added to the existing stock by developmental agencies for milk production, needs to be analyzed.

Sharma (1984) while assessing the socio economic profile of cross bred cattle keepers in Bangalore city had found that dairy farming was predominantly

practiced by Hindus. A positive association was observed between the family size and herd. The managerial decisions are also influenced by the education levels of the earning family members. He also brought out the importance of management in dairy production by building management index and correlating with milk production.

Sharma and Rajpali (1988) tried to ascertain the factors influencing level and pattern of investment in rural and urban dairy units. The level of investment in urban dairy units was found comparatively much higher than that of rural dairy units.

Rajendran and Prabhaharan (1993) in their study in Dharmapuri District of Tamil Nadu observed that the milk producers were evenly distributed in four categories of farmers' i.e. landless, marginal farmers, small farmers and large farmers. Percentage of illiteracy was higher among landless and educational level was improved with increase in farm size. The investment on milch animals occupied a major share in all the categories of farmers and its percentage was found to be marginally higher in the case of landless and marginal farmers. Crossbred cows accounted for major share of investment. Investment on buildings showed an increasing trend with the increase in landholding.

Sharma and Singh (1993) conducted a study in hilly areas of Himachal Pradesh. The study revealed that average daily milk yield of cross bred cow in the case of beneficiary households was 5.44 litres, which was more than on the non-beneficiary house-holds who keep only nondescript cattle.

Naik and Mohanty (1995) conducted a study on economics of milk production with special reference to resources use in the existing market environment of Orissa. The findings indicated that the milk production environment in the state is primitive where local breeds are found to be concentrated to the extent of 67.64 % in size class I (less than 5 cows per house hold) to 78.72 per cent in size class II (6 to 9 cows per house hold) .

Gadre (1995) studied the cost and returns of dairy enterprise as an adjunct to crop enterprise in region of Maharashtra state by analyzing the data for the year 1992-1993 and 1993-94. The study showed positive relationships between number of cattle and size of land holding. Also, farmers showed breed preference - out of 74 milch cows, about 71 per cent belonged to the Jersey breed, whereas out of 229 milch buffaloes over 87 per cent were of the Nagpuri breed for buffalo. Further, it was observed that the highest net returns were obtained by the small farmers from both a cross bred cow and buffalo. The study suggested that animals can play an important role in increasing the income of the small farmers.

Shukla *et al* (1995) studied the impact of operation flood programme on the economy of rural milk producers in Kanpur- Dehat district of Uttar Pradesh. The investment in dairy enterprise revealed that the average investment per household was Rs. 17,648 in the programme area as compared to Rs. 11,374 in the non-programme area. The average annual net income was much higher and amounted to Rs. 4,872 per milch animal per annum and Rs. 11,742 per house hold per annum in the programme area as compared to Rs. 2,491 per milch animal and Rs. 4,883 per house hold per annum in the non-programme area.

Baruah *et al* (1996) reported in Assam that, on an average, total fixed investment per milch animal was Rs 9759.44 irrespective of unit size of which 4.72, 2.69 and 92.59 per cent were spent on cattle shed, equipments and milch animals respectively.

Ganeshkumar (1997) studied the economic efficiency of cow milk production in Villupuram district of Tamil Nadu. He worked out the cost of milk production to be Rs. 8.75 for local cows and Rs.7.27 for crossbred cows. 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. 2.33 for crossbred cow and Rs.1.88 for local cow. He also found that 10 per cent increase in expenditure on dry fodder and concentrate would significantly increase the milk production by 4.28 and 2.77 per cent for crossbred cows, and 0.25 and 0.34 per cent for local cows, respectively.

Kumar and Balishter (1996) studied economics of crossbred cows and Murrah buffalo in Firozabad district of Uttar Pradesh. The analysis showed that average number of milch animals per family were 1.32 in case of families maintaining only crossbred cows and 1.2 in case of households rearing only Murrah buffaloes. They concluded that dairy farming with crossbred animal is highly remunerative in the study area.

Gabyal (1999) found that jhuming cultivation (shifting cultivation) is an integral part of socio-cultural life of the Mizo tribe in Mizoram. With increase in population, the jhuming cycle has shorthanded considerably and land productivity has fallen in the jhuming lands.

NATP-MM Project Report (2004) the project was carried out in three different states namely, Maharashtra, Karnataka and Kerala. The study revealed that literacy rate in these states ranged from 43 to 93 per cent, highest being in Kerala followed by Maharashtra and Karnataka. Average size of operational holding varied from 0.18 to 5.60 ha highest being in Maharashtra followed by Karnataka and Kerala. The herd size composition ranged from 1.25 to 6.4 and showed a similar pattern of operational holding.

Thus, the studies so far carried out have partially brought out the socio-economic profile and they have not studied the resource structure- physical, financial, manpower, and how they are being utilized, allocated and managed for various farm activities. In India, dairy farming is part of crop farming. The yardstick of specialized dairy farming cannot be used since many of the farm resources need to be apportioned for costing the farm business. The present study is aimed at viewing dairy farming as an integral part of farming community where in the farm resources are managed by farmers of different capabilities.

2.2. Economic aspects of dairy farming on different categories of farms

In the past, most of the studies limited their work to cost of milk production as economics of milk production. Hence the reviews under this heading cover mostly cost of milk production structure.

Cost of milk production in dairy enterprises

Analysis of cost of milk production is important, since it enables the researchers for better understanding of milk production from its economic perspective, which eventually forms the basis for milk pricing as well. They reported that feed cost was the single largest cost item, which amounted to nearly 60-80 per cent of the total costs. Later researchers, namely, Sankhayan and Sharma, 1984 carried out studies on economics of milk production across different regions of the country for different milch bovine species for various categories of farmers and also for different seasons of the year

Sharma and Singh (1994) while studying economics of milk production in Himachal Pradesh, reported that the average annual cost of maintenance for crossbred cow, local cow and graded local buffalo was a 3624.55, Rs 1981.95, Rs 4161.00 and Rs 2584.20 respectively. The variable cost about 85 per cent of the total cost and fixed cost accounted for only 15 per cent.

Autkar *et al* (1995) carried out a study on livestock economy in Maharashtra. The annual maintenance cost per milch animal was computed at Rs 1,669, Rs 2,028, and Rs 2,178 for small, medium and large farmer respectively and the overall cost was Rs 1914. By and large the feed cost constituted about 65 per cent of the gross cost across all categories of sample households.

Kalra *et al* (1995) conducted a study on economics of milk production in rural areas of Haryana. They revealed that the share of variable and fixed cost was approximately 85 and 15 per cent, respectively. The daily maintenance cost of milch buffaloes, crossbred and local cows were Rs 19.11, Rs 20.25 and Rs 14.22 per animal. The corresponding figures for the per litre cost of milk production were Rs 4.95, Rs 3.53 and Rs 6.91. The crossbred and buffaloes yielded positive returns whereas local cows incurred net loss of Rs 3.82 per day.

Manbhekar *et al* (1995) reported that in Maharashtra the variable cost constituted about 94 and 86 percent of the gross cost for local cows and buffaloes respectively. The corresponding values for feed cost were about 60 and 67 per

cent respectively. The annual loss from the local cow was Rs 278, while the crossbred yielded an annual income of Rs 18,113. The per litre cost of milk production was Rs 6.71 and Rs 3.52 for local cow and crossbred cow, respectively. The maintenance of crossbred cow was profitable than that of local cow.

Shiyani *et al* (1995) studied cost and returns from dairy enterprise in Saurastra region of Gujarat. The daily maintenance cost of milch buffalo was Rs 35.89 for H1 (1 cow or buffalo), Rs 32.75 for H2 (2 cow or buffalo) and Rs 33.23 for H3 (3 or more cow or buffalo); whereas it was Rs 18.49 for H1, Rs 18.03 for H2 in the case of milch buffalo. The feed cost alone accounted for about 65 per cent of total cost. The variable cost accounted for more than 92 per cent total in all the groups. The average per litre cost of buffalo milk production amounted to Rs 6.14 for H1, Rs 5.85 for H2 and Rs 5.65 for H3 where as net profit per litre of milk was Rs 1.41, Rs 1.42 and Rs 1.74 respectively. The per litre average cost of cow milk was computed at Rs 4.23 for H1, Rs 4.10 for H2

Shiyani and Singh (1995) conducted a study on economics of milk production in Gujarat. The results revealed that the feed and fodder constituted nearly two- third of the total milk production. The members of the cooperatives earned higher profit as compared to non- members. Season- wise analysis showed that the milk yield of cow as well as buffalo was maximum during winter season as the per litre cost of milk production

Gupta and Agarwal (1996) conducted a study on economics of milk production in Himachal Pradesh and observed that among all types of milch animals, the per litre cost of milk production was Rs 4.69 for crossbred cow. They also highlighted that, although dairying was economically viable enterprise in the state, the net income was meager. It was due to the low milk yield caused by inadequate feeding of milch animals. Among different categories of milk producers, the landless labour earned the highest net returns from crossbred and medium farmers from buffaloes.

Pundhir (1996) analyzed the input structure on milk production in Himachal Pradesh and observed that the variable inputs like green fodder, dry fodder, concentrate and labour respectively accounted for about 18, 22, 17 and 26 per cent for crossbred; 21, 25, 10 and 31 per cent for cow and 22, 26, 13 and 26 for buffaloes. The per litre cost of milk production was found to be Rs 4.25, Rs 2.51 and Rs 4.65 for rainy season followed by Rs 4.95 Rs 3.18 and Rs 5.32 for winter season and Rs 5.29, Rs 3.99 and Rs 4.85 in summer season for buffalo, crossbred and local cow, respectively. He concluded that the dairying with crossbred was the most suitable enterprise as it gave highest net return per day than local cow and buffalo. Chand (1997) in his study in Kurukshetra district of Haryana revealed that the annual maintenance cost for buffalo, crossbred and local cow were Rs. 12,019, Rs 11,535 and Rs 5,811, respectively. The average per litre cost of milk production was Rs 6.38, Rs. 6.17 and Rs 5.59 for buffalo, crossbred and local cow, respectively. The net income from buffalo was relatively higher as compared to crossbred and local cow.

Panghal *et al* (1997) carried out a comparative economic study of milk production in different agro- climatic region of Haryana and concluded that the total cost of milk production was lower in dry region as compared to the irrigated region. Among cost components, operational cost was to be a major one (68-70 per cent) and labour cost found to be decreasing with in farm size. The cost of green fodder was almost equal in irrigated region, which was due to more availability of green fodder throughout the year.

Badal and Dhaka (1998) conducted a study on economics of milk production in Bihar. The average annual maintenance cost per milch animal worked at Rs 6,550, Rs 7,428 and Rs 4,362 for buffalo, crossbred cow and local cow respectively. Feed cost constituted about 45 per cent whereas labour cost contributed in the range between 17 to 31 per cent of the gross cost. The fixed cost accounted for about 25 per cent for all types of milch animals. The per litre cost of milk production was estimated at Rs 5.88, Rs 5.67 and Rs 7.10 for buffalo, crossbred and local cow respectively.

Chandra (1998) conducted a study on economics of milk production in Farukhabad district of Uttar Pradesh and observed that the gross cost per day per animal was highest (Rs.51.10) for large farmers and lowest (Rs.49.20) for landless labourers in crossbred cows; whereas, the net returns was highest (Rs.12.50) for medium farmers, and the lowest (Rs.3.90) for small farmers, and negative for landless farmers. In case of buffaloes, the gross cost was highest at Rs.56.40 for large farmers and lowest at Rs. 47.70 for small farmers.

Kumarvel (1998) in his study on analysis of milk production and disposal pattern in Virudhunagar district of Tamil Nadu concluded that rearing crossbred cow were more profitable than local cows and negative return in case of local cows were largely attributed to their very low yield levels. He also found that concentrate and green fodder were the most important for milk production, which positively increased the milk supply, with increase of these feeds.

Dixit (1999) in a study on bovine economy in Mandya district of Karnataka state observed that the net income and family income in case of local cow were negative in all the categories, while for buffalo net return was observed to be negative for all categories. Only for crossbred cow net return was observed to be positive, whereas for total bovine, the net income was observed to be negative.

Pandit (2002) conducted a study on economics of milk production in Deoghar district of Jharkhand. He observed that the average net maintenance cost per milch animal was highest for crossbred (Rs 70.04), followed by buffalo (Rs 35.70) and local cow (Rs 18.10). But the average per litre cost was markedly lower in crossbred cow (Rs 9.07) due to higher productivity of crossbred, followed by buffalo (Rs 9.73) and highest for local cows (Rs 12.40). The crossbred and buffalo yielded net returns of Rs 16.91, Rs 8.40 per milch animal per day, respectively. The local cow yielded a loss of Rs 0.79 per milch animal per day.

Rajadurai (2002) studied economics of milk production in Madurai district of Tamil Nadu and found that the feed cost accounted for more than 2/3rd of gross cost for small, medium and large categories. The per litre cost of milk production

was Rs 9.72 and Rs 7.44 for local and crossbred cow, respectively. It was further observed that the per litre cost was highest for large size households (Rs 8.00) and lowest for small households. There was a negative return in rearing the local cow for small and medium categories of households except for large categories owing to low productivity of the animals.

Chand *et al* (2002) studied the economic analysis of commercial dairy herds in Arid region of Rajasthan and observed that the average cost of maintaining a cow was highest in winter season, followed by rainy and summer season, which was mainly attributed to the expenditure on fodder and feeds in winter and rainy season as compared to the summer season. Feed cost alone accounted for more than 70 per cent in the overall cost of maintenance per animal per day. The overall net cost per animal per day was Rs.53, Rs.51 and Rs.50 on small, medium and large herds, respectively. The overall milk yield per animal per day in small, medium and large herds were observed to be 7.72, 7.30 and 7.13 litres, respectively. The price of milk was high in summer season due to comparatively higher demand and lower supply of milk, which could in turn be due to lower production in summer season. It was also noticed that the net return per milch animal in a day was Rs.18, Rs.13 and Rs.12 on small, medium and large herds, respectively, which suggested that the small producers are better managers and took better care of their animals.

Gandhi (2002) studied the pricing policy and cost of production of milk in Coimbatore dairy cooperatives and found that the cost of maintenance of crossbred cow and buffalo was Rs.10, 231.10 and Rs.11,340.35 per year, respectively. The net cost of milk production per litre was Rs.7.18 and Rs.9.90 for crossbred cow and buffalo, respectively. The overall net profit per annum from crossbred cows Rs.2222 to Rs.1932 in small category producers. In case of buffaloes, net profit was Rs.1276, which ranged from Rs.1219 in small category to Rs.1642 for medium category. He concluded that rearing of crossbred cows was more profitable than buffaloes rearing due to its higher productivity.

Hemlatha *et al* (2003) in their study on economics of milk production in Maharashtra state observed that the average daily maintenance cost of dairy animal was Rs 52.40, Rs 49.61, Rs 24.30 and Rs 48.28 in the case of Holstein Friestein- crossbred (HF-CB), Jersey- crossbred (JS-CB) Non-descript cow (NDC) and Graded Buffalo (GB) respectively. The feed cost alone contributed for more than 60 per cent of the gross cost in all breeds. The labour cost varied from 16.85 per cent (GB) to 22.25 per cent (NDC). The per litre cost of milk production was highest in the case of NDC (Rs 8.10) followed by GB (Rs 7.43), JS-CB (Rs 4.51) and HF-CB (Rs 1.03).

Kumar (2003) analyzed economics of milk production in Vellore district of Tamil Nadu and examined that the net cost was highest for buffaloes (Rs.66.68), followed by crossbred cows (Rs.60.06) and local cows (Rs.40.82). Per litre cost of crossbred milk was highest (Rs.8.21) for small farmers and lowest (Rs.7.23) for medium farmers categories. For buffaloes, it was highest (Rs.12.99) for small and lowest (Rs.11.20) for landless category. The average net income for overall categories was in general highest for crossbred (Rs.9.06) when compared to local cows (Rs.2.71) and buffaloes (Rs.0.20). the per litre cost of milk production was found to be lower and average net income was higher for crossbred cows than buffaloes, which may be due to higher productivity of the crossbred cows as compared to buffaloes.

Hymajyothi *et al* (2003) undertook a study on economics of milk production in Andhra Pradesh. The average daily maintenance cost was worked out to be Rs 38.20 and it varied from Rs 28.01 for small herd size (1-2 buffalo) to Rs 48.00 for large herd size (5 and above) category. The average per litre cost of milk production was Rs 7.95 for small, Rs. 7.92 for medium and Rs. 7.86 for large herd size category.

NATP-MM Project (2004) carried out in Karnataka and Kerala indicated that in Karnataka, the cost of milk production for non-descript cows ranged between Rs 15.23 / lit to Rs 18.16 / lit and for crossbred cows, it varied from Rs 8.73 / lit to Rs 12 / lit. With regard to buffaloes, it stretched from Rs 13.12 / lit to Rs 15.67 / lit. The

feed cost was the major component of the cost accounting for more than 50 per cent of the gross cost in all the cases. The labour cost component was next in order accounting for about 25 per cent of the gross cost. With regard to Kerala state, cost of milk production for non-descript cattle was in the range of Rs 15.46 / litre and Rs 21.96 / lit. In crossbred cows, it varied from Rs 9.86 / lit to Rs 12.22 / lit. The cost of milk production for buffalo ranged from Rs 14.92 to Rs 17.02 / lit.

Reddy *et al* (2004) undertook a comparative study of cost of milk production under different Agro-climatic regions in Semi-Arid regions of Andhra Pradesh (AP), Tamil Nadu (TN) and Karnataka (KA). The average daily maintenance cost of crossbred cow was found to be Rs 38.99, Rs 49.36 and Rs 48.88 in AP, TN and KA respectively. The per litre cost of milk production was estimated at Rs 5.48, Rs 7.20 and Rs 5.84 in AP, TN and KA respectively. The feed cost was the major component and accounted for 64 per cent in AP, 72 per cent in Tamil Nadu and 74 per cent in Karnataka.

Dixit *et al* (2006) in their study on economics of milk production in Karnataka and Kerala, indicated that in Karnataka, the cost of milk production for non-descript cows was ranged between Rs.12.23/lit to Rs.18.16/lit and for crossbred cows, it varied from Rs.8.73/lit to Rs.12/lit. With regard to buffalo it stretched from Rs.13.12/lit to Rs.15.67/lit. The feed cost was the major components of the cost accounting for more than 50 per cent of the gross cost in all the cases. The labour cost component was next in order accounting for about 25 per cent of the gross cost. With regard to Kerala state, cost of milk production for non-descript cattle was in the range of Rs.15.46/lit and Rs.21.96/lit. In crossbred cows, it varied from Rs.8.96/lit to Rs.12.22/lit. The cost of milk production for buffalo ranged from Rs.14.92 to Rs.17.02/lit.

Mondel *et al* (2007) while studying economic aspects of livestock enterprise in semi-arid watershed of Andhra Pradesh observed that in the case of cow, feed cost alone contributed for about 54 and for buffalo, about 48 and 35 per cent in gross cost inside and outside watershed, respectively. The fixed cost accounted for about 37 and 61 per cent for cows and 46 and 63 per cent for buffaloes inside and

outside watershed respectively. The average per litre cost of milk production was 7.91 and 10.64 in the case of cow milk and Rs 7.73 and Rs 8.43 for buffalo milk inside and outside watershed, respectively. Inside watershed, both cows and buffaloes yielded positive annual return, whereas, outside the watershed, only buffalo yielded positive annual returns.

Sirohi *et al* (2007) conducted study on economics of milk production in Haryana. They revealed that the daily gross maintenance cost of crossbred cows and buffaloes showed a notable variation (6 and 7 per cent respectively) between milch and lactating animals as well as across different productive levels. These variations primarily attributed to the difference in expenditure on feed inputs, which accounted for about 52 to 48 percent in case of crossbred cows and about 36 to 33 per cent for buffaloes. The magnitude of return also showed differences and varies directly with productivity level, which was 9 percent for milch animals against 35 per cent for lactating animals in case of crossbred cows whereas, in case of buffalo, only lactating animals obtained positive net margin (33 per cent). At the field level, rearing of crossbred cow and buffalo is considered to be an economically sustainable proposition only if their average dairy productivity during lactation was greater than 9 and 6 litres respectively.

2. 3. Analysis of cost management in dairy farming

From the year 1955 onwards, researchers spent considerable amount of time in bringing optimum farm plan where dairy animal keeping was part of farm activities. In general, the objective function used to be maximizing the farm income. Isolated attempt to lease cost ration formulations were carried out by nutritional scientists where in farm situations were not considered. In the present study, efforts were made to minimize the critical input cost and thereby work out the remunerations which could be enjoyed by the farmers.

2.3.1. Optimum farm plan

Commensurate with the objective of the study, only those studies which include dairy and other livestock along with crop enterprise in the formulation of optimum enterprise-mix have been reviewed and are presented below:

Sirohi and Gangwar (1968) explored the possibility of increasing farm incomes by reorganization of farm enterprises in Kanjhawala block of Delhi. Land, labour and capital restrictions with land transfer activity was used in the investigation. The optimum optimization of farm resources was examined with and without inclusion of vegetable crops and dairy enterprises as well as with improved agricultural practices. The results showed that dairy activity could enter the optimum plans where capital restrictions were relaxed.

Jain and Johl (1968) observed a considerable scope for increasing farm incomes by incorporating dairy enterprise in the farm organization of farmers in the hinterland of milk supply scheme, Jaipur (Rajasthan). The results showed that returns to fixed farm resources in the optimum farm plans on different farm size groups. It was also suggested that more area should be put under milk enterprise and better market facilities should be provided to the dairy farmers.

Singh (1970) developed optimum farm plan by combining crops and dairy enterprise (Buffalo) with help of linear programming technique in order to accesses possibilities of increasing incomes on sixty of different sizes Etah district of UP. The result showed that there was little scope for increasing farm income and labours by merely rationalising the use of presently available resources in optimum plans to improve level of technology, with restricted capital, there was no change in total number of buffaloes and with increased capital availability, the number reached maximum specified limit with the relaxation of dairy capital. The mean optimal income increased by 9.4 and 24.58 per cent in the optimum plans formulated with existing and improved level of technologies respectively. With unlimited capital, the income increased by 21.96 and 54.05 per cent in the respective plans.

Guglani and Sirohi (1972) examined scope for increasing farm income through changes in cropping pattern and dairy as a complimentary enterprise through linear programming technique. The optimal organization of crop and dairy enterprise with credit facilities suggested a decrease in the number of cows to zero but an increase in the number of buffaloes from zero to 13 for normal year.

Nath (1973) used the linear programming technique for adjustment on farm with crop and dairy enterprises in Ludhiana district and concluded that dairying being remunerative enterprise must be encouraged so as to have more income.

Sankhayan (1973) observed that by using linear programming technique, that vast potentialities for allocation of the existing resources on crop and dairy activities in the hilly areas of Himachal Pradesh in wake of adoption of different components of new technology were discernible.

Saini and Singh (1977) used linear programming technique to develop normative plan for a farm situation in Punjab. The results of study indicated that there is considerable scope in increasing productivity and employment on farm through dairy enterprises. The institutional financial structure was identified, single important impediment for dairy development on farms in the study areas.

Singh *et al* (1977) examined the impact of varying levels of dairy enterprise with crop farming in the context of augmenting the income and employment potential of small farms in Patiala district of Punjab and suggested the importance of the role of dairy enterprise in increasing the income and employment in small farms.

Mruthyunjaya and Sirohi (1979) used linear programming to develop the optimum farm plan on small and large farms in Bijapur district of Karnataka state. The entire area was used for different optimum plans on small farms and no surplus land holdings were available. However, 60% of the land holdings were found unutilized in most of the optimum farm plan on large farms due to scarcity of the resources particularly of buffalo power. The returns were higher and more stable when optimum plans were developed without dairy on both small and large

farms. The human labour and capital were the major constraints when plans were developed with optimum levels of dairy animals along with crop enterprises.

Pandey and Bhogal (1980) reckoned the magnitude to which farm income and employment could be increased from the optimal crop and milk production plans on farms in Aligarh district of Uttar Pradesh, using linear programming model. The study revealed that the farm income and employment could be increased substantially on farms through the adoption of optimal crop and dairy enterprise plans with improved production process.

Handique (1981) developed different optimal plans with different level of technology of tribal areas of Assam and Meghalaya in North eastern India. In this study, linear programming technique was applied with extension of mixed integer programming to develop the optimum livestock and crop enterprise. When optimal plans were developed through existing technology and with available capital, only non-descript cow could enter in to the optimal plans. However, when improved technology was adopted in farm plan with borrowing activity of capital, the considerable number of livestock could find place in the optimum plans in both the plains and hilly area. Livestock productivity in general and milk production in particular entered rather significantly in the optimal plans under unrestricted capital availability and improved technology.

Sardana and Panghal (1984) using a linear programming model applied to data from small and marginal farmers in Bhiwani district of India showed that the introduction of 2 rather than 1 buffalo for milk and draught use and the use of improved technology could considerably improve income and employment. They used linear programming in farm planning and concluded that reallocation of existing resources even at existing technology could increase income and employment in small farms.

Vijayalakshmi (1985) conducted study on optimum crop and livestock decisions under uncertainty in Bangalore district, Karnataka and found land to be the unique and biggest constraint in enhancing the income of farmers even with

improved technological inputs. She found that dairying with crossbred cows as advanced technology was not size neutral. To make dairying with crossbred cows profitable, she suggested provision of subsidized or cheap feed inputs that meet minimum requirements through development of farm and rationing of fodder to the small land owners undertaking training.

Singh and Sharma (1987) evaluated the potential of increasing income and employment on small farms of mid western Uttar Pradesh with different farming systems. It was observed that a maximum potential for increasing income above existing level occurred in crop-dairy goat-farming, followed by crop-goat farming and crop-dairy-poultry in that order. A purely crop farming system proved to be the poorest choice in terms of income and employment.

Patil *et al* (1993) in their study on designing new farming system for conditions representative of the rain-fed farming around Baroda in Gujarat observed that the system of cash crops only, provided that the animal productivity is adjusted to utilize the available feed biomass. The use of urea-treated straw or Stover or supplementary concentrates resulted in increased milk production, especially in highly productive cows.

Kumar (1997) reported that while studying economic analysis of farming systems in Mathura district of Uttar Pradesh, the buffalo based dairy enterprise was more profitable in all the farming system, if promotion could further augment the net returns of the farming systems. It was also observed that the number of milch buffaloes increased significantly in the optimum plans under all farming situations.

From the fore going review of the studies under optimum farm plans, there seems to be a general consensus that crop – livestock integration exhibits substantial potential for increasing employment and income, especially on small farms. Most of the previous studies have considered dairy as a fixed activity. However, in the present study, minimizing cost of inputs which are critical to dairy activity will be considered for increasing the farm income. In doing so, the

availability of home grown fodder and crop byproducts will be taken as separate constraint. Hence, an attempt has been made in the present study to bring out the importance of reducing cost of milk production by efficient feed and fodder management.

2.4. Identification of constraints faced by dairy farmers

2.4.1. Constraints in feeding

Moore (1978) studied microeconomic aspects of the livestock economy and found that the respondents with a large base growing more and more diversified fodder crops and were able to keep higher number and better quality milch animals than those with less or no access to land.

Bairathi (1993) conducted study of constraints on milk production and procurement of milk producers in Jaipur. He reported that non availability of green fodder round the year was one of the very serious constraints at producers' level.

Rao and Singh (1995) studied the impact of operation flood programme on the economics of buffaloes and milk production in Guntur district of Andhra Pradesh and their observation revealed that feed and fodders formed a major component of the gross cost on both extension and control area of the study in milk production.

Balakrishnan (1997) studied the evaluation for dairy production practices in selected farming systems of Karnataka state. He pointed out that the non availability or poor availability of green fodder and high cost of concentrate feeding were major constraints.

2.4.2. Constraints in breeding

Saini (1975) reported that easy availability of natural service, poor conception rate and inadequate facilities for AI were the important constraints in adopting AI for crossbreeding.

Sharma (1980) conducted study of socio-physiological and infrastructural constraints in efficient execution of intensive cattle development project. He found lack of knowledge, poor results of AI in buffaloes and too much repeat breeding in AI as the major constraints, which impede the utilization of service and facilities of ICDP.

Singh (1994) studied constraints in milk production in Meerut district of Uttar Pradesh and reported non availability of semen at proper time and non availability of timely veterinary services and lack of technical guidance as very serious technical constraints felt by dairy farmers.

Pandey (1996) conducted a comparative study of rearing system in Chotanagpur region of Bihar and reported the major constrains were related to breeding such as distance location of AI centers, non availability of staff at centers and preference for a natural service.

2.4.3. Constraints in health care and management

Shroti (1986) studied the analysis of constraints in milk procurement in Aligarh (UP) and found that the first aid workers were not as qualified and trained as to judge diseases and lack of supply of FMD and HS vaccines even on payment. It was also observed that the vaccinations were not timely conducted and emergency veterinary services were not available. Singh (1994) studied constraints in milk production based by milk producer in Meerut district of UP and he reported that high cost of medicine and less qualified staff working at village level has serious constraints perceived by farmers.

2.4.4. Constraints in milk supply

George (1983) with regard to the performance of the widely acclaimed Kaira district co-operative milk producers union stated that during the first two decades of its existence, price of milk lagged behind other commodities in general and milk production was being a losing enterprise, if all costs were taken into consideration.

Rao (1986) studied the problem of milk producers in delta village of Andhra Pradesh and he found some grievance like no facility to sell small quantity of milk, mal practices in fat determination, irregular payment and low cost of milk.

Gupta and Raj (1995) studied consumption and disposal of milk in Churu district of Rajasthan. They reported that marketed surplus was much lower in summer region in comparison to that of rainy and winter seasons.

2.4.5. Major Constraints in Dairy Farming

Several researchers have found that non-availability of fodder throughout the year, high cost of compound feed, non-availability of Artificial-Insemination facilities, insufficient credit and market infrastructure, lack of training of farmers were the major constraints faced by the dairy farmers. Nevertheless, various researchers have observed following common constraints prevailing among dairy farmers.

- High cost of mineral mixture.
- Irregular supply and high cost of cattle feed.
- Non-availability and high charges of veterinary service.
- Level of education and level of extension contacts.
- Lack of purchasing power to buy crossbred cows.
- Low price of milk.
- Distantly located A-I centers.

Yedukondalu *et al* (2000) conducted a study in Andhra Pradesh and found that Non-remunerative price of milk, lack of co-operatives for milk marketing, non availability of good dairy animals, high cost of concentrates, low availability of green fodder, non availability of veterinary facilities and distant location of A. I. centre were the major constraints perceived by dairy farmers.

Ulmek and Patil (2001) identified the constraints faced by buffalo owners in breeding tract of Pandharpuri buffaloes of Maharashtra. The constraints identified were shortage of water, scarcity of green fodder, high feeding expenses, and non availability of funds and low remunerative price of milk. The resource constraints were more significant in Solapur and Sangli district of Maharashtra.

Ansari *et al* (2004) in their study in Uttar Pradesh observed that due to shrinkage of pasture and grazing land, small and marginal farmers have been facing serious problems in providing balanced diet to improved breeds of cows and buffaloes. The major constraints for keeping maximum number of non-descript cows and buffaloes are non-availability of feed and fodder, poor shelter, poverty, frequent occurrence of diseases, lack of medical support, non-existence of Artificial-Insemination centers and inadequate number of veterinary hospitals.

Awasthi *et al* (2004) conducted a study in drought-prone area of West Bengal. They observed that the farmers who have access to external inputs irrespective of breeds have performed far inferior compared to those with high access to external inputs. Resource poor farmers of drought-prone area have problems to have continuous flow of milk round the year.

Natchimuthu and Ramkumar (2004) studied the constraints in utilization of dairy development program in Pondicherry. The constraints identified among the farmers were low price of milk, high cost of compound feed, non availability of land for green fodder cultivation, lack of veterinary facilities, inadequate knowledge about balanced feeding and poor conception rate through artificial insemination.

NATP (2004) in a study conducted in Karnataka and Kerala, observed that major constraints faced by the dairy farmers were lack of green fodder and dry fodder, non-availability of land for fodder cultivation, high cost of feeds, low price for milk and low productivity of milch animals.

Bardhan *et al* (2005), conducted study in Uttaranchal and identified the major constraints as non-remunerative price of milk, low availability of green fodder, high cost of feed, poor quality of concentrate, distant location of A.I. centre,

and reproductive problems.

AN OVERVIEW:

The past reviews provide good background information in planning and execution of the proposed study. However, complete information is not available on the economics of dairy farming in dry farming areas in general and in Tamil Nadu particular. The study area pertains to Tamil Nadu allocation of resources in different enterprise mix of farm, operating expenses and the resultant income from the farm enterprises which were not analyzed on holistic approach. As a result, question like, can we improve the dairy farm in reducing cost and increasing the earning, remain unanswered. The present study is a systematic attempt in this direction to fill this information gap.

CHAPTER 3

METHODOLOGY

3.0. METHODOLOGY

Adoption of improved dairy farm business is more conspicuous in dry farming areas. Dairy animal keeping has helped the farmer to guard against the risk and uncertainties in crop cultivation and assured him of continuous farm income. The economic aspect of this promising enterprise in dry farming area has to be brought out. For this, study has selected districts in Tamil Nadu which are classified as dry zones.

3.1. Selection of study area

Tamil Nadu has seven agro-climatic zones covering the 30 districts of the state. They are 1. Area in Western Ghats called western zone, 2.areas surrounded by in Cauvery called river-Cauvery delta zone, 3.areas in Deccan plateau-southern zone, 4.areas in high rainfall zone, 5.areas in hill and mountain-hilly zone and 6 and 7 zones are more or less plain receiving limited rainfall called as North western zone and North Eastern zone. There is no clear-cut demarcation of districts for these zones. Out of 7 agro-climatic zones, two zones were selected i.e., North western zone and North Eastern zone. Ten districts are coming under these two zones. Among these ten districts two districts namely Dharmapuri and Thiruvannamalai districts were selected for this study. The majority of areas in the districts are operating dry land agriculture due to large variation in the rainfall received. Irrigation source depends on the wells and tube wells.

3.2. Sampling design

Multistage stratified random sampling procedure was adopted to select the taluks, village and sample households. Dharmapuri District from North western zone and Thiruvannamalai District from North Eastern zone districts were selected. From these two districts, two taluks/blocks were selected based on the progress in milk procurement over the years. Thiruvannamalai and Dharmapuri Districts are each having 18 and 8 blocks respectively. From this, one block from each district was selected. In all the four selected villages, two villages from Dharmapuri disrtrict of Penagaram taluk and two villages from Tiruvannamalai district of Sengam taluk

were selected based on the connectivity to milk- collection. Sample households were selected from each of village by probability proportion to the size of sample and based on herd size of the farm. In all the four villages selected (Bikkampatti, Nagadasampatti, Sethupattu, Kurisilapattu), dairy farmers were randomly selected from each villages based on probability proportional to cattle keepers in the villages. Commensurate with objectives of the present study 148 sample farms were selected for further analysis.

3.3. Selection of the Milk Producers

In all the Four selected villages, two villages from Dharmapuri district of Pennagaram taluk and two villages from Tiruvannamalai district of Sengam taluk complete enumeration of milk producer households was carried out in order to collect some preliminary information on number and type of milch bovines, size of land holdings, area under irrigation, etc. a list of milk producer households from the selected villages, indicating the herd size and types of milch bovines maintained was prepared. The households were then categorized into small (1-4) Standard Animal Unit (SAU) of milch animals, medium (4-8) and large herd (above 8 SAU). The list of herd samples according to group and categories are given in table 3.1.

Table 3.1. List of herd samples according to group and categories.

Particulars	Small	Medium	Large	Total
Dharmapuri	35	26	19	80
Tiruvannamalai	28	20	20	68
Total household	63	46	39	148

3.4. Sources and method of data collection

The study used both primary and secondary sources of data to accomplish the set objective of the research endeavor.

The primary data was collected by conventional survey method using structured questionnaire through personal interview during the agricultural year 2008 -09. Detailed information with respect to demographic particulars, occupation,

family size, sex, education, operational holding, herd size, structure and composition, livestock crop inventory, land use pattern, cropping pattern, etc., were collected. Further, data related to farm inventory, quantity of various inputs utilized in dairying along with their money values and of dairy animals. The information were also collected regarding allocation, utilization of farm resources and the constraints faced by farmers in farm business, Labour utilization for various enterprises investment pattern, input utilization, output realization through market outlets were also collected.

Secondary data regarding demographic features, agro climatic conditions, land use pattern, cropping pattern, cropping intensity, livestock population, number of milk collection centre, infrastructure facilities of dairy development , etc, were collected from various sources like, district agricultural department, district animal husbandry department, district statistical office, etc.

3.5. Analytical framework

The collected data were tabulated as per the objectives. The analytical tools were to be employed in the study area.

3.6. Tabular analysis

Tabular analyses were employed to bring out socio economic profile and to work out the cost of milk production, cost management practices and constraints faced by the farmers for different categories of the households.

3.7. Socio-economic profile and resource structure

To understand in depth the profile of dairy farmer and the resource structure were using both secondary and primary data were used. Secondary data included the employment opportunities for dairy business activities, input and output market for dairy farm enterprises, government and NGO's role in promoting dairy business in the area and other related parameters. Primary data were analyzed from data collected from selected farmers. The following information were brought out – Farm size, family size ,educational status, number of earning

members, farm production activities –crop livestock rearing ,employment level and pattern, role of farming members in different activities, training in technical and management aspects of dairy animal keeping an other related details.

3.8. Economic aspects of dairy farming

In any enterprise the economic aspect of how the resource are managed to bring out the desired output, occupy vital role. To bring out this, primarily the records of the farm need were to be gathered systematically before analysis. Common experience in India is that farmers do not keep proper accounts of this farm business. By personal interview method the following records were scrutinized,

1. Farm inventory, financial transaction, feeds, fodder and inputs used 2. Labour used 3. Production from livestock 4. Bank loan 5. Herd size structure and the production traits

This information forms the basis for calculating cost of production and cost management of dairy farm enterprises. The dairy cattle management practices followed will be categorized into six parts, viz., and 1.breeding 2.feeding 3.housing and 4.health, 5.milking and 6.other management practices. The data were analyzed in physical and financial terms.

3.8.1. Resource management practices

Schedule were developed to record the fodder and concentrate feeding for the following parameter,

1. Number of animals fed. Frequency and regularity in feeding, type of feed and fodder and the quantity of feed offered.2.Procurement/source of feed stuffs with approximate cost.3.Feeding of different categories of animal.4.Use of any feed additives.

This has helped to bring out improvement in feeding practice. Hence nutritional and physical aspects of feeding were brought. Price of milk sold, cattle market etc were also ascertained to bring out dairy farm.

In dry land farming, mostly more than one enterprise was taken up by farmers to overcome the uncertainties in crop cultivation. In doing so, farm recourse planning was frequently altered and changed as per the situation. Allocations of farm recourses for the competing enterprise needed careful implementation so that farm income can be increased. To underline cost control measures in critical inputs like feeds and fodder and emphasizing remunerative market outlets, cost management in dairy farming in the study area was taken up to underline the cost effective measures.

The analysis centered around 1.Usage of farm resources for the existing farm enterprises as a whole 2.Quantum of finance involved– investment as well as working capital 3.Output, both in physical and financial terms listing of critical inputs for farm as a whole and dairy farm in particular.

3.9. Cost calculation in maintenance of dairy animal and milk production

Cost of milk production is one of the important parameters of economic efficiency of production. The cost components identified for milk production have been categorized into fixed cost and variable cost. An attempt was made in this section to give details of these costs calculation.

Fixed Cost: It refers to those costs which remain unaltered over a short period of time. The relevant components of fixed cost that go into milk production were:

A) Depreciation: it is loss in the value of an asset due to wear and tear, and its own use over the time period. Depreciation on cattle shed and dairy equipments was also included. An annual depreciation of 2 percent on pucca sheds and 5 percent on kacha sheds was assumed, based on personal observations and judgments depreciation on each cattle shed was calculated. The depreciation on the value of milch animals, cattle- shed and dairy equipment was calculated by straight line method of depreciation. For the purpose of calculating the depreciation on crossbred and buffaloes, the rate was taken as 10, 8.5 percent respectively, assuming the productive period of 10 years for crossbred and 12 years for buffaloes (Singh, 1979). The

depreciation on equipments like chaff cutter, feeding and water trough, milking cans and utensils, used exclusively for the dairy animals were taken into account. The depreciation on individual equipment was charged as per the average life of the equipment. The calculated depreciation rate was apportioned on the basis of total number of standard animal units maintained by the milk producer households.

B) Interest on the fixed capital: the value of animals, cattle sheds, stores and other equipments relating to milk production was taken as the fixed capital. The interest on fixed assets was calculated at the rate of 9 percent per annum. The annualized interest rate was apportioned per SAU per day.

Variable Cost: Considered as expenses on green fodder, dry fodder, concentrate and mineral mixture, human labour, veterinary and miscellaneous expenses such as ropes, electricity and water charges, basket and water pails and minor repair charges on cattle sheds. The variable expenses on fodder and feeds were ascertained for individual animals in each herd. The expenses of human labour, veterinary charges and miscellaneous expenses were apportioned to individual animals on the basis of standard animal units (SAU) present in the herd by using ratio suggested by Patel *et al.* (1988).

Conversion coefficient used by Patel at al. (1980) to make Standard Animal Units

Local cows	=	*1.00*
Crossbred cows	=	*1.40*
Buffalo	=	*1.30*
Bullock/he- bullock	=	*1.00*
Local cow/ buffalo heifer >2year	=	*0.75*
Calf of buffalo and local cow >1year	=	*0.50*
All local calves below 1 year	=	*0.33*

a) **Feed cost:** The value of purchased feeds and fodders were recorded as reported by the respondents, whereas, the farmer own feed and fodder were valued at the prevailing market prices in the study area. In case of grasses (green fodder), the cost were estimated according to the cost of labour used in cutting and fetching the grass.

b) **Labour cost:** The cost of hired was recorded as reported by the milk producer households, while the family labourers was valued at average wage rate of permanent labour in the selected villages.

c) **Veterinary expenses:** The actual expenses incurred on the health care, veterinary medicines, vaccination of milch animals was recorded by personal enquiry method.

d) **Miscellaneous expenses:** The actual expenses on item like electricity charges, water charges, minor repairs, expenses on ropes, pails and other routine expenses were included in this category.

3.9.1. Per Unit Cost in dairy business

In dairy business, experience involved in maintaining per day and the income received from the sale of milk and manure are brought out and in order to estimate the cost of producing a Kg of milk, the average maintenance cost per milch cow/ buffalo/ day was divided by the average milk per day of the respective breed/species.

3.9.2. Functional Analysis

Cost calculation gives financial aspect of production and functional aspect of production refers to the technical relationship between inputs to the output. Therefore, one of the reasons for performing functional analysis is to provide information regarding the appropriate relationship between input and output that can lead to more practical recommendation, inferences and adjustment accordingly. Such information would be useful to the farmers for making rational decisions recording the use of scarce resources on the dairy herds.

3.9.3. Milk Production Function

Milk production function is calculated by taking inputs, viz., green fodder, dry fodder, concentrate, human labour, etc. and output of milk. Production function provides knowledge on the kind and quantity on the product that could be expected quantity of input resources are employed in the production process. Earlier researchers fitted milk production functions and used this concept for studying the response of feed inputs in milk production and for economic interpretation.

Milk production is a complex biological process and it is influenced by a number of genetic, feed and managerial factors like breed, order and stage of lactation, inherent potential of the animal, quantity and quality of feeds and fodders, health care, housing and management and environmental factors, etc. It is impossible to incorporate all the multitudinous factors which are responsible for milk production in a single production function.

3.9.4. Selection and Specification of Variables

The choice of variables to depict the production process correctly, the selection of relevant variable to be included based on prior information and should not be contrary to any of the physical, biological and economic logic known to underlie the production process. Therefore, appropriate selection and specification of variables are essential step in the specification of appropriate milk production function. The choice of factor in ascertaining input-output relationship in milk production is however, constrained by the available magnitude in view of the fact that milk production is affected by various input factors. The mathematical model of milk production employed in the present study is given:

The specification of the economic model is

$$Y=f(X.X2.X3.X4, X5, X6, X7, X8)$$

Where,

Y= Value of milk produced/Animal/day (in Rs.)

X1= Value of green fodder/Animal/day (in Rs.)

X2= Value of dry fodder/Animal/day (in Rs.)

X3= Value of concentrate mixture/Animal/day (in Rs.)

X4= Value of labour (implicit value)/Animal/day (in Rs.)

X5= Cost of capital- interest on investment/Animal/day (in Rs.)

X6=Depreciation value of capital asset/Animal/day (in Rs.)

X7=Veterinary expenses/Animal/day (in Rs.)

X8=Recurring expenses/Animal/day (in Rs.)

3.9.5. Dependent Variable

In the mathematical model, value of milk is taken as dependable variable. The actual daily milk yield per animal per day in the previous day of visit was recorded. The same was multiplied by price realized by milk producers' households from the different agencies. It was done to transform the physical quantity into monetary value.

3.9.6. Explanatory Variables

The details of the variables considered responsible for affecting variation in the milk yield are discussed. The monetary value of fodders (green and dry fodder), concentrates, human labour and miscellaneous expenses were considered.

1) **Expenditure on fodders:** the actual quantity of fodders (green +dry) fed to individual animal on the previous day of visit of the selected households was multiplied by the purchase price/ market price of the type of fodder fed to determine the value of fodders fed. The expenditure was mentioned in monetary terms.

2) **Expenditure on concentrates:** the quantity of compounded readymade concentrate fed for animal per day or the composition and the quantity of concentrates in the cases of homemade mix on the previous day of visit was ascertained. The cost of each ingredient of homemade concentrate mix was included and the cost per kilogram of homemade concentrate was calculated. In the case of compounded feed, the cost per kilogram was valued. The expenditure on concentrate was arrived at by multiplying the quantity fed to individual animals by the price.

3) **Expenditure on human labourers:** Generally, a cattle keeping rural household maintains different categories of animals, like animals in milk, dry animals, heifer, young stock and bullocks. By and large, labour used was recorded for the entire herd reared by the bovine keepers.

   Different types of labourers both hired and family labourers were used, namely, adult men, women and child. Male, female and child labour were later

converted into standard male unit based on the prevailing wage rate for different types of labour. Similarly, categories of animals maintained by the households were also converted into standard animal unit.

The labour used for standard animal unit in terms of adult male unit (both hired and family) was converted into appropriate number of hours of adult male units for different categories of animals. The standard male hours of labour employed per animal per day was converted into monetary terms by multiplying the corresponding wage rate.

4) **Expenditure on miscellaneous cost (Recurring expenses):** the item costs included in this category are minor repairs of cattle sheds, electricity charges, utensils- buckets, milk canes and ropes, etc., which were computed annually and apportioned according to standard animal units (SAUs) per day. The veterinary charges incurred on the milch animals were calculated on the annual basis and their expenses per milch animals per day were also worked out and added to the miscellaneous cost.

3.9.7. Specification of the Mathematical Model

The production function analysis requires specification of a particular function form and its subsequent estimation. The choices for a specific functional form were made both on the basis of economic and statistical grounds.

After brought out the cost structure, critical cost component were identified by using regression equation where in income from dairy enterprise output were functionally fitted led by taking inputs like cost of feed and fodder, labour, interest rate and other cost. In the present study also, the above algebra forms namely Linear, Semi-log, Cobb-Douglas were tried, the mathematical forms of the milk production surfaces were studied were given below.

1. Linear

$$Y = a + \sum_{i=1}^{n} b_i x_i + u$$

2. Cobb-Douglas

$$Y = a + \prod_{i=1}^{n} x_i^{b_i} + u$$

3. Semi-Logarithmic

$$Y = Log\ a + \sum_{i=1}^{n} b_i . \log x_i + u$$

Where, '*Y*' is the dependent variable, *xi*'s are the explanatory variables, 'n' is the total number of explanatory variables, 'a' is the intercept and *bj*'s are the regression coefficients, u is the random disturbance term which is assumed to follow normal distribution with zero mean and constant variance.

The following economic and statistical criteria were used for the final selection of the function:

i. The value of coefficient of multiple determination (R^2)

ii. Significance level of individual regression coefficients, and

iii. The ability of the function to provide economically meaningful results.

The statistical package used was "MINITAB 11".

3.10. Cost management in dairy farming

Since feed cost is the major item in cost of milk production, any saving by way of least cost ration will benefit the farmers. If feeding animals as per nutritional requirement is met, potential production can be obtained. Hence, along with physical constraints, nutritional constraints are also included.

3.10.1. Nutritional constraints

The major nutrient specification for each productive class of bovine population is based on the milk production, body weight of the animal, fat content of the milk, and physiological status of the animal. For preparing the linear programming model, the following types of information are considered: Other constraints as provided by the regression model namely labour capital etc.

The following assumptions were made while working out the plan.

Technical aspect

1. The average body weight of the animal (estimated from length and health girth)
2. Average fat content of milk (to be ascertained from co-operative societies)
3. The list of available feeds in the locality with their nutrient availability and Corresponding prices
4. Specification of take of crude protein (CP) / Total Digestible Nutrient (TDN) Calcium (ca), phosphorous (p) and dry matter (DM) in the ration
5. Specification of maximum voluntary intake of roughage

3.10.2. Specification of the model

The cost minimization model used in this study can be briefly stated as,

Minimize cost of feed

$$C = \sum_{J=1}^{n} P_j X_j$$

Subject to

$$\sum a_{ij} x_j \quad \begin{matrix} \leq \\ \geq \end{matrix} \quad b_i$$

$$x_j < 0$$

P j = Cost/price of feed inputs,

n = number of inputs –feed, fodder

bi = nutritional constraints like TDN, CP, DMI etc and Physical constraints like maximum and minimum of quantity.

x_j =feed inputs

Constraints were cow milk, buffalo milk, straw, no of cow no of buffalo, cumbu napier, concentrate, green fodder and dry fodder.

Feeds and fodder considered in the least-cost ration were entered with nutritive value. The calculated least cost ration for different category of animals was compared with farmers feeding standard. The possibility of decreasing cost was brought out adding other critical inputs namely labour and capital for each herd size. In doing so, existing condition was compared with calculated cost. The software package used was LP88.

3.11. Constraint analysis

The constraints as perceived by the farmers were recorded and questions were asked to the agents/ agencies involved to confirm and to identify the cause of such constraints. The inter relationship between the constraints were identified by using percentage Linkages between the constraints were studied and area for potential intervention was brought out. The frequency, percent and rank of each constraint as reported by farm families are presented in tabular form for each area of study. The important constraints, their cause and effect are presented in a schematic chart. Areas for potential intervention are also suggested for over all improvements of the system.

CHAPTER 4

DESCRIPTION OF THE STUDY AREA

4.0 DESCRIPTION OF THE STUDY AREA

4.1. Brief description of Tamil Nadu.

The state of Tamil Nadu lies between 8 5' and 13 35' North Latitude and between 76 15' and 80 20' East Longitude. Tamil Nadu has a geographical area of about 130058 sq. kms. with population of 6.2 crores. About 2.2 crores are main workers out of which 34.37 per cent are agricultural laborers (Provisional estimates of 2001 Census). Currently there are thirty districts. (Fig 1)

4.2. Geography of Tamil Nadu

Tamil Nadu is the eleventh largest state in India. West and North of the state have lofty hills, while the East and South are coastal plains. The bordering states are Kerala to the west, Karnataka to the northwest and Andhra Pradesh to the north. Tamil Nadu has a wide variety of minerals with the most reserves in India. Lignite almost 90 per cent of India`s reserves, Magnesite 45 per cent and Granite over 40 per cent among others. Forest cover over 17 percent of the state's geographical area.

4.3. Demography of Tamil Nadu

Tamil Nadu is the sixth most populous State of the Indian Union. The State accounts for 6.05 per cent of the country`s population. The population density is 478 persons per square kilometer. Approximately 47 per cent of populations live in urban areas, one of the highest percentages in India. During the decade 1991-2001, Tamil Nadu reported the second lowest decadal growth in population after Kerala, among the group of States with population exceeding 20 million in 2001.

4.4. Agriculture

Agriculture is the main occupation of the people. Mostly dry land agriculture is practiced. Out of the total net sown area, that is 83.82 per cent, paddy occupies 39.60 per cent, followed by millets and other cereals with 14.20, oilseeds 16.98 with, pulses with 12.68 and others with 9.04 per cent. Most of the farmers are

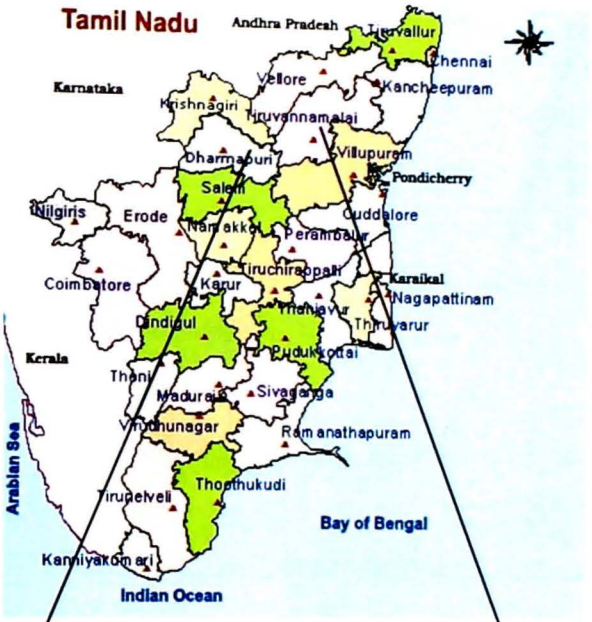
marginal and small. The overall average size of holding is 0.91ha. Major food crops are rice, jowar, ragi, bajra, maize, and pulses. Cotton, sugarcane, coconut, tea and coffee as well as a number of horticultural products like bananas and mangoes are cash crops while groundnuts, sesame, and sunflower are important oil seeds crop. Paddy is the main crop. (Statistical Hand Book of Tamil Nadu, 2001).

4.5. Animal Husbandry and Dairy development

Animal Husbandry plays a major role in providing income and employment opportunities for the farming community. Cross breeding programme and various other related schemes by the animal husbandry department has led to an increase in cross bred population and milk production in Tamil Nadu with wide network of animal husbandry infrastructure facilities and veterinary institutions. The estimated milk production, which was 33.75 lakh MT during 1990-91, had increased to 49.90 lakh MT during 2001-2002. The per capita availability of milk per day had increased from 166 gms to 219 gms in the same period. The State's total livestock population is 261.7 lakhs accounting for 5.56 per cent of the country's livestock population. Out of this bovine population is 46.17 per cent followed by goats and sheep with 44.71 per cent (Department of Animal Husbandry, Chennai).

The normal activities of milk procurement, processing and distribution are being done by the District Cooperative Milk Producers Unions. At present, 8803 Milk Producers' Co-operative Societies are functioning at village level and there are 17 District Cooperative Milk Producer's Unions covering all districts except Chennai to facilitate, better administration and qualitative improvement of integrated dairy development. These unions are connected to 40 milk chilling plants and 20 dairies with an average milk collection of 17.04 and 16.93 lakhs litres per day in flush and lean seasons respectively. Milk is distributed all over the state with a vast network of distribution centers and 213 automatic vending machine units.

Tamil Nadu Map fig-1



DHARMAPURI DISTRICT

TIRUVANNAMALAI DISTRICT

4.6. Dharmapuri - District Profile

Dharmapuri district, which came into existence from 02.10.1965 is situated in the North western Corner of Tamil Nadu and is bounded by Tiruvannamalai and Villupuram Districts on the east, Salem District on the South, Krishnagiri District on the north and Kaveri river on the west. It is located between latitudes N 11 47' and 12 33' and longitudes E 77 02' and 78 40'. The total geographical area of Dharmapuri District is 4497.77 Sq Kms, i.e. 3.46 per cent of Tamil Nadu. It is embroidered with the Vellore and Thiruvannamalai district in the east, Salem district in the south, Bangalore and Chamrajnagar districts of the state of Karnataka in the west and Chittoor District of the state of Andhra Pradesh in the north. Covering an area of 9,622 sq.km. Dharampuri district has a population of 2,856,300 inhabitants according to the 2001 census report.

After independence, Dharmapuri was a part of the Salem district and it was in 1966 that Dharmapuri district was carved out from Salem district. Krishnagiri District which was previously a part of Dharmapuri district became a separate district in 2004.The main languages spoken in the district are Tamil, Kannada, Telugu and Urdu. The district is rich in mineral deposit like apatite, copper ore, corundum, gold, iron ore, limestone, magnesite, nickel, quartz, vermiculite, black granite and grey granite. A number of industries are also located here. The major industries are Ashok Leyland, Lakshmi Automotive Looms, TVS Moped, Indian tobacco, Premier Mills, Asian Bearings and English Electricals. The district is also the largest producer of mango and accounts for one half of the mango yield in the state. The district is the second largest producer of tomato and accounts for 22 per cent of the area in the state.

4.6.1. Climate and Rainfall

The climate of the Dharmapuri District is generally warm. The hottest period of the year is generally from the months of March to May, the highest temperature going up to 38 C in April. The Climate becomes cool in December and continuous

so up to February, touching a minimum of 17 C in January. On an average the District receives an annual rainfall of 895.56 mm.

4.6.2. Soil

The Soil type ranges from black to mixed loam; Red sandy soils are seen in Harur Taluk. Black and loam soil are found in Dharmapuri Taluk. Generally the soil is low in Nitrogen and Phosphate content with no marked variation between Taluks. Soil type in Dharmapuri district is given in the table 4.1.

Table 4.1. Soil Classification- Dharmapuri

Sl. No.	Type of Soil	Places in the District
1.	Lateritic Soil	Almost in all Blocks
2.	Black Soil	Dharmapuri Taluk
3.	Sandy Coastal Alluviam	Almost in all Blocks
4.	Red Sandy Soil	Harur Taluk

4.6.3. Agriculture

4.6.3.1. Land use pattern

Land use pattern was brought out in the following table 4.2. Out of the total geographical area of the state, about 1,63,053 ha is the net area sown. Area under

Table 4.2. Land use pattern

Sl. No.	Classification	Total area in hectare
1	Forest	164177
2	Barren and uncultivable land	19648
3	Land put to non agricultural uses	51248
4	Cultivable waste	5364
5	Permanent pastures and other grazing land	6209
6	Land under miscellaneous tree crops and graces not included in net area sown	2894
7	Current fallows	31464
8	Other fallows land	5720
9	Net area sown	163053
11	Geographical area	449777
12	Total cropped area	196648
13	Area sown more than once	33595

forest constitutes about 1,64,177 ha of the total geographical of the state. The gross cropped area accounts 33595 of the total area in the state.

4.6.3.2. Area and production of crops

The District economy is mainly agrarian in nature. Nearly 70 per cent of the workforce is dependent on agriculture and allied activities. The district is one among most backward and drought prone area in the state. The major crops grown were paddy, ragi, sorghum, ground nut other minor millets were 40.90 per cent, pulses accounts about 23.90 per cent, rice accounts about 5.60 per cent of the total area Land use Area and production of crops was brought out in table 4.3.

Table 4.3 Area and production of crops

Sl. No	Area under different crops	In Hectare	In percentage
1	Sornavari / Kuruvai / Kar	2726	01.60%
	Samba / Thallady / Pisanam	5533	03.30%
	Navarai / Kodai	1206	00.70%
	Total	**9,465**	**05.60%**
2	Millets(Ragi)	18,243	10.80%
3	Other Minor Millets	69,162	40.90%
4	Pulses	40,441	23.90%
5	Sugar Cane	11,971	07.10%
6	Mango	6,506	03.80%
7	Coconut	7,037	04.20%
8	Tamarind	1,197	00.70%
9	Other Crops	5,067	03.00%
	Total Cropped area (A+B)	**1,69,089**	
A	Net Area Sown	1,53,322	90.70%
B	Area sown more than once	15,767	09.30%

Dharmapuri district forms a major horticultural belt in the state. As the area is drought – prone it has become essential to switch over to cultivation of drought tolerant perennial fruit crops in this district. Mango is the main horticulture crop of this District. It has the highest area under the fruit crops. The district accounts for nearly one-third area under mango and nearly one-half of the mango yield in the state. Palacode is the main area where tomato is cultivated. Chilli is cultivated mainly at Pennagaram.

4.6.4. Fisheries

Dharmapuri being an inland district, fishing is restricted to inland only here. Main varieties of fish available are katla, rogu, mirgal, common and corp.

4.6.5. Dairy development

The Dharmapuri District Cooperative Milk Producers' Union has been functioning since 1982. At present the Union is procuring 1, 40,000 litres of milk per day from 665 Milk Producers Cooperative Societies (table 4.4) in the district per societies the average is 210 litre/day. The milk procured from the Milk Producers Cooperative Societies in the district is transported to the Feeder Balancing Dairy, Krishnagiri and processed for local milk sales and for the conversion of products like Butter, Ghee, Skim Milk Powder and Khoa.

Table 4.4. Milk production in Dharmapuri district.

S. No.	Particulars	Quantity/Value
1.	Number of milk societies	665
2.	Milk production in 000' lit	8.97
3.	Value of milk produced (Rs. In lakhs)	76.23

Table 4.5. Animal husbandry

Sl. No.	Livestock population Classification	Numbers
	I. LIVESTOCK	
1.	**Cattle** **Male** i. Under one year ii. 1 to 2.5 years iii. Over 2.5 years **Total**	 **22,618** **18,349** **34,468** **75,435**
	Female i. Under one year ii. 1 to 2.5 Years iii. Over 2.5 years a.In Milk b.Dry c.Not calved even once **Total**	 **82,244** **62,318** **--** **--** **10,312** **--** **1,54,874**
	Buffaloes	**1,60,794**
	Cattle Total	**3,91,103**
2.	Sheep	**3,12,798**
3.	Goats	**2,01,174**
4.	Horses and Ponies	**-**
5.	Pigs	**1,84,477**
6.	Mules	**36**
7.	Camels	**-**
8.	Donkeys	**-**
9.	Dogs, Domestic	**65,378**
	II. POULTRY	
1.	Fowls	**2,07,389**
2.	Ducks	**2,974**

Table 4.6. Veterinary institution and animal treated in Dharmapuri district.

Sl. No.	Veterinary Institutions	Numbers	Animals Treated	Castration performed
1	Hospital	2	5,47,134	4,907
2	Dispensaries	26		
3	Clinical centre	1		
4	Sub centre	25		
5	Mobile units	2		

Table 4.7. Geographical area and Human population

Taluk Name	Population		Geographical Area	
	In numbers	In percentage	In Hectare	In percentage
1. Dharmapuri	3,75,118	29%	78,451	17%
2. Pennagaram	1,94,882	15%	1,13,027	25%
3. Palacode	3,01,580	23%	0,73,267	16%
4. Harur	2,08,131	16%	1,10,354	25%
5. Pappireddipatti	2,15,471	17%	74,678	17%

4.7. Thiruvannamalai district

Thiruvannamalai district came into existence on 30th September 1989 after the bifurcation of the North Arcot district. The district lies between 12o 00' and 12o 49' north latitude and 7838 to 7945 east latitude. The district is bounded on north and west by Vellore district, on the southwest by Dharmapuri district, on the south by Villupuram district and on east by Kanchepuram district.

The total geographical area of the district is 6351.61 sq .km. Cheyyar and Thiruvannamalai are the two revenue divisions in the district. The district is divided into 6 taluks namely, Thiruvannamalai, Chengam, Polur, Arani, Vanadavasi and Cheyyar. There are 18 panchayat unions covering with 875 panchayats with 1067 revenue villages. Thiruvannamalai is one of the most sacred pilgrim centers of Hindus. The district was known as 'Thondai Mandalam' in the ancient days. Thiruvannamalai and the Arunachaleswara temple located in Thiruvannamalai town have a long history from 750 AD. With an area of 6,191 sq km, Thiruvannamalai District has a population of over 2 million. Agriculture is the main occupation. Paddy, pulses, sugarcane, groundnut, gingelly, cotton and millets are the main crops. Apart from agriculture, it also has textile industries,

small scale industries and cottage industries. Thiruvannamalai District is enriched with granites and magnesite deposits. It has a tropical climate.

4.7.1. Forest and hills

The area under reserve forest is 106653ha and it is concentrated in Chengamand Pollur taluks. The important forest produces are Sandalwood, Eucalyptus, Bamboo, Tamarind, etc. The important hills in the districts are Javadhu hills (2500 feet above Kailasagiri) (2743 feet above MSL) and Thiruvannamalai (2668 feet above MSL).

4.7.2. Irrigation

Tanks and dug wells are the chief source of irrigation in this district, followed by canals. There are two major tanks namely Dusi mamandr, and Vakkadi- Mukkur besides 1913 minor irrigation tanks in this district. Sathanur dam in the Chengam taluk has a capacity of 7321 million cubic feet. An area of 7183 ha of land is benefited by the left bank canal and 905 ha of land is benefited by the right bank canal in Thandarapet and Thiruvannamalai blocks.

4.7.3. Climate and rainfall

The climate is tropical. The period from April to June is generally hot. The average rainfall of the district is 1074.70 mm. nearly 45 per cent of the rainfall is received during the north east monsoon period (October to November).

4.7.4. Soil

The predominant soil types are red loam and red sandy loam spread over in all taluks (table 4.8). Black loam is found in tank and riverbed areas of Vandavasi and Cheyyar taluks accounting for about 15% of the total area.

Table 4.8. Soil Classification

Sl. No	Type of Soil	Places in the District
1.	Red loam	Small patches in the taluks of Tirivannamalai, Chengam and Polur
2.	Lateritic Soil	Nil
3.	Black Soil	Tirivannamalai, Chengam Polur, Arni, Cheyyar and Vandavasi
4.	Sandy Coastal Alluviam	Nil
5.	Red Sandy Soil	Nil

4.7.5. Agriculture

4.7.5.1. Land use pattern

Land use pattern was brought out in the following table 4.9. Out of the total geographical area of the state, about 163053 ha is the net area sown. Area under forest constitutes about 164177 ha of the total geographical of the state. The gross cropped area accounts 33595 of the total area in the state.

Table 4.9. Land use pattern

Sl. No.	Classification	Total area (Ha)
1	Forest	153318
2	Barren and uncultivable land	21058
3	Land put to non agricultural uses	92598
4	Cultivable waste	14963
5	Permanent pastures and other grazing land	2908
6	Land under miscellaneous tree crops and graces not included in net area sown	2690
7	Current fallows	68662
8	Other fallows land	32621
9	Net area sown	242387
11	Geographical area	631205
12	Total copped area	304929
13	Area sown more than once	62542

4.7.5.2. Area and production of crops

The District economy is mainly agrarian in nature. Nearly 70 per cent of the workforce is dependent on agriculture and allied activities. The district is one among most backward and drought prone area in the state. Number of land holding above 3 ha is 20249 in the district. There are nearly 3.14 lakhs of small land holdings less than of 1.00ha. The number of holdings between 1 and 2 ha is 66837 and land holdings between 2 and 3 ha size is 20654. The normal cultivable area under all crops in this district is 3.60 lakh ha, of which the major area of 1.30 lakh ha is under paddy and 1.60 lakh ha under groundnut. The other major crops cultivated in the district are cumbu ragi minor millets, pulses, sugarcane, gingelly and cotton (table 4.10).

4.10. Area and production of crops

Sl. No.	Crops	Percentage to the total area sown
	Food grains	
1	Cereals and millets	51.25
2	Pulses	2.74
3	Oil seeds	32.01
4	Other crops	14.00
	Total	**100**

Table 4.11. Milk production in Thiruvannamalai district.

S. No.	Particulars	Quantity/Value
1.	Number of milk societies	739
2.	Milk production in litres	235088
3.	Value of milk produced (in Rs)	2303862.40

The districts the leader in white and blue revolution among the districts in Tamil Nadu two milk chilling plants are in operation at Thiruvannamalai and Anakkavoor, providing approximately 2.35 lakh litre per day, in both flush and lean

season (table 4.11). The total livestock population is 8.9 lakh, of which 48.3 per cent cattle population. There are 739 milk co-operative societies are there in Thiruvannamalai district and milk procured per day is 2.79 lakh litres, per societies average procurement is 377litre/day.

4.7.6. Area and population

As per the 2001 census, the total population of this district was 20,42,979, of which 10,30,052 were men and 10,12,927 women. The urban population is 242928 constituting 12 per cent of the total population, the remaining 88 per cent i.e. 1800051 is rural population. The density of the population is 330 per sq. km. The SC and ST population is 438390 and 62067. The total literate among male are 580432 and that of female are 337125. Area and population is given in the table 4.12.

Table 4.12. Area and population

Sl. No.	Particulars	Numbers
1	**Area in sq. Km**	6191
2	**Total population**	2186125
	Male	1095859
	Female	1090266
	Rural	1785364
	Urban	400761
3	**Density/ sq. km**	352
4	**Literate**	
	Male	79.17
	Female	55.63
5	**Main workers**	
	Total workers	1064783
	Male workers	633166
	Female workers	431617
	Rural workers	924770
	Urban workers	140013
	Cultivators	345436
	Agricultural labour	423574
	Household industry	54723
	Other workers	241050
	Marginal workers	234839
6	**Non workers**	1121342

Table 4.13. Animal Husbandry

Sl. No.	Livestock population	Numbers
	Cattle	
1.	**Male**	
	i. Under one year	**24113**
	ii. 1 to 2.5 years	**15693**
	iii. Over 2.5 years	**20658**
	Total	**60464**
2.	**Female**	
	i. Under one year	**39949**
	ii. 1 to 2.5 Years	**32926**
	iii. Over 2.5 years	**250811**
	a.In Milk	**28422**
	b.Dry	**79717**
	c.Not calved even once	**5640**
	Total	**437465**
	Buffalos	
	Cattle Total	**497929**
3.	Sheep	**198318**
4.	Goats	**150141**
5.	Horses and Ponies	**142**
6.	Pigs	**7259**
7.	Mules	**Nil**
8.	Camels	**Nil**
9.	Donkeys	**153**
10	Dogs, Domestic	**36595**
	Dogs,	
	TOTAL LIVESTOCK	**890537**
II	**II. POULTRY**	
1	Fowls	**246160**
2	Ducks	**6154**
	Total Poultry	**252314**

Table 4.14. Veterinary institution

Sl. No.	Particulars	Numbers
1	Veterinary institution	5
2	Veterinary hospitals	45
3	Veterinary dispensaries	1
4	Sub centers	72

CHAPTER 5

RESULTS AND DISCUSSION

5.0 RESULTS AND DISCUSSION

Based on planning commission's classification, Tamil Nadu state has been classified into southern plateau and hill region. The state has been further sub-divided into seven agro-climatic zones. Tamil Nadu receives an annual rainfall of 925 mm rainfall, received mainly through southwest monsoon (33 per cent of total rainfall) and the northeast monsoon accounts for remaining 47 per cent on unseasonal rain. The large majority of the area in the state comes under dry farming i.e. 52 per cent. Crop–livestock production is one way of optimizing outputs from limited land and reducing risks. Diversification is more common in areas with erratic rainfall and frequent crop failures.

5.1. Background information of the selected districts

Tamil Nadu has implemented all agricultural and livestock progr78amme and significantly contributed to achieve green, blue, white and yellow revolutions in India. Of its 24.9 million bovine populations, 45 per cent is milch animals, producing annually 4.5 million tones of milk. Tamil Nadu is fast emerging as one of the major milk producing states with its multi dimensional developmental activities. Tamil Nadu has 30 districts out of which 4 districts receive less than 845mm rainfall. Dharmapuri and Thiruvannamalai are the backward and drought prone districts of the state which come under North-Western Zone and North-Eastern zone of Tamil Nadu respectively. Dharmapuri is having 12.9 lakh populations, out of which rural consist of 84.98 per cent. The total cropped area is 1.96 lakh ha of which irrigated area is 0.78381 lakh ha. The main crops grown are paddy, sorghum, groundnut and cotton. The total livestock population is 19.7 lakh of which, cattle and buffalo are 1.42 lakh and 1 lakh respectively. The Dharmapuri district receives rainfall about 853mm in the year. The Dharmapuri District Cooperative Milk Producer Union has been functioning since 1982. At present the Union is procuring 1, 40,000 litres of milk per day from 665 Milk Producers Cooperative Societies in the district and the average per society is 210 litre/day. The milk procured from the Milk Producers

Cooperative Societies in the district is transported to the Feeder Balancing Dairy, Krishnagiri and processed for local milk sales and for the conversion of products like Butter, Ghee, Skim Milk Powder and Khoa. Tiruvannamalai district is having population of 21.86 lakhs, out of that rural populations consist of 17.8 lakh. Total cropped area is 3.52 lakh ha of which irrigated area is 1.74 lakh ha and this district receives rainfall about 853 mm annually. The main crops grown are paddy, sugarcane and groundnut. The total livestock population is 8.9 lakh, of which 48.3 per cent is cattle population. There are 739 milk co-operative societies in Thiruvannmalai district and milk procured per day is 2.79 lakh litres, and average procurement per societies is 377litre/day. From these two districts milk is mainly transported to metropolitan cities of Chennai and Bangalore. Of late, private dairy (Arokya dairy) has succeeded in procuring is some areas. Commensurate with the objectives of the study, the results were presented for the present investigation on "Economic analysis of dairy farming in dry farming areas of Tamil Nadu".

Table 5.1. List of herd samples according to group and categories.

Particulars	Small	Medium	Large	Total
Dharmapuri	35	26	19	80
Tiruvannamalai	28	20	20	68
Total household	63	46	39	148

5.2 Socio Economic Profile and Resource Structure of Sample Households

Selection of enterprise for generating income for family largely depends on the family farm resources. Decision regarding resource allocation, depends on biological, economic and social aspects of the farm. To view the production process in a holistic manner at dairy farm level, socio-economic aspects of various categories of animal keepers need to be examined. This will serve as background information for the forth coming analysis.

The objective of this section is to examine some of the basic characteristics of the sample households that may have a profound influence on production and marketing decisions and on profitability of dairy farm business. The study had used both secondary and primary data to bring about the socio-economic profile of dairy farming in the study area. Secondary data included the employment opportunities for dairy business activities, input and output market for dairy farm enterprises, government and NGO's role in promoting dairy business in the area and other related parameters. Primary data was analyzed from data collected from selected farmers. The following information were brought out – Farm size, family size ,educational status, number of earning members, farm production activities –crop livestock rearing ,employment level and pattern, role of farming members in different activities, training in technical and management aspects of dairy animal keeping an other related details.

5.2.1. Demographic particulars of sample households

The size and composition of family are the important factors that affect the size of dairy enterprises which happens to be a family based occupation at village level. The distribution of sample households according to the size of the family was given in Table 5.2.

Table 5.2. Family size and composition on the sample households of dairy farm.

Particulars (No)	Size of herd			
	Small	Medium	Large	Overall
Average family size	4.70	5.02	4.26	4.66
Average adult male	1.63	1.70	1.29	1.54
Average adult female	1.62	1.61	1.39	1.54
Average children	1.44	1.72	1.58	1.58

It can be noted from table that the overall family size on the sample households was 4.66 persons which was on par with 2001 census figures in rural households of Tamil Nadu state. On a facile view, there was no marked difference in the size of the family between small and large herd size categories, 4.70, 4.26 but size of family was 5.02 on medium herd size category.

The number of the adult members both male and females were more than children in small and medium herd size categories. In general, male members were more than female members which indicated that the higher availability of the work force for farm.

5.2.2. Educational status

The ability to take effective managerial decision depends upon the level of education of the head of the household. Improved technical know-how and effective management decision on resource allocation presuppose a standard of education of the dairy farmers. In other word, a better quality of management input warrants better educational standards. The distribution of cattle keeping

Table 5.3. Education status of the head of the family in dairy farm

(In per cent)

Particulars	Size of herd			
	Small	Medium	Large	Overall
Illiterate	65.08	63.04	38.46	55.53
Primary	14.29	8.7	25.64	16.21
Middle	1.59	6.52	20.51	9.54
High school	7.94	10.87	5.13	7.98
Higher secondary	1.59	6.52	5.13	4.41
Graduate	9.52	4.35	5.13	6.33
Total	**100**	**100**	**100**	**100**

households according to the education status of the head of the household was presented in the Table 5.3. In general, it was observed that about 55.53 per

cent of families member were illiterate and 16.2 per cent have undergone primary education, the rest has completed matriculation and 6.33 per cent were graduate and above. However, herd was traditional in nature where the farmer's experience in dairy farming adds support to the success of dairy farming. All these farmers' have 15 to 35 years of dairy business experience. Also, the contact of veterinary doctors, service personals for artificial insemination, extension agencies do have positive effect on their managerial decision.

5.2.3. Occupational Status

The occupational structure of the earning family members could be clearly distinguished into two categories namely main and subsidiary. The main occupation is the one which contributes major per centage of the income and/or utilizes major portion of the farm family's time. Those occupations which supplement the farm income are considered as subsidiary occupations. Table 5.4 presents the distribution of earning family members according to occupations.

Table 5.4. Distribution of households as per occupation in dairy herd

Particulars	Size of herd			
	Small	Medium	Large	Overall
Dairying	25 (39.6)	22 47.83	30 (76.92)	77 (52.03)
Agriculture	33 (52.3)	17 (36.96)	7 (17.95)	57 (38.51)
Business	5 (7.94)	7 (15.22)	2 (5.13)	14 (9.46)

(Number in parenthesis is percentage to total)

For small herd farm agriculture was main occupation with 52.3 per cent of total sample farm and dairying is subsidiary enterprises accounting for 39.6 per cent. The medium farm has given equal preference to dairy and crop cultivation, and 76.92 per cent of total large herd under study rely on dairying as main source of income.

5.2.4. Cropping pattern

It can be observed from Table 5.5 that by and large, the share of jasmine, rice, CN grass occupy major area on irrigated land irrespective of category of farm. In dry land principal crops grown were sorghum, saamai, and mango. The farmers are cultivating paddy mostly during rainy season from June to September except a few farms in large herd size category where the rice crop was cultivated twice in a year. The by product, paddy straw, sorghum Stover, and saamai straw are the source of dry fodder for livestock (including bovines in the study area).

Table 5.5. Average sizes of land holding and crops grown in different categories of herd **(In hectare)**

Sl. No.	Particulars	Size of herd			
		Small	Medium	Large	Overall
A	**Total irrigated land**	**0.12**	**0.22**	**2.76**	**1.20**
1	Jasmine	0.02 (3.23)	0.23 (18.4)	1.13 (18.93)	**0.46 (17.60)**
2	Rice	0.16 (25.81)	0.12 (9.6)	0.58 (9.72)	**0.29 (10.97)**
3	Sericulture	–	–	0.24 (4.02)	**0.24 (9.18)**
4	CN grass	0.17 (27.42)	0.14 (11.2)	0.80 (13.40)	**0.37 (14.16)**
B	**Total dry land**	0.22	0.41	3.22	**1.42**
1	Sorghum	0.06 (9.68)	0.30 (24)	1.18 (19.77)	**0.51 (19.64)**
2	Mango	–	–	0.72 (12.06)	**0.72 (27.55)**
3	Saamai	0.04 (6.45)	0.40 (32)	0.37 (6.20)	**0.27 (10.33)**
4	Others	0.17 (27.42)	0.06 (4.8)	0.95 (15.91)	**0.39 (15.05)**
Total		**0.62 (100)**	**1.25 (100)**	**5.97 (100)**	**2.61 (100)**

(Number in parenthesis is percentage to total)

As regards to area under fodder crops, significantly large areas were allocated in large herd category. The area cultivated was 0.80, 0.14, 0.17 hectare respectively for large, medium and small herd size category. The

fodder crops mainly grown are CN hybrid (Co-3). Other crops grown are ragi, maize and tapioca by few farmers.

5.2.5. Average herd size

Table 5.6. Average herd size in sample households of dairy farmers

(Numbers/household)

Particulars	Herd size								
	Small			Medium			Large		
	Cross bred	Buffalo	Total	Cross bred	Buffalo	Total	Cross bred	Buffalo	Total
Household keeping buffalo (%)		25/63			23/46			21/39	
Productive animal In milk	1.76	1.42	2.32	2.67	2.83	4.09	7.84	5.72	10.92
Dry and pregnant	0.09	0.1	0.13	0.46	1.29	1.11	0.62	1.1	1.21
Dry animal	0.8	0.06	0.82	0.2	0.64	0.52	1.67	0.64	2.01
Replace-ment stock Heifer	0.09	0.28	0.15	0.44	0.57	1.09	0.65	0.87	0.84
Female calf	0.23	0.22	0.16	0.91	0.67	0.62	2.7	0.97	1.61
Male calf	0.14	--	0.07	0.31	--	0.16	0.47	--	0.24
Draught animals Bullock	0.12	–	0.18	0.2	_	0.30	0.43	_	0.65
Total (Standard animal unit)	2.03	2.08	3.84	5.19	6	7.88	14.38	9.3	17.47

From the above Table 5.6, it can be inferred that, on an average, crossbred cow herd consisted of 2.08, 5.19 and 14.38 milking animals in small, medium and large herd category respectively. The average milch animal was 1.76 for small farmers, 2.67 for medium farmers and 7.84 for large farmers. The heifer and young stock was one in both the categories of farmers. The average herd size was 3.84, 7.88 and 17.47 for small, medium and large farmers respectively. Milch buffaloes were 1.42 for small herd, 2.83 for medium herd and 5.72 in large herd. Buffalo herd stands in contrast to cow herd where

natural service for breeding was done by keeping bulls in the village, this way, farmers to some extent overcome the normal trend of prolonged inter calving period for buffalo.

Continuity in milk production is restored by keeping 2:1 as milking and pregnant dry cattle in the herd. A progressive cattle keeper is one who manages to keep the proportion of dairy animals to the bare minimum and maintains higher proportion of animals in milk. Table 5.6 presents the proportion of animals in milk according to herd size category.

The proportion of animals in milk was high in all categories and it was more than 80 per cent in all cases. The proportion of animals in milk slightly decreased with the increase in herd size category.

The cattle keepers always try to keep milking animals in the herd. It is more so in the case of small herd size. This was due to the commercial outlook of the cattle keepers in the study area. In buffalo also the same trend was observed with s 93 per cent of animal in milking were kept in small size herd. In large herd size the percentage was just above 65 per cent which was mainly due to dry animal and total number of animals was high in this group.

5.2.6. Other livestock

Table 5.7. shows that the total goat and sheep was highest in the large herd than the small and medium herd size. Sale of goat and sheep rearing is also one of the income generating enterprise.

Table 5. 7. Other livestock populations in the sample household

(Numbers/household)

Particulars	Size of herd			
	Small	Medium	Large	Overall
Goat	3.22	4.46	6.28	4.65
Sheep	4.53	5.24	7.21	5.66
Total	**7.75**	**9.7**	**13.49**	**10.31**

5.2.7. Investment pattern in dairying

Investment on crossbred cattle constituted the major component followed by cattle shed and dairy equipment. Out of the overall total investment to the value of 1.23 lakhs for cow herd, 69.05% was for cows, 30.12 for shed and 0.82 for dairy equipments. Small herd had invested Rs.25858 for dairy in that 70.30 % was for cows. The medium herd had a total asset of Rs.75885 for dairy. In that value of cows was 69.09%. Highest investment was found in large herd to the extent of Rs 2.06 lakhs. The investment on shelter for small herd was 28.61% followed by large herd 30.49% and medium herd 29.85 %. The investment on dairy equipment per herd was negligible and constituted 1.08, 1.06 and 0.69 per cent of total investment by small medium and large herd respectively.

Table 5.8. Investment pattern in dairying for various herd size (Rs./ farm)

Particulars	Size of the herd							
	Crossbred cow				Buffalo			
	Small	Medium	Large	Overall	Small	medium	Large	Overall
Total value of animals	25858 (70.30)	52428 (69.09)	142367 (68.82)	73551 (69.05)	15948 (70.89)	33580 (62.94)	72476 (78.86)	40668 (72.31)
Cattle shed	10523 (28.61)	22652 (29.85)	63081 (30.49)	32085 (30.12)	6087 (27.06)	19032 (35.67)	18200 (19.80)	14440 (25.82)
Dairy equipments	399 (1.08)	805 (1.06)	1430 (0.69)	878 (0.82)	460 (2.04)	739 (1.39)	1224 (1.33)	807 (1.44)
Total	36781 (100)	75885 (100)	206879 (100)	123344 (100)	224496 (100)	53352 (100)	91900 (100)	55916 (100)

(Number in the parenthesis is percentage to total)

Farmers who keep buffalo spent Rs.15948 for small herd, Rs 33580 for medium and Rs.72476 for large herd. Value of animal and shelter constituted 98 % of total investment. Very meager percentage was invested for equipments etc. housing of buffaloes was separate from that of cows.

The investment on animals is directly proportional to its milk production potentiality. It could be observed that the average price of crossbred was approximately Rs.17000, Rs.21000 and Rs.25000 per animal unit respectively for small, medium and large herd size where as in buffalo the average price was Rs.14000, Rs 17000 and Rs.14000 for small, medium and large category. The value of animals maintained by large herd size category of households was generally higher followed by medium and small herd size category. Thus, the value of animal is expected to have positive impact on dairy productivity. The increase in the value of the animals according to herd size category has also been reflected in the increase in milk production per animal per day (Table 5.8).

5.2.8. Order of Lactation

Farmers in general keep only productive animal. The productive life of cows and buffaloes goes up to 5th lactation and after that, it is not remunerative to maintain the animals. The Table below shows distribution of animals as per lactation number. Out of 670 records of crossbred cow, 79 per cent belonged to 1 to 3rd lactation and in buffalo out of 176 records 82.4 per cent belonged to 1st to 3rd lactation.

5.2.9. Estimated production of milk per lactation

The individual milk records of cows and buffaloes were grouped month wise as per stage of lactation. The early stage consists of 90 days, mid lactation 90-180 days and the remaining 180 days was considered as late lactation. Table 5.9. gives details of milking cows and buffalo.

It has been reported that the daily milk yield of a cow starts increasing from the day of freshening, attaining a peak between 6 and 12 weeks after calving where the level is maintained for some time and thereafter starts declining gradually till the day the cow gets dried. Crossbred cattle showed an increase in

Table 5.9. Distribution of milch animals according to order of lactation in the dairy farm

Lactation number	Size of the herd						
	Crossbred cow				Buffalo		
	Small	Medium	Large	Overall	Small	Large	overall
First	16 (17.8)	28 (16.7)	67 (16.3)	111 (16.6)	7 (12.1)	19 (16.1)	27 (14.8)
Second	42 (46.7)	60 (35.7)	158 (38.3)	260 (38.8)	32 (55.2)	35 (29.7)	67 (38.1)
Third	20 (22.2)	40 (23.8)	98 (23.8)	158 (23.6)	14 (24.1)	38 (32.2)	52 (29.5)
Fourth	8 (8.9)	27 (16.1)	43 (10.4)	78 (11.6)	02 (3.1)	18 (15.3)	20 (11.4)
Fifth and above	4 (4.4)	13 (7.7)	46 (11.2)	63 (9.4)	(5.2)	8 (6.8)	11 (6.3)
Total	90 (100)	168 (100)	412 (100)	670 (100)	58 (100)	118 (100)	176 (100)

(Number in the parenthesis is percentage to total)

average daily milk yield from first to second month of calving and from third month onwards registered a steady milk yield up to six months. The differences among herd sizes were marginal and overall for early, mid and late lactation milk yield was about 727.33, 888, and 336.67 kg for crossbred cows. For buffalo it was 460, 570 and 343 kg of early, mid, late lactation respectively. In general, crossbred cows yield an average of 8.59 Kg per day during early stage of lactation as against 5.11 Kg per day for buffaloes. The mid lactation average for cow was 10.2 and for buffalo it was 6.33. The late lactation with the cut off

period of 10 months average yield was 2.85 Kg for cow and 2.74 Kg per day for buffaloes.

Table 5.10. Estimated milk yield and number of records of animals for each stage of lactation *(Kg/Lactation)*

Sl. No.	Stage of lactation	Size of the herd							
		Crossbred cow				Buffalo/Kg			
		Small	Medium	Large	Overall	Small	Medium	Large	Overall
1	Early (1- 90 days)	610	685	887	727.33	472	480	453	468.33
2	Mid (90 -180days)	786	890	988	888.00	576	550	580	568.67
3	Late (180 -300days	300	325	385	336.67	310	325	350	328.33
	Total	**1696**	**1900**	**2260**	**1952**	**1358**	**1355**	**1383**	**1365.33**

Among crossbred cow herd, the large herd was having better milk production per lactation (2260 Kg /lactation) as against medium (1900 Kg) and small herd (1696 Kg per lactation) as shown in Table 5.10. For buffaloes there is no significant difference among herds.

5.2.10. Management Aspects of Dairying

The balanced feeding, health care and scientific management are the three major factors in exploiting genetic potential of crossbred cattle and upgraded buffaloes. Hence, management aspects of dairy animal keeping were brought out to understand and underline the areas of importance

5.2.11. Breeding Practices

The facility for artificial insemination is extensively available and this service is free of cost. The cattle keepers had a preference for Jersey semen for artificial insemination and a few of them had a preference for particular pedigreed bull semen. The animals were mostly inseminated in mid and late heat, after two to three months of calving. Even though good quality semen were available for buffaloes in state government department, farmers give importance for natural service. The two main reasons behind this were

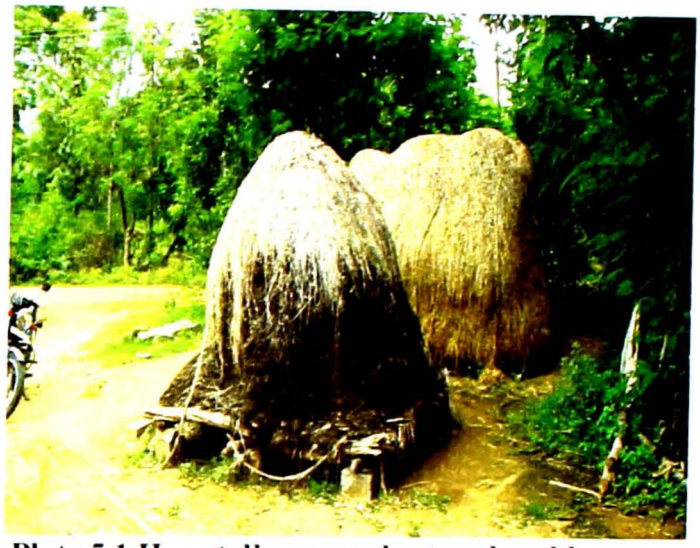


Plate 5.1 Hay stalk- groundnut and paddy straw

Plate 5.2 Housing system for large herd farm

Plate 5.3 Poor housing system on backside of the home

unpredictable and silent heat cycle in buffaloes and untimely service of veterinary professional.

5.2.12. Feeding Practices

The crossbred animals in Tamil Nadu were solely maintained on purchased fodder and feeds. The availability of green fodder was very much limited. Field grass grown in and around their home during rainy season was the only source of supply of green fodder. It was supplemented by local grasses, sorghum stover, CN grass, jowar stalks, after removing the mature cobs from fields. The major source of nutrition came from the concentrate mixture fed to cows. The ingredients mixture was prepared by each cattle keeper at home. The ingredients that went into mixture were expeller wheat bran and gram husk. There was no standard followed in mixing the ingredients.

The freshly calved animals were given colostrum in general and calf ration was found in particular medium and large herd and some of the small herd size. Almost all the crossbred animals were stall fed. Grazing was also practiced. Green fodder was generally fed in the evening and dry fodder in the morning and afternoon. Both the dry and green fodders were chaffed and fed to animal except, in small herd size. Water was given three to four times daily, ad libitum. Feeding standards were practiced by large farmers.

The availability of feeds was almost the same throughout the year. There was no seasonal variation except green fodder that is fed to crossbred animals. The average feeds and fodder fed for crossbred cow and buffalo were given in the Table 5.11.

The average quantities of green fodder, dry fodder and concentrates fed per crossbred cow herd per day was 15.89, 9.61 and 7.28 kg and 11.12, 5.98, 5.24 kg per day respectively in buffaloes. In general, farmers feed conventional feeds. Unconventional feeds such as by-products available from plantation crop, fruits and vegetables are not utilized due to the fact that these by-products need processing before feeding.

Table 5.11: Average feeds and fodder per animal per day (Kg)

Particulars	Size of the herd							
	Crossbred cow				Buffalo			
	Small	Medium	Large	Overall	Small	Medium	Large	Overall
Green fodder	8.46	12.5	26.70	15.89	3.45	11.81	18.1	11.12
Dry fodder	3.94	5.71	9.18	9.61	3.12	5.42	9.4	5.98
Concentrate Mixture	1.32	4.76	15.78	7.28	1.79	5.48	8.44	5.24

The variation in the feed allocation to crossbred cows across the herd size categories is consistent with the resource endowments of the cattle keepers. The quantities of green fodders and concentrates increased with the herd size category while in case of dry fodder the quantity was almost same for all size categories.

5.2.13. Milking Practices

The animals, both crossbred and buffalo were milked twice a day, once in the morning (6 to 7 A.M) and once in the evening (4.30P.M to 5.30P.M). In some herds of large farmers the milking was done thrice a day. The place of milking was generally in the stalls. The udder was washed with water before milking but not wiped with cloth. Generally galvanized steel buckets were used for milking. In some cases, brass or stainless steel vessels were also used.

5.2.14. Health Care and Disease Control

Farmers rely mostly on the services of veterinary doctors who were appointed by state milk producers' cooperatives union. Farmers generally, co-operate with veterinary doctor to prevent infection and contagious diseases, regular deworming schedules and insecticide application to control external parasites.

Plate 5.4 Farmer milking his cow

Plate 5.5 Procurement of milk in the study area

Plate 5.6 CN grass used for feeding

As a prophylactic measure, the animals were generally given vaccination for foot and mouth, anthrax, mastitis and rinderpest diseases. State government also provides veterinary service through veterinary dispensary. The diseased animals were generally tied separately in the stall. A few large herd size cattle keepers also hire the services of a veterinary doctor on a regular basis. In such cases, whenever the animal fell sick, the doctor would visit the stall and treat the animals. Generally allopathic medicines were used for treatment of the animals.

5.2.15. Care of Young Stock for Replacement

All the calves in the stall were allowed to suckle for colostrum milk. The period up to which the calves were allowed to suckle varied from one cattle keeper to another. In most of the cases, it was up to three months. Small quantities of forage were given from second month onwards. Calf ration feeding started from third month. The practice of dehorning the calves was prevalent with majority of cattle keepers, who maintained crossbred calves in the stall for rearing were de-wormed at suitable intervals. The cattle keepers were quite attentive towards growth rate, age and body weight at which the crossbred heifers should be inseminated.

Male calves born were disposed off within a month or two of their birth. Most of the cattle keepers reported that they sold the calf to brokers for meat purpose. However, a few instances of deliberate killing by not feeding colostrum and feeds were also reported. In most cases, the calves were sold and the monetary value was nominal being Rs.1500/calf.

5.2.16. Shelter Management

Farmers keep the animals in closed space with locally available building materials the crossbred animals were generally tied in the stalls. A great majority of cattle keepers possessed separate stalls for the animals however; some households used part of their residence as stalls for animals. Large herd size cattle keepers generally having pacca and katcha cattle sheds were observed in some of the medium and all small size herd cattle keepers. In small

herd generally the cattle shed had mud floor, brick wall and roof made up of with tiles, while medium and large herd were having cement/ stone flooring, brick wall and asbestos/tiles roofing. Air and light circulation in the stalls varied from fair to good in all the herd size. The drainage channel was made in medium and large herd category and generally, it was not found in small herd category. The average floor area available per crossbred animal was according to standard in all large and medium herd size whereas, in small herd it was not a problem due to 1 or 2 adult animals kept in the herd. In contrast, irrespective of the category, buffalo were let loose during day time and kept in the shed during night time except young stock. Almost all the farmers built katcha buffalo sheds except a few farmers. The standards were according to available land in each herd. So, no similar pattern or norms were followed. The floor of the shed made up of mud and drainage channel were not built separately in the shed for both categories of herd.

5.2.17. Marketing management

All the villages were having milk booth operated by private dairy from morning 6 to 8.30 AM and evening from 4.30 to 6.30PM. For collecting milk, hired labours were appointed by the Hatsun dairy (Arokya milk). Even though the government running Aavin co-operative societies is having in the villages, farmers sold their production of milk to Hatsun dairy only. Every village in the study area has more than two milk collecting centers. On an average 95 per cent of milk was procured by the Hatsun dairy. Milk price is offered by the agency at the rate of Rs 12.00 per litre of cow milk and Rs 15 for buffalo milk. Farmers also, to a little extent sell to tea stall/other agencies which amounted 1-3 per cent of the total milk. Some farmer sells directly to the consumers.

In general, farmer's preference for selection of market channel was due to the competitive price offered by the procurement agencies/consumers. Hatsun dairy has the higher share in total milk procurement. The additional marketing services namely, free veterinary services and medical care for the milking and growing animals and subsidized inputs bring the farmers close to

Hatsun dairy. Table 5.12 shows in nutshell the production, consumption and disposal of milk. Wherever buffaloes are kept, farmers keep little quantity of milk for some consumption.

Table 5.12. Production, consumption and marketed surplus of milk

(lit/day)

Categories of farm	Total production		Total consumption			Disposal of milk (% disposed)	
	cow	buffalo	cow	buffalo	Overall	cow	buffalo
Small herd	12.94	7.94	0.75	0.56	0.97	12.19 (94.20)	7.38 (92.95)
Medium herd	25.27	16.43	0.87	0.73	1.23	24.40 (96.56)	15.70 (95.56)
Large herd	47.01	28.18	0.81	0.77	1.22	46.20 (98.28)	27.41 (97.27)

From the above table it is clear that crossbred cow contribute more than buffaloes. In small herd the production of crossbred cow milk was 12.94 litre and buffaloes was 7.94 litre per day. For home consumption the overall quantity retained was 0.97/day. Marketed surplus in small herd was 12.19 (94.20%) of cow milk and 7.38 for buffalo milk. In medium herd, the production of crossbred cow milk was 25.27 litre and buffaloes produce 16.43 litre per day. For home consumption the overall quantity was 1.23/day. Marketed surplus in medium herd was 24.40 (96.56%) for cow milk and 15.70 (95.56%) for buffalo milk. In large herd the production of crossbred cow milk was 47.01 litre and these keep buffaloes producing 28.18 litre per day. For home consumption the overall quantity was 1.22/day. Marketed surplus in large herd was 46.20 for cow milk and 27.41 (97.27%) for buffalo milk.

5.2.18. Economic and Financial Aspects of Dairy Herd

Unlike crop, livestock enterprise has multiple objectives in resource allocation decisions. Economic and technical criteria go hand in hand in decision making. Farmers have to see profit from milk production by remunerative price for the produce. They have to keep home grown as replacement stock –female young stock whose growth rate, maturity and entry

into production process has important role to play in decision making. While bringing out the cost of production of milk, two aspects need to be brought out.

(1) production structure such as type of breed for milk production, composition of output –milk, calf, milk products, net return etc, as well as

(2) The social structure such as concentration of production namely, which type of dairy herd is having more cattle or producing more milk and marketing.

Under the subtitle of economic and financial aspects, the analysis pertains to cost of maintenance per animal and cost of production per Kg of milk among various categories of dairy herd.

Milk production provides regular cash inflow for the farm families to meet their home need as income flowing from the dairy enterprise is well spread over the year, there is the desirability as well as the scope for developing dairy enterprise both as a specialized or a supplementary enterprise. Individual households in rural areas most often do maintain different types of milch animals for milk production. But, the large scale adoption of dairy enterprise will be possible, only if it is profitable.

Cost of the milk production is one of the important economic indicators which can help the farmers in taking important management decision. Generally, a milk producer can increase his dairy income in two ways by increasing milk production and / or by reducing cost of milk production. The second alternative can be achieved through judicious use of various inputs used in dairy enterprise.

With this view, an effort was made to estimate the costs and returns of milk production for different types of lactating animals and the same were presented in this section. In order to draw a comparative picture of the economic aspects of milk production for different types of lactating animals based on annual milk production, cost and returns were worked out in various herd size categories. An attempt was therefore made to examine the extent of expenditure in maintaining lactating animals. The total cost was divided into two major groups, viz., variable and fixed costs. Variable cost includes expenditure

on green fodder, dry fodder, concentrates, family labour, medicine and veterinary care and miscellaneous expenses. Fixed costs include depreciation and interest on cattle shed and stores, dairy equipments and milch animals.

5.3. Economics of keeping dairy animals on different categories of farm

Farmers in dry farming areas, normally diversify their farm activities so as to have more than one source of income, Livestock rearing, for many reasons forms an inseparable activity of farming community. With the faster development of dairy sector in the country, of late, dairy farming is considered as regular income generating occupation. Farmers, by taking commercial dairy production differ in their managing capacity of their farm resources. By and large, in spite of their existing level of knowledge on modern ways of keeping dairy animals they are always at sub-optimal level of production leading to under- utilized farm resources. Also, with the absence of proper accounting records, farmer cannot ascertain the total cost, total return and margin of profit on the farm. With a view to assess the existing situation in various categories of herd, and functional financial aspects of resource management the study has been carried out on those aspects.

5.3.1. Cost and return of maintaining dairy herd

Maintaining dairy herd depends mainly on the resource structure available at the disposal of the farmer –land area for crop and crop by products available as feed, labour hours for carrying out the farm operation, working capital, ratio of production animal versus replacement stock, and so on. Farmers in the study area keep mostly productive animals. The value of animal ranges from 17000 to 25000 crossbred cows and for graded buffalo it ranges from 15000 to 17000. Interest on investment and depreciation are the fixed cost. Variable cost includes feed cost, labour cost, veterinary and medicine charges and miscellaneous expenses which are of recurring type. Three types of unit cost of production, namely cost per household in keeping dairy herd,

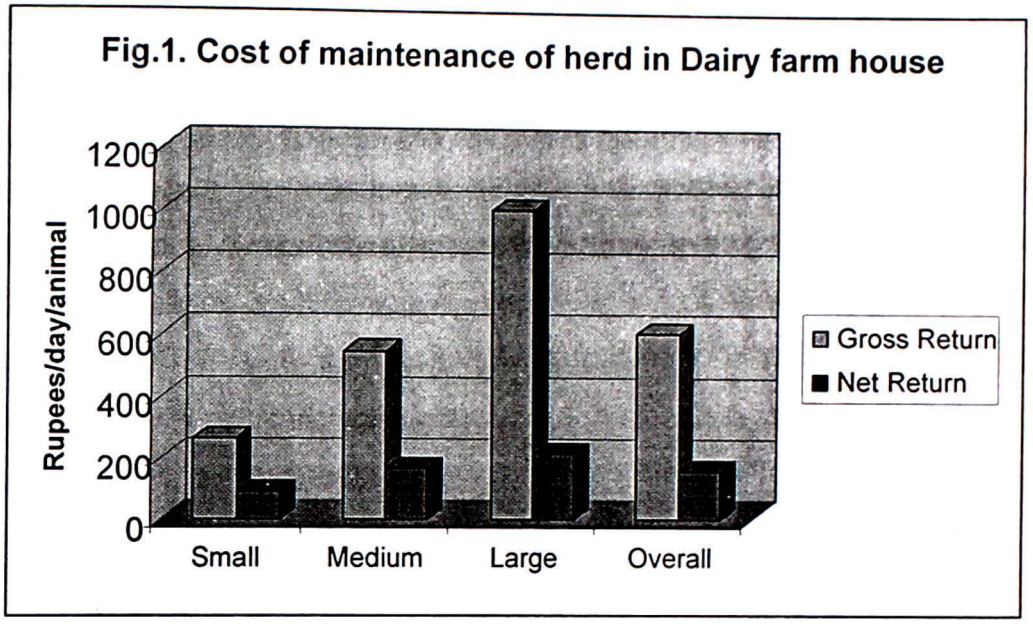
cost per milking animal and cost of production per litre of milk are brought out in table 5.13.

Table 5.13. Cost of maintenance of dairy herd

(Rs./day/animal)

Sl. No	Particulars/size of herd	Small	medium	Large	Overall
	FIXED COST				
1	Depreciation on fixed assets	10.373 (6.48)	33.44 (8.85)	62.83 (8.00)	31.37 (7.99)
2	Interest on investment	21.48 (13.41)	33.45 (8.85)	80.36 (10.23)	40.72 (10.37)
3	Total fixed cost	31.85 (19.89)	66.89 (17.71)	143.19 (18.24)	72.08 (18.36)
	VARIABLE COST				
4	Green fodder/grazing	28.88 (18.03)	48.61 (12.87)	82.67 (10.53)	49.19 (12.53)
5	Dry fodder	22.87 (14.28)	33.41 (8.84)	118.28 (15.06)	51.29 (13.07)
6	Concentrates	38 (23.72)	120.98 (32.02)	302.68 (38.55)	133.54 (34.02)
7	Total feed cost	89.75 (56.03)	203.00 (53.73)	503.63 (64.14)	234.01 (59.62)
8	Medicine and Veterinary care	11.96 (7.47)	3.35 (0.89)	12.45 (1.59)	9.41 (2.40)
9	Miscellaneous expenses	10.90 (6.81)	55.85 (14.78)	25.82 (3.29)	28.81 (7.34)
10	Total labour	15.70 (9.81)	48.69 (12.89)	100.1 (12.75)	48.20 (12.28)
11	**Total variable cost**	128.33 (80.12)	310.89 (82.29)	642.00 (81.76)	320.43 (81.64)
12	**Gross Cost**	160.17 (100)	377.78 (100)	785.19 (100)	392.51 (100)
	RETURNS				
13	**Total Sale of milk**	256.98	527.59	965.75	583.44
	Crossbred	146.26	292.00	554.59	330.95
	Buffalo	110.72	235.59	411.16	252.49
14	From cow dung	10.23	18.12	35.11	21.15
15	**Gross Return**	260.44	545.71	1000.86	602.34
16	**Net Returns**	90.04	167.63	215.63	157.77

(Number in parenthesis is percentage to total)



5.3.2. Cost of maintenance of dairy herd

In the study area, the overall cost of maintaining dairy herd (cow and buffalo) was 392.5 per day out of which major item was feed cost accounting for Rs 234.01/day/farmer which was 59.62 per cent of total cost. Total fixed cost worked out to be Rs 72.08/day/farmer. This was 18.36 per cent of total cost which was attributed to feeding labour. Next to that, labour Rs. 48.2/day/farmer which consist of mainly family labour. Recurring cost and veterinary expenses account for Rs 38.22/day which shares 9.74 per cent of total cost. Since veterinary doctor's service is looked after by the dairy which collects milk, salary of the doctors and the unit was considered as hidden cost and have omitted in accounting cost calculation.

Farmers in dry farming areas normally diversifying their enterprises, even with in dairy farming, crossbred cows and buffaloes were being maintained to overcome risk and to get remunerative milk price. Average price of cow milk was Rs 12/litre and that of buffalo milk was Rs 15/litre. By this differential price for product, the overall income from sale of milk was 583.44 in that cow milk share was 330.95/day. However farms in the different herd size differ in selling the volume of cow and buffalo milk. Small herd received Rs

146.26 from sale of milk, medium herd received almost equal share from cow and buffalo milk, Rs 292 (55.35 per cent of total value for sale of milk) and Rs 235.59 for buffalo milk. Large herd 554.59 of income from sale of milk as cow milk, and Rs 411.16 for buffalo milk the net return by keeping milch cow and buffalo worked out to be Rs 90.04 for small herd, Rs167.63 for medium herd and Rs 215.63 for large herd.

5.3.3. Cost of maintaining milch animals –Crossbred cow

Massive breed improvement programs was launched since 1955 to improve existing bovine stock by crossbreeding and upgrading buffaloes for increased milk production in the country. Technology developed for this purpose has different impact on different areas and farm. In dry farming areas where feed resources are limited, farmers efforts to keep animals are by and large, left to the managerial skills irrespective of size of herd.

In the study area, farmers keep productive animals for financial improvement of the farm but differ very much with herd size. Table 5.13 gives the details of cost structure for all categories of farm and also overall picture in the study area.

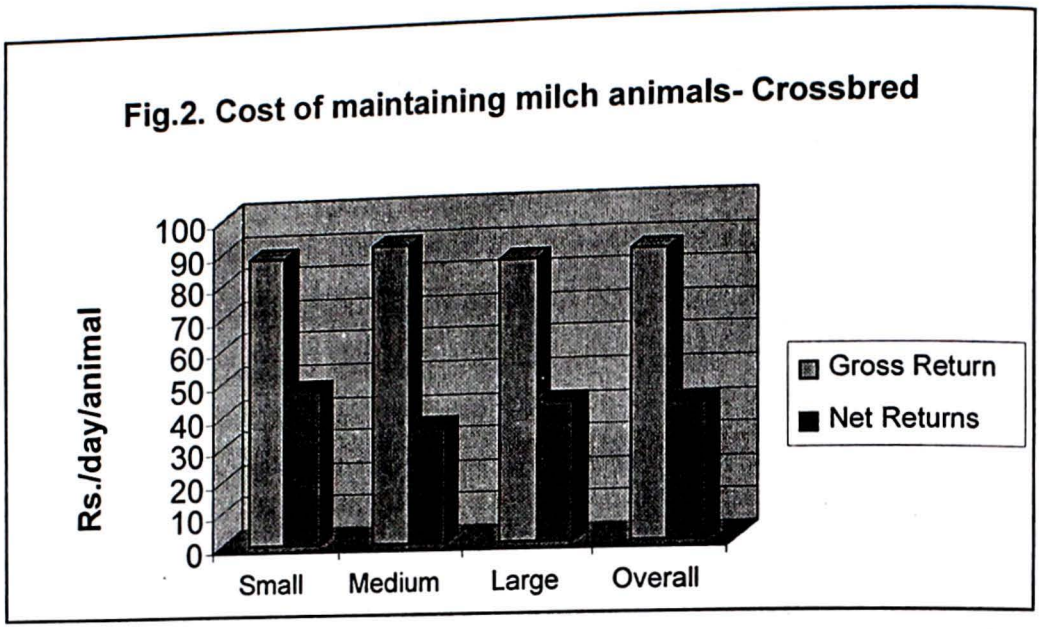
The overall maintenance cost for crossbred cow/ day was Rs 51.29 and income from sale of milk and manure was Rs 87.87 per day yielding a net profit of Rs 41.37. Feed cost alone occupies 63.13 per cent of total cost any saving on improvement in feed regime will definitely increase the net income for the farmer. The situation in small herd is little better than medium and large herd. The small farmers incur Rs 50.41 for keeping crossbred milch cow and earn Rs 87.43 as gross income, thereby earning Rs 47.29 as net income. The medium herd farmers total cost of maintenance of cow was Rs 55.95 and received income of Rs 93.83/day/cow. Bringing net income of 34.87 per day per cow, the large herd, though having lesser cost of Rs 49.69 than other sizes of farm (mainly small and medium) its profit margin was only Rs 41.97, lesser than the small herd farm (table 5.14). This has shown that economies of scale work even in dairy farm enterprises.

Table 5.14 Cost of maintaining milch animals in different sizes of herd-Crossbred

(Rs. / day/ animal)

Sl. No.	Particulars/size of herd	Small	Medium	Large	Overall
	FIXED COST				
1	Depreciation on fixed assets	4.36 (7.73)	4.91 (8.78)	2.77 (5.58)	3.52 (6.87)
2	Interest on investment	5.88 (8.30)	4.41 (7.88)	4.01 (8.07)	4.39 (8.55)
3	Total fixed cost	10.24 (16.02)	9.32 (16.66)	6.78 (13.65)	7.91 (15.43)
	VARIABLE COST				
4	Green fodder/grazing	9.76 (19.37)	9.36 (16.74)	5.94 (11.95)	7.33 (14.30)
5	Dry fodder	6.87 (13.62)	6.42 (11.48)	7.35 (14.78)	7.05 (13.75)
6	Concentrates	9.25 (18.36)	20.66 (36.93)	24.17 (48.64)	21.07 (41.08)
7	Total feed cost	25.88 (51.34)	36.45 (65.15)	37.45 (75.37)	35.46 (69.13)
8	Medicine and Veterinary care	3.90 (12.31)	0.15 (0.27)	0.53 (1.06)	0.95 (1.85)
9	Miscellaneous expenses	4.18 (8.65)	4.69 (8.39)	0.81 (1.62)	2.24 (4.38)
10	Total labour	6.20 (11.66)	5.34 (9.54)	4.12 (8.30)	4.73 (9.22)
11	**Total variable cost**	40.16 (83.97)	46.63 (83.35)	42.90 (86.35)	43.38 (84.57)
12	**Gross Cost**	50.41 (100)	55.95 (100)	49.69 (100)	51.29 (100)
	RETURNS				
13	Sale of milk	85.02	86.46	81.20	84.23
14	From cow dung	2.41	4.37	4.15	3.64
15	**Gross Return**	87.43	90.83	85.35	87.87
16	**Net Returns**	47.27	34.87	41.97	41.37

(Number in parenthesis is percentage to total)



5.3.4. Milk production cost in Crossbred cows

Table 5.15. Cost of milk production per litre of milk - Crossbred cow

Sl. No.	Particulars/ size of herd	Small	Medium	Large	Overall
	FIXED COST				
1	Depreciation on fixed assets	0.55 (7.72)	0.483 (7.88)	0.47 (5.58)	0.50 (7.06)
2	Interest on investment	0.59 (8.29)	0.539 (8.78)	0.68 (8.07)	0.60 (8.38)
3	Total fixed cost	1.14 (16.02)	1.02 (16.66)	1.15 (13.65)	1.10 (15.44)
	VARIABLE COST				
4	Green fodder/grazing	1.38 (19.36)	1.027 (16.73)	1.01 (11.95)	1.14 (16.01)
5	Dry fodder	0.97 (13.61)	0.704 (11.48)	1.25 (14.78)	0.97 (13.29)
6	Concentrates	1.31 (18.35)	2.266 (36.93)	4.10 (48.64)	2.56 (34.64)
7	Total feed cost	3.66 (51.31)	4.00 (65.15)	6.35 (75.37)	4.67 (63.94)
8	Medicine and Veterinary care	0.88 (12.30)	0.016 (0.27)	0.09 (1.06)	0.33 (4.54)
9	Miscellaneous expenses	0.62 (8.65)	0.515 (8.39)	0.14 (1.62)	0.43 (6.22)
10	Total labour	0.83 (11.66)	0.585 (9.54)	0.70 (8.30)	0.71 (9.83)
11	**Total variable cost**	5.98 (83.92)	5.11 (83.35)	7.28 (86.35)	6.12 (84.54)
12	**Gross Cost**	7.13 (100)	6.13 (100)	8.43 (100)	7.23 (100)

(Number in parenthesis is percentage to total)

In table 5.15, the detail of cost per litre of milk is brought. Farms in the study area receive Rs 12/litre of milk from private dairy operating in that area. Cost of production /litre of milk were minimum for medium herd farm- Rs 6.13/litre followed by small herd farm Rs 7.13 and maximum for large farm as Rs 8.43/litre and the overall cost of production for the area was Rs 7.23/litre. Variable cost of production occupies 51 percent in medium herd to 70 per cent in the large herd and over all it was 60.25 per cent of the price (Rs12/litre). In all situations the largest single item in the cost was feed cost- 63.94 per cent.

5.3.5. Cost of maintaining milch buffalo

Buffalo, in general, are advantageous over crossbred cows because of (1) Disease resistance 2) It fetches more price for the fat rich milk and (3) It can be outstanding by coarse feed stuff (sorghum Stover, paddy straw and samaai straw) and grazing with less concentrate feed. Table 5.16 brings out the cost structure of maintaining milch buffalo across herd size overall picture in the area.

The overall expenditure incurred for rearing milch buffalo was Rs 48.13/ day and the income received from sale of milk and dung was 76.330. Profit margin was Rs 28.28/day/buffalo which is lesser than maintaining crossbred.

Fig.3. Cost of maintaining milch buffalo

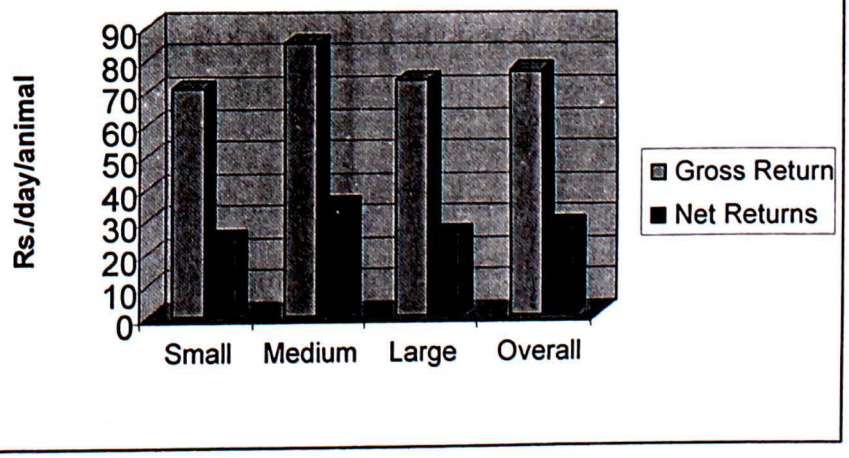


Table 5.16. Cost of maintaining milch buffalo

(Rs. / day/ animal)

Sl.No	Particulars/size of herd	Small	medium	Large	Overall
	FIXED COST				
1	Depreciation on fixed assets	5.26 (11.40)	1.70 (3.36)	2.34 (4.92)	2.57 (5.34)
2	Interest on investment	4.21 (9.13)	2.05 (4.07)	2.36 (4.96)	2.53 (5.26)
3	Total fixed cost	9.47 (20.53)	3.75 (7.43)	4.69 (9.88)	5.10 (10.60)
	VARIABLE COST				
4	Green fodder/grazing	8.45 (18.32)	8.32 (16.50)	6.32 (13.31)	7.19 (14.95)
5	Dry fodder	7.75 (16.79)	5.73 (11.36)	10.62 (22.35)	8.82 (18.32)
6	Concentrates	15.49 (33.59)	23.20 (45.99)	19.80 (41.70)	20.16 (41.87)
7	Total feed cost	31.69 (68.70)	37.25 (73.85)	36.74 (77.37)	36.17 (75.14)
8	Medicine and Veterinary care	0.41 (0.89)	0.41 (0.82)	0.50 (1.05)	0.46 (0.96)
9	Miscellaneous expenses	0.22 (0.47)	5.29 (10.49)	1.42 (3.00)	2.35 (4.89)
10	Total labour	4.34 (9.42)	3.74 (7.41)	4.13 (8.70)	4.05 (8.42)
11	**Total variable cost**	36.66 (79.47)	46.69 (92.57)	42.79 (90.12)	43.03 (89.40)
12	**Gross Cost**	46.13 (100)	50.44 (100)	47.49 (100)	48.13 (100)
	RETURNS				
13	Sale of milk	67.70	81.95	71.01	73.55
14	From cow dung	2.93	4.22	2.10	3.08
15	**Gross Return**	70.63	85.17	73.11	76.30
16	**Net Returns**	24.50	34.73	25.62	28.28

(Number in parenthesis is percentage to total)

The higher cost of rearing buffalo was seen in the medium herd farm- Rs 50.44 followed by large- Rs 47.43 and Rs 46.13 in small hard farm. The reason for lower profit margin than cow is attributed to lack of remunerative price for buffalo milk at Rs 15 per litre milk without giving importance for fat percentage.

5.3.6. Milk production cost in buffaloes

Table 5.17 shows that the cost of producing one litre of buffalo milk was least in medium herd farm–Rs 9.22/litre, followed by large herd farm – Rs 10.03 and small herd farm – Rs 10.23. As in the case of cow maintenance, feed cost constitute 68 per cent of total cost in small herd, 73.86 per cent for medium and 77.37 per cent for large herd.

Table 5.17. Cost of milk production per litre of milk– Buffalo (Rs./ day/)

Sl.No	Particulars/size of herd	Small	Medium	Large	Overall
	FIXED COST				
1	Depreciation on fixed assets	1.17 (11.40)	0.31 (3.36)	0.49 (4.92)	0.66 (6.56)
2	Interest on investment	0.93 (9.13)	0.37 (4.07)	0.50 (4.96)	0.6 (6.05)
3	Total fixed cost	2.10 (20.52)	0.68 (7.43)	0.99 (9.88)	1.26 (12.61)
	VARIABLE COST				
4	Green fodder	1.87 (18.32)	1.52 (16.50)	1.34 (13.31)	1.58 (16.04)
5	Dry fodder	1.72 (16.79)	1.05 (11.36)	2.24 (22.35)	1.67 (16.83)
6	Concentrates	3.44 (33.58)	4.24 (45.99)	4.18 (41.70)	3.95 (40.42)
7	Total feed cost	7.03 (68.69)	6.81 (73.86)	7.76 (77.37)	7.20 (73.31)
8	Medicine and Veterinary care	0.09 (0.89)	0.08 (0.82)	0.10 (1.05)	0.09 (0.92)
9	Miscellaneous expenses	0.05 (0.47)	0.97 (10.49)	0.30 (3.00)	0.44 (4.65)
10	Total labour	0.96 (9.41)	0.68 (7.42)	0.87 (8.70)	0.84 (8.51)
11	**Total variable cost**	8.13 (79.46)	8.54 (92.59)	9.04 (90.12)	8.57 (87.39)
12	**Gross Cost**	10.23 (100)	9.22 (100)	10.03 (100)	9.83 (100)

5.3.7. Cash inflow and outflow in maintaining cow and buffalo

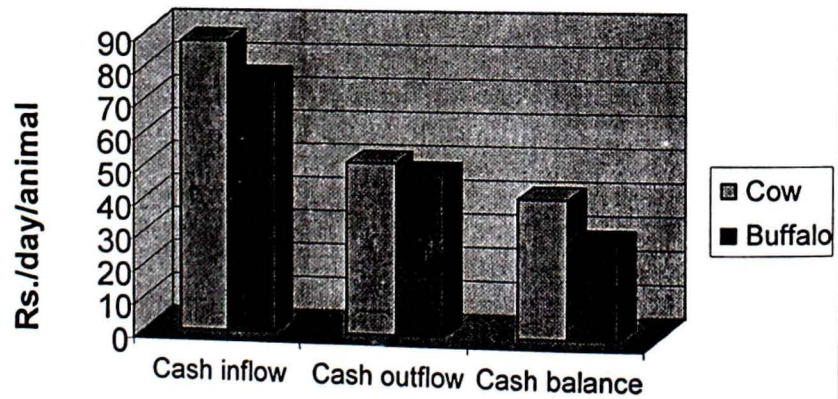
By virtue of higher milk production and better care crossbred cows brought higher cash balances of Rs 35.80 as against Rs 28.28 for buffalo. Table 5.18 shows in the nut shell the cash inflow and out flow for the two types of milch animal. Farmers by taking up dairy farming have mobilized the resources mainly capital for investing on milch animals and for working capital. Definitely the study area has shown productive and profitable activities of dairy farm leading to employment and income for the farm family which otherwise would be a victim for vagaries of monsoon.

Table 5.18 Cash flow for dairy enterprise

(Rs./day/animal)

Particulars	Cow	Buffalo
Cash inflow	87.87	76.30
Cash outflow	51.29	48.13
Cash balance	41.37	28.28

Fig. 4. Cash flow for dairy enterprises



5.3.8. Production function analysis of milk production under different herd size

Understanding milk production activities at farm house in terms of financial aspect has brought out the feed cost as major items in the milk production. Whether the rupee spent on feed has remunerative income –this can be

brought by functional analysis of milk production-rupee value of milk as function of rupee value of inputs. In doing so, specification of variables that go into milk production were identified as

$$Y=f(X1,X2,X3,X4, X5, X6, X7, X8)$$

Where Y= Value of milk produced
X1= Value of green fodder
X2= Value of dry fodder
X3= Value of concentrate mixture
X4= Value of labour (implicit value)
X5= Cost of capital- interest on investment
X6=Depreciation value of capital asset
X7=Veterinary expenses
X8=Recurring expenses

Table 5.19. Regression coefficient for milk producing crossbred cow under various herd situation.

Regression coefficients (b_i)	Size of herd		
	Small	Medium	Large
Sample size	63	46	39
Regression constant	1.38 (0.0356)	2.49*** (0.0594)	1.85** (0.0579)
Cost of green fodder	-0.041 (0.0191)	-0.285** (0.0199)	0.146 (0.0167)
Cost of Dry Fodder	-0.056 (0.0094)	-0.146** (0.0110)	0.227 (0.0345)
Cost of Concentrate	0.193* 0.0165)	0.012 (0.0283)	0.121 (0.0199)
Cost of Labor	0.312*** (0.0114)	--	0.089 (0.0172)
Veterinary expenses	--	--	-0.188 (0.0232)
Interest on investment	-0.116 (0.0166)	0.404*** (0.0054)	0.405** (0.0205)
Depreciation	0.380***	0.0933*** (0.0139)	-0.093 (0.0370)
Miscellaneous	_	_	-0.074(0.0359)
R^2 (Adjusted)	48.7***	59.2***	50.5***
'F' Statistic	8.90	11.16	5.46
$\sum bi$	0.672	0.077	0.711

(Parentheses in the brackets are standard error)
*** Significant at 1% level. ** Significant at 5% level. * Significant at 10% level.

5.3.8.1. Small herd farm

From the table 5.19, it is observed that significant contribution of expenses on concentrates mixture (significant at 10 per cent), labour (1 per cent level) and depreciated value for the asset (1 per cent). Every rupee spent on concentrate mixture feed result in increasing income by 0.193 rupee, whereas for one unit increase cost of labour result in increase Rs 0.312 in income which indirectly states the importance of labour hours spent on managing crossbred cow. Small farmer's main asset was cross herd cow itself. Indirect influence from the coefficient for depreciation points out the scope for keeping better crossbred cows with better feeding of concentrate mixture. Other variables such as cost green fodder cost dry fodder, interest on capital invested have negative but not significant impact on income.

5.3.8.2. Medium herd farm

In fitting function for medium herd farm, variables like labour, veterinary charges and miscellaneous expenses were omitted for want of better fit function. It is observed from the table 5.19 that except spending on concentrate mixture, all variables are significantly related with income from milk. Expenditure on green fodder and dry fodder has negative influence on income. Increased rupee spending on green fodder leads to decrease of Rs 0.25 on income and that of dry fodder Rs 0.146 decrease on income, whereas, interest on investment gives positive impact on income -an increase of Rs 0.404.

5.3.8.3. Large herd farm

For large herd farm except interest on investment on dairy enterprises, all variables were found to be not significant. Positive relation of interest on investment shows an increase of Rs 0.405 in income for interest on investment. In all herd size situation the $\sum bi$ is less than one, which indicates decrease return to scale. Definite conclusion can be drawn when the sample size is increased by taking more farmers in other dry land area.

5.3.9. Buffalo milk production

Milch buffaloes are reared mostly with less concentrate feed and less management care. Under small herd farm concentrate which has positive significance on impact on income- the coefficient is 0.585 (significant at 5 per cent level).

Table 5.20. Regression coefficient for milk producing buffalo under various herd situations.

Regression coefficients (b_i)	Size of herd		
	Small	Medium	Large
Sample size	25	23	21
Regression constant	0.984** (0.0341)	1.25** (0.2368)	2.54** (0.0401)
Cost of green fodder	0.078 (0.0124)	0.245*** (0.0464)	-0.249** (0.0175)
Cost of Dry Fodder	0.165** (0.0279)	0.379** (0.0016)	0.1888** (0.0118)
Cost of Concentrate	0.585** (0.0201)	0.379*** (0.0715)	-0.146 (0.0186)
Cost of Labor	–	0.386** (0.0178)	0.103 (0.0161)
Veterinary expenses	–	0.095 (0.0767)	-0.085* (0.0118)
Interest on investment	0.0013 (0.0132)	–	-0.355* (0.0488)
Depreciation	-0.015 (0.0520)	-0.3189** (0.0729)	0.581** (0.0411)
Miscellaneous	–	-0.406 (0.0602)	–
R^2 (Adjusted)	65.2***	74.7***	63.2***
'F' Statistic	12.99	8.90	6.41
Σbi	0.6493	0.7591	0.0378

(Parentheses in the brackets are standard error)

*** Significant at 1% level. ** Significant at 5% level. * Significant at 10% level.

From table 5.20, it was shown that the medium herd farm has almost all variables significantly related to income. Coefficient for expenses on green

fodder and grazing is 0.24 (significant at 5 per cent level), for cost of concentrate it was 0.379 (significant at 1 per cent level), coefficient for labour was 0.386 and for depreciation it was negative 0.319 (significant at 5 per cent level). The large herd farm has negative coefficient – 0.248 for cost of green fodder and positive coefficient 0.188 for cost of dry fodder. While interest on investment has negative effect of 0.353 (significant at 1 per cent level) depreciation has positive coefficient of 0.581 (significant at 5 per cent level). In the entire buffalo situation the R2 value is high, ranging from 63 to 74.7 per cent. The $\sum$ bi which reflects the return to scale for all herd size is less than 1 indicating decreasing return to scale.

Both for crossbred cow and buffalo management the $\sum$ bi is less than one. This definitely points out that there is a need for allocating resources judiciously among inputs. While the price of milch animal is guided by market forces, feeding regime is under the control of farmers. To what extent management of herd can be improved by feed management is brought out under the cost management chapter.

5.4. Cost management in dairy farming-Feed cost

Knowledge about cost structure of animal maintenance and milk production and accounting each item of cost help the producer to alter or adjust their productive farm. In dry farming, the situation is restricted to limited resources – land area for cultivated irrigation faculties for fodder resource for livestock, price for input etc. Unlike crop cultivation, where farmers for certain operation, rely on hired/contract labour, dairy farming is solely a family business. Family labour is used for all the operation of managing dairy animal. In India, the social climate for dairy development was created by co-operation movement. Government for faster development provided free veterinary services for breeding and disease control. Though an important aspect of keeping animal is disease control cost accounting is done partially to the extent of cost of medicine.

Economic analysis brought out in this study consist of financial (cost of production and maintenance) and functional aspect (production function analysis). Both the type of analysis point out importance of feed expenses hence , an attempt was made in this session to examine whether any improvement can be brought out by allocating feed resource to producing animal effectively by keeping other item of cost unchanged.

Linear program model was used to bring out optimum plan for various herd sizes in study area

Model

The following assumptions were made while working out the plan.

5.4.1 .Technical aspect

Animals are fed as per the body weight – 2.5 per cent of body weight as dry matter intake

1. Crude Protein (CP) and Total Digestible Nutrient (TDN) as per body weight and milk production dry matter intake as per the body weight.
2. Milk production coefficient is taken as such gives –per animal per day milk yield as shown in various herd sizes.
3. Concentrate mixture as per milk production
4. The concentrate ingredients considered were wheat bran, rice bran and ground nut oil cake.
5. Maximum limit for straw intake, rice bran intake.
6. Minimum limit for total milk production – both from cow and buffalo
7. Minimum limitation for number of animals
8. Prices of feeds as per value paid by the farmer.

Table 5.21 shows the optimum feed plan for milch animals for various herd sizes

Table 5.21. Feed management for maintaining milch animal

Per day/farm

Sl. No.	Particulars	Optimum farm plan		
		Small	Medium	Large
1.	**No of milch animal**			
	Cow	2.00	3.00	7.01
	Buffalo	1.42	1.96	4.37
	Heifer	1.00	–	–
2.	**Milk production (in lit)**			
	Cow	15.00	28.11	48.00
	Buffalo	6.39	11.66	25.00
3.	**Feed and fodder(Kg)**			
	Grasses	20	40	140
	Straw	27.4	28	45
	Concentrate Wheat bran	3.35	7.94	14.52
	Rice bran	2	2	14
4.	**Total return over feed cost(Rs)**	225.05	405.40	692.40

In all situations, the most constrained limitation was dry matter intake by animal, and quantity of concentrate and grass available.

Table 5.22. Comparison of optimum feed plan with farmer's feeding practices

Particulars	Optimum plan			Farmer's feeding practices		
	Small	Medium	Large	Small	Medium	Large
Total income from sale of milk(Rs)	275.85	512.22	951.00	256.98	527.59	965.75
Total feed cost(Rs)	136.43	198.28	414.24	89.75	203.00	503.63

From the above table 5.22, it is clear that if the farmers are asked to feed as per nutrient requirement, there is little improvement over the existing situation- in fact small herd farmer's optimum plan brings negative return in feed cost over farmer's fed practices- to the extent – Rs 42.72/day. Other herd farm – medium had marginal improvement of Rs 4.72/day and large farm had Rs 89.39/day. In conclusion, with available feed material namely- field grass straw and bran very little improvement in feed cost can be achieved. In dry

farming area, if dairy has to be profitable, non-conventional feed materials need to be made available at cost effective price.

5.5. Constraints in milk production

Normally, the traditional agricultural system was of agrarian nature in which livestock rearing never faced any constraint because the system got adjusted to the existing level of resources over a period of time. All kinds of activities were fitted on their own in the system as the system got adjusted with the level of technology resulting in nearly no constraints. With the introduction of technologies to improve the system, there are lot of obstacles, bottlenecks and constraints emerging in the system and pulling down the benefits of technology.

As the farmers have reported many constraints their numbers/ frequencies are given in the table 5.23.

Table 5.23 Breeding and Health care constraints as reported by farmers in the study area.

Sl. No.	Items	Very Serious	Serious	Total	Percentage
1	Lack of A. I. facilities.	55	47	102	68.92
2	Distant location of A.I. center and veterinary hospital	-	45	45	30.41
3	Problems of repeat breeding	30	30	60	40.54
4	Non-availability of veterinary staffs	25		25	16.89
5	Inefficient services at the A.I. centers	-	27	27	18.24
6	Distant location of A.I. centers	-	25	25	16.89
7	Non-availability of semen of desired breed at proper time	-	18	18	12.16
8	Lack of good transportation facilities.	-	21	21	14.19
9	Presence of scrub bulls in the area.	-	11	11	7.43

An attempt was made to identify the constraints in the milk production in the study area on the basis of observation and discussions with the respondents. The constraints were identified on the basis of discussions with selected dairy farmers. The following constraints were identified in the production of milk which further analyzed for their priority. In this chapter to highlight the constraints as opined by the sample farmers, Constraints were grouped under four major headings- Breeding and Health care, economic and marketing.

It could be observed that in the breeding and disease management constraints lack of A.I facilities was major constraints it was reported by 68.92 per cent of respondents, problem of repeat breeding was also major constraints that is about 40.54 per cent of respondents.

Table 5.24. Socio-psychological constraints

Sl. No.	Items	Very Serious	Serious	Total	Percen-tage
1	Ignorance of co-operative society	-	3	3	2.03
2	Lack of democratic awareness and harmony among members	-	7	7	4.73
3	Superstitions belief of farmers.	-	15	15	10.14
4	Lack of faith in modern medicine.	-	25	25	16.89
5	Prefer natural services than A.I.	32	28	60	40.54

The socio-psychological constraints have been mentioned in table 5.24; it can be observed that preference of natural services for breeding than A.I facilities was the opinion expressed by 40-54 per cent of farmers.

Table 5.25. Technical constraints

Sl. No.	Items	Very Serious	Serious	Total	Percentage
1	Lack of knowledge about fodder cultivation ad fodder seeds.	70	-	70	47.30
2	Inadequate knowledge about balanced Feeding to animals	73	-	73	49.32
3	Quality of roughages	35	-	35	23.65

Lack of knowledge in different aspects of improved dairy farming practices, lack of knowledge about fodder cultivation and fodder seeds and inadequate knowledge about balanced Feeding to animals were the major constraints in the technical constraints. The Technical constraints have been mentioned in table 5.25., Lack of knowledge about fodder cultivation ad fodder seeds and inadequate knowledge about balanced feeding to animals their percentage about 47.30 per cent and 49.39 per cent respectively.

Table 5.26. Marketing constraints as reported by farmers in the study area

Sl. No.	Items	Very Serious	Serious	Total	Percent-age
1	Non-existence of milk cooperatives in the locality.	-	15	15	10.14
2	Purchase of milk by the societies on FAT per cent basis and no consideration of SNF basis	-	10	10	6.76
3	Exploitation by middlemen.	-	25	25	16.89
4	Problems in transportation of milk to the Co-op	-	2	2	1.35
5	Ignorance of the necessity of obtaining health certificate from veterinarian for the animals to be sold or purchased	40	-	40	27.03
6	Ignorance of the importance of keeping record of milk sold	-	33	33	22.30
7	Low prices of milk offered	100		100	67.57
8	Irregular payment of milk purchased	-	50	50	33.78
9	Lack of interest in feeding animals due to low price of milk.	-	12	12	8.11
10	Small, scattered and unorganized producer.	-	18	18	12.16
11	Lack of adequate linkages and coordination among the various agencies.	-	15	15	10.14

In the marketing constraints (table 5.26) low price of milk offered by societies was the major constraints its percentage was 67.57. Other constraints given weightage were Irregular payment (33.78 per cent of total), ignorance of health certificate for sale of animal (27.03 per cent of total) lack of records about milk sold (22.3 per cent of total)

Table 5.27. shows the details of economic constraints faced by farm families in the study area. About 77.70 per cent of the farm family reported high cost of compound feed and lack of suitable crops for fodder cultivation as the serious constraint faced by them. Purchase price of cattle was reported by 67.57per cent of farm families. High cost of veterinary medicines and Costs of maintenance of crossbreeds were the main constraints in the study area that is 50.68 and 65.54 per cent respectively. Green fodder availability and high price in fodder market were considered as constraints for 70.95 per cent and 6.76 per cent respectively

Table 5.27. Economic constraints

Sl. No.	Items	Very Serious	Serious	Total	Percentage
1	High cost of compound feed	55	60	115	77.70
2	Purchase price of cattle	100	-	100	67.57
3	Non-availability of feeds on credit basis	65	-	65	43.92
4	Non-availability of subsidized feeds	38	-	38	25.68
5	Problems in receiving payment milk	-	60	60	40.54
6	Poor resources for green fodder cultivation	105	-	105	70.95
7	High cost of green fodder	-	10	10	6.76
8	High cost of veterinary medicines	75	-	75	50.68
9	Costs of maintenance of crossbreeds	97	-	97	65.54
10	Non-availability of bank services in the area	20	-	20	13.51
11	High capital investment for housing of animals.	110	-	110	74.32

Table 5.28 Miscellaneous constraints

Sl. No.	Items	Very Serious	Serious	Total	Percentage
1	Discrepancy in readings of FAT and SNF between the union and society	-	30	30	20.27
2	Lack of good rapport between the supervisors and members of the society	-	18	18	12.16
3	Lack of community approach for effective adoption of dairy farming practices	37	-	37	25.00
4	More benefits by growing cash crops than fodder	-	52	52	35.14
5	People do not consider dairy farming as a profitable business	57	-	57	38.51

5.5.1. Overall constraints as reported by farmer in the study area

The dairy farmers of expressed the following constraints which limits expanding their dairy business in the study area.

1. Low price of milk offered by societies
2. Irregular supply and high cost of cattle feed
3. Lack of purchasing power to buy crossbred cows
4. Distantly located A-I centers
5. Non availability of improved crossbred milch bovines and
6. Good quality fodders availability

Low price of milk offered by societies was the major constraints, Non availability of improved crossbred milch bovines and good quality fodders were the most important constraints formed a hindrance in projecting the dairying in the study area a profitable venture. These influenced factors must be addressed with proper planning to improve and expand the dairying in large scale in the state.

CHAPTER 6

SUMMARY AND CONCLUSION

6.0 SUMMARY AND CONCLUSIONS

Tamil Nadu, one of the progressive states of India, has participated actively in green and white revolution of the country. Also the development of infrastructure to promote industrial and IT sector urged private sector to come forward in state's developmental activities. Extensive coverage of state Animal Husbandry department in breeding and disease control has given farmers confidence to take up improved dairy farming. With the organized milk procurement and procuring by state and private dairies, the state has 19 dairy co-operative milk producers union supporting 18 dairies under the brand name of 'Aavin' and 30 private dairies which follow the same principles in procurement of milk from rural areas.

Tamil Nadu has been classified into 7 agro- climatic zones based on ecological and social characteristics. This present study has taken 2 zones- North Western zone and North Eastern zone to study the dairy farming. The 2 zones which happened to have major area under dry farming, two districts namely Dharmapuri and Thiruvannamalai districts were selected.

Hence the present study encompassing important issues of dairy farming was undertaken to overcome the problem facing dairy farmers of dry areas in the state of Tamil Nadu. The present study on **"Economic analysis of Dairy farming in dry farming areas of Tamil Nadu"** undertaken with the following objectives,

1. To ascertain the socio-economic characteristics and resource structure of dairy farmers in the study area.

2. To study the economic aspects of dairy farming on different categories of farm.

3. To analyze the cost management in dairy farming.

4. To identify constraints faced by the dairy farmers.

Multistage stratified random sampling procedure was adopted to select the taluks, village and sample households. Dharmapuri District from North western

zone and Thiruvannamalai District from North Eastern zone districts were selected. From these two districts, two taluks/blocks were selected based on the progress in milk procurement over the years Thiruvannamalai and Dharmapuri Districts are each having 18 and 8 blocks respectively. From this one block from each district was selected. In all the four selected villages, two villages from Dharmapuri district of Penagaram taluk and two villages from Tiruvannamalai district of Sengam taluk were selected based on the connectivity to milk- collection. Sample households were selected from each of village by probability proportion to the size of sample and based on herd size of the farm. In all the four villages selected (Bikkampatti, Nagadasampatti, Sethupattu, Kurisilapattu), dairy farmers from each village were randomly selected based on probability proportional to cattle keepers in the villages. Commensurate with objectives of the present study has selected 148 sample farms were selected for further analysis.

In all the 4 selected villages, two villages from Dharmapuri district of Penagaram taluk and two villages from Tiruvannamalai district of Sengam taluk complete enumeration of milk producer households was carried out in order to collect some preliminary information on number and type of milch bovines, size of land holdings, area under irrigation, etc. A list of milk producer households from the selected villages, indicating the herd size and types of milch bovines maintained was prepared. The households were then categorized into small (1-4 Standard Animal Unit (SAU) of milch animals, medium (4-8) and above 8 SAU were considered large herd.

The study used both primary and secondary sources of data to accomplish the set objective of the research Endeavour.

The primary data was collected by survey method using structured questionnaire through personal interview during the agricultural year 2008 -09. Detailed information with respect to demographic particulars, occupation, family size, sex, education, operational holding, herd size, structure and composition, livestock crop inventory, land use pattern, cropping pattern, etc., were collected. Further, data related to farm inventory, quantity of various inputs utilized in dairying

along with their money values and of dairy animals. The information were also collected regarding allocation, utilization of farm resources and the constraints faced by farmers in farm business, Labour utilization for various enterprises investment pattern, input utilization, output realization through market outlets were also collected.

Secondary data regarding demographic features, agro climatic conditions, land use pattern, cropping pattern, cropping intensity, livestock population, number of milk collection centre, infrastructure facilities of dairy development , etc, were collected from various sources like, district agricultural department, district animal husbandry department, district statistical office, etc.

The following methodology was adopted to bring out the results. Cost of milk production is one of the important parameters of economic efficiency of production. The cost components identified for milk production have been categorized into fixed cost and variable cost. An attempt was made in this section to briefly elaborate these costs.

Regression analysis technique was employed to develop the milk production functions for different types of milch animals and Cobb Douglas production function was used.

The results of this study were brought out as per the objectives. The socio economic profile reveals that specialized dairy farming was main occupation in study area. Dairying mostly practiced with family members involving less hired labour force.

The overall family size on the sample households was 4.66 persons; there was no marked difference in the size of the family between small and large herd size categories. In general, it was observed that about 55.53 per cent of family members were illiterate and 16.2 per cent have undergone primary education, the rest of them have completed matriculation and 6.33 per cent were graduate and above. For small herd farm agriculture was main occupation, 52.3 per cent of total sample farmers and dairying is subsidiary enterprises for 39.6 per cent. The medium farm has given equal preference to dairy and crop cultivation and 77.92 per cent of total large herd under study rely on dairying as main source of income.

By and large, the share of jasmine, rice, CN grass occupy major area on irrigated land irrespective of category of farm. In dry land principal crops grown were sorghum, saamai, and mango. The area cultivated was 0.80, 0.14, 0.17 hectare respectively for large, medium, small herd size category. The average size of operational holding on sample household in cow herd was 0.7, 0.89, 3.78 hectare for small, medium, large herd size categories respectively. The average land holding for buffalo in small dairy herd was 0.62 and 1.13 hectare for small and large herd dairy farmers respectively.

On an average, crossbred cow herd consisted of 2.08, 5.19 and 14.38 milking animals in small, medium and large herd category respectively. The average milch animal was 1.76 for small farmers, 2.67 for medium farmers and 7.84 for large farmers. The heifer and young stock was one in both the categories of farmers. The average herd size was 3.84, 7.88 and 17.47 (Standard animal unit) for small, medium and large farmers respectively. Milch buffaloes were 1.42 for small herd, 2.83 for medium herd and 5.72 in large herd. Other livestock populations in the sample household were sheep and goat. Total goat and sheep were highest in the large herd than the small and medium herd size. Sale of goat and sheep rearing is also one of the income generating enterprise.

Out of the overall total investment in the area, value of cow was 1.23 lakhs for cow herd 69.05% was for cows, 30.12 for shed and 0.82 for dairy equipments. Small herd had invested Rs.25858 for dairy in that 70.30 % was for cows. The medium herd had a total asset of Rs.75885 for dairy. In that value of cows was 69.09%. Highest investment was found in large herd to the extent of Rs2.06 lakhs. The investment on shelter for small herd was 28.61% followed by large herd 30.49% and medium herd 29.85 %.

Farms which keep buffalo spent Rs.15948 in small herd, Rs 33580 in medium and large herd allotted Rs.72476 for buffalo. Value of animal and shelter constituted 98 % of total investment. Very meagre percentage was invested for equipments etc. Buffaloes were housed separately. The value of animals maintained by large herd size category of households was generally higher

followed by medium and small herd size category. Thus, the value of animal is expected to have positive impact on dairy productivity.

The differences among herd sizes were marginal and overall early, mid and late lactation milk yield was about 773, 920, and 356 kg for crossbred cows. For buffalo it was 460, 570 and 343 kg of early, mid and late lactation respectively. In general, crossbred cows yield an average of 8.59 Kg per day during early stage of lactation as against 5.11 Kg per day for buffaloes. The mid lactation average for cow was 10.2 and for buffalo it was 6.33. The late lactation with the cut off period of 10 months, average yield was 2.85 Kg for cow and 2.74 Kg per day for buffaloes.

The availability of green fodder was very much limited. Field grass grown in and around their home during rainy season was the only source of supply of green fodder. It was supplemented by local grasses, sorghum stover, CN grass, jowar stalks, after removing the mature cobs from fields. The average quantities of green fodder, dry fodder and concentrates per crossbred herd per day was 15.89, 9.61 and 6.29 kg and in buffalo, the quantities were 11.12, 5.98, 5.24 kg per day. In general, farmers feed conventional feeds. A great majority of cattle keepers possessed separate stalls for the animals; however, some households used part of their residence as stalls for animals. Large herd size cattle keepers generally having pacca and katcha cattle sheds were observed in some of the medium and all small size herd cattle keepers.

All the villages having milk booth operated by private dairy from morning 6 to 8.30 AM and evening from 4.30 to 6.30 PM. For collecting milk, hired labours were appointed by the Hatsun dairy (Arokya milk). Even though the government running Aavin co-operative societies was present in the villages, farmers sold their production of milk to Hatsun dairy only. Out of every village in the study area, more than two milk collecting centers are there. On an average 95 per cent of milk was procured by the Hatsun dairy. Milk price is offered by the agency at the rate of Rs 12.00 per litre of cow milk and Rs 15 for buffalo milk.

In small herd the production of crossbred cow milk was 12.94 litre and buffaloes produce 7.94 litre per day. For home consumption the overall quantity was 0.97/day. Marketed surplus was 12.17 of cow milk and 7.38 for buffalo milk. In

medium herd the production of crossbred cow milk was 25.27 litre and buffaloes produce 16.43 litre per day. For home consumption the overall quantity was 1.23/day. Marketed surplus was 24.40 of cow milk and 16.43 for buffalo milk.

In the study area, the overall cost of maintaining dairy herd (cow and buffalo) was 392.5 per day in that major item was feed cost accounting for Rs 234.01/day/farmer which was 59.62 per cent of total cost. Total fixed cost worked out to be Rs 72.08/day/farmer. Small herd received Rs 146.26 from sale of milk, medium herd received almost equal share from cow and buffalo milk, i.e., Rs 292 (55.35 per cent of total value for sale of milk) and Rs 235.59 for buffalo milk. Large herd kept 554.59 of income from sale of milk as cow milk, and Rs 411.16 for buffalo milk the net return by keeping milch cow and buffalo worked out to be Rs 90.04 for small herd, Rs167.63 for medium herd and Rs 215.63 for large herd.

The overall maintenance cost for crossbred cow/ day was Rs 51.29 and income from sale of milk and manure was Rs 87.87 per day yielding a net profit of Rs 41.37. Feed cost alone occupies 63.13 per cent of total cost. The small farmers incur Rs 50.41 for keeping crossbred milch cow and earn Rs 87.43 as gross income, thereby earning Rs 47.29 as net income. The medium herd farmers total cost of maintenance of cow was Rs 55.95 and received income Rs93.83/day/cow. Bringing net income of 34.87 per day per cow, the large herd, though the having lesser cost Rs 49.69 than other sizes of farm, mainly small and medium, its profit margin was only Rs 41.97, lesser than the small herd farm. For crossbred cost of production /litre of milk were minimum for medium herd farm- Rs 6.13/litre followed by small herd farm Rs 7.13 and maximum for large farm as Rs 8.43/litre and the overall cost of production for the area was Rs 7.23/litre. Variable cost of production occupies 51 in medium herd to 70 per cent in the large herd and over all it was 60.25 per cent of the price (Rs 12/litre).

The overall expenditure incurs for rearing milch buffalo was Rs 48.02/ day and the income received from sale of milk and dung was 76.33. Profit margin was Rs 28.28/day/buffalo which is lesser than maintaining crossbred. The higher cost of rearing buffalo was seen in the medium herd farm- Rs 50.44 followed by large- Rs 47.43 and Rs 46.13 in small hard farm. The cost of

producing one litre of buffalo milk was least in medium herd farm –Rs 9.22/litre, followed by large herd farm – Rs 10.03 and small herd farm – Rs 10.23. As in the case of cow maintenance, feed cost constitute 68 per cent of total cost in small herd, 73.86 per cent for medium and 77.37 per cent for large herd. By virtue of higher milk production and better care crossbred cows brought cash balances more than buffalo (Rs 35.80) as against Rs 28.28 for buffalo.

In Small herd farm, expenses on concentrates mixture (significant at 10 % level), labour (1% level) and depreciated value for the asset (1% level). Cost of green fodder, dry fodder and interest on capital invested have negatively was significant impact on income. In medium herd farm concentrate mixture significantly related with income. Expenditure on green fodder and dry fodder has negative influence on income. For large herd farm except interest on investment on dairy enterprises, all variables were not found to be significant. For buffalo, Small herd farm was only significant in cost of concentrate which has positive significance. The medium herd farm has almost all variables significantly related to income. Expenses on green fodder and grazing is 0.246 (significant at 5 % level), cost of concentrate was 0.379 (significant at 1 % level).The large herd farm has negative coefficient of – 0.248 for cost of green fodder and positive coefficient 0.188 for cost of dry fodder. Both for crossbred cow and buffalo management, the $\sum$ bi is less than one. This definitely points out that there is a need for allocating resources judiciously among inputs.Small herd farmer's optimum plan brings negative return in feed cost over farmer's fed practices to the extent of – Rs 42.72/day. Other herd farm – medium had marginal improvement of Rs 4.72/day and large farm had Rs 89.39/day. In conclusion, with available feed material namely, field grass, straw and bran very little improvement in feed cost can be achieved. In dry farming area, if dairy has to be profitable, non-conventional feed materials need to be made available at cost effective price.

It could be observed that in the breeding and disease management constraints, lack of A.I facilities was major constraints, which was reported by

68.92 per cent of respondents. Problem of repeat breeding was also major constraints reported by about 40.54 per cent of respondents.

Lack of knowledge in different aspects of improved dairy farming practices, lack of knowledge about fodder cultivation and fodder seeds and inadequate knowledge about balanced Feeding to animals were the major constraints in the technical constraints, the frequency for these equally given importance their percentage about 40.54 per cent, 47.30 per cent and 49.39 per cent respectively

In the marketing constraints low price of milk offered by societies was the major constraints its percentage was 67.57. Other constraints given weightage were Irregular payment by private organization (33.78 per cent of total), ignorance of health certificate for sale of animal (27.03 per cent of total) lack of records about milk sold (22.3 per cent of total)

Regarding details of economic constraints faced by farm families in the study area, about 77.70 per cent of the farm family reported high cost of compound feed and lack of suitable crops for fodder cultivation as the serious constraint faced by them. Purchase price of cattle was reported by 67.57 per cent of farm families. High cost of veterinary medicine and cost of maintenance of crossbreeds were the main constraints in the study area that is 50.68 and 65.54 per cent respectively. Green fodder availability and high price in fodder market were considered as constraints for 70.95 per cent

The dairy farmers expressed the following constraints which limits expanding their dairy business in the study area. Low price of milk offered by private organization, irregular supply and high cost of cattle feed, lack of purchasing power to buy crossbred cows, low price of milk, distantly located A-I centers, non availability of improved crossbred milch bovines and Good quality fodders availability were the most important constraints These influenced factors must be addressed with proper planning to improve and expand the dairying in large scale in the state.

POLICY IMPLICATIONS

The investigation, in nutshell, has highlighted the need to develop dairy farming into dry farming areas as an income generating enterprise. The breeding programme for this dairy animal has to be supported by inputs and output price.

Since the feed cost has accounted more than 60 per cent of total cost, providing good quality feeds and fodder to the farming community will go a long way in increasing the milk production. With available feed material namely- field grass straw and bran, very little improvement in feed cost can be achieved. In dry farming area, if dairy has to be profitable, non-conventional feed materials need to be made available at cost effective price.

The dry land farmers need to be encouraged to cultivate fodders tree such as Agathi, Subabul which are highly drought resistant nutrients and cultivation of cow pea, stylo and Co4 grass in coconut and mango grooves as intercrop can also be suggested.

To enable the dry land farmers to take up dairy activities, procurement price of milk has to be increased.

Limitation of the study

1. As in the case with Indian farming, no farmers keep permanent record of the farming activities. Through utmost care has been taken to get the real picture of the situation, the findings were based on the honesty and memory of the respondents in providing their responses.

2. The study was conducted in particular conditions, system and sample, and hence, the results of the study might find their applicability in the similar set up.

3. Although the study included almost all relevant variables, some of the hidden cost cannot be ascertained in a subsidized and free veterinary service.

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7.0 BIBILIOGRAPHY

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ANNEXURE

Annexure.1.

INTERVIEW QUESTIONNAIRE
NDRI SRS BANGALORE

Title of the project: ECONOMIC ANALYSIS OF DAIRY FARMING IN DRY FARMING AREAS OF TAMILNADU

General information

Serial No. _____ **Farm No.** _____

District _____ **Block** _____ **Village** _____

Family particulars

Name of the head of the family **Caste** **SC/ST/OBC/Others (Specify)**

Class **Family size No**

	Adult	children	
Male			
female			

1. A) Demographic particulars:

S.NO	NAME	Relation	AGE	Education status *	SOURCE OF INCOME **	INCOME/ MONTH /annual(Rs)

* School, college, professional, technical, others

** Source of income-Dairy/Agri/Horti/sericulture/goat/sheep/other business etc.

B) Information on farm asset land holdings (in acres)

Type of Land	Own	Leased	Total	Rental Value (Rs / Acre)
1. Un-irrigated				
2. Irrigated				

C) Crops grown and byproducts

	Irrigated		Unirrigated	
	Kharif	Summer	Kharif	Summer
Name of crop				
Year of production				
Yield of byproduct				

Livestock asset:

D) Bovine Population

Particulars	Buffaloes		Crossbred cows		Indigenous cows	
	No.	Value (Rs.)	No.	Value (Rs.)	No.	Value (Rs.)
Milch animals: in milk						
Dry						
Heifers: Pregnant						
Non-pregnant						
Young stock: 1-2 yr. Male						
Female						
below 1 year: Male						
Female						
Draught animal (bullock)						
Bulls for mating						
Grand total						

E) Other livestock population

Other livestock	No.	Breed	Home born/purchased	Value (Rs.)	Purpose of keeping *
Sheep					
Goat					
Poultry					

* For milk / meat / wool / egg

F) Other investment on dairy enterprise

Particulars		No.	Year of purchase	Original / Purchase value(Rs.)	Present value (Rs.)	Period used (Years)	Expected life (Years)	Annual repairs (Rs.)
Cattle shed								
Store for fodder/ feed								
Chaff-cutter shed								
Bullock cart								
Buckets								
Water cans								
Milk cans								
Milking machine								
Chaff-cutter	Manual							
	Power driven							
Ropes								
Water hand pump								
Measuring sets								
Other tools								

G) Investment on cattle shelter

	Area-length	Width-height	value	Year of construction	Maintenance cost
Type of floor					
Type of wall					
Type of roof					

H) Sericulture unit details

Area:

Other equipments:

Investment:

Cocoon production:

Value:

3. Economic traits of milch animals

Milch animal	Age at 1st calving	Running order of lactation	Stage of lactation (Days)	Date of previous calving	Date of drying	Date of next calving	Average milk production per day		Peak yield per day (litres / da
							Flush	Lean	
Buffaloes 1									
2									
3									
4									
5									
6									
Local cows 1									
2									
3									
4									
5									
Cross-bred 1									
2									
3									
4									
5									
6									
7									
8									
9									
10									
Grand total									

4. *MILK PRODUCTION, CONSUMPTION AND SALE*

(Per Day in Different Seasons)

Season	Total milk production in the household (litres/day)		Utilization of milk (litre)						Sale price of milk (Rs per litre)		To whom sold*	Qty. Of milk converted into different products (kg)			Product sold (kg)			Sale price of product (Rs / kg)		
			Retained in the household		Used as fluid milk		Sold													
	C	B	C	B	C	B	C	B	C	B		1	2	3	1	2	3	1	2	3
Flush																				
Lean																				
Total																				

C-Cow B- Buffalo

*** Milk vendor (1), Co-operative Society (2), directly to milk plant (3), Tea Shop (4), Consumer (5), others (6).**

1. Butter 2. Ghee 3. Others (Specify)

5. A) VARIABLE COSTS FOR DAIRY ENTERPRISE

Particulars		Total Cost	Proportion spent on		
			Buffalo	Crossbred	Local cow
Veterinary and medicine					
Insemination / breeding					
Maintenance equipment					
Purchase of tools, chains, ropes. etc.,					
Bedding					
Water					
Electricity					
Transport					
Marketing					
Interest On Borrowed Capital					
Insurance premium	Livestock				
	Machinery				
Rents and Taxes					
Others					
Total					

5. B) HIRING CHARGES OF HUMAN LABOUR AND MACHINERY

Items			Unit/price	Seasons		Remarks
				Flush	Lean	
Crop production	Human labour	Permanent				
		Casual				
		Contract jobs				
	Bullocks and machinery	Bullock pairs				
		Tractor				
		Combine harvester				
		Thresher				
		Tube well				
Dairy	Human labour	Permanent				
		Casual				
		Contract jobs				
		Bullock pairs				
Others						

C) FEED AND FODDER INVENTORY

1. Frequency of purchasing /bringing feed &fodder: (daily/weekly/fortnightly/monthly/annually)

Green fodder:

Dry fodder;

Concentrate:

Mineral mixture:

2A) If home ready made conc. mixture used for feeding, then composition of conc. mixture:

Proportion:

Price;

B) If purchased conc. mixture used for feeding, then composition of conc. mixture:

Proportion:

Price:

6. A) FEEDS AND FODDERS FED PER ANIMAL PER DAY DURING THE SEASON

(Per Animal per Day)

Particulars		Buffalo			CB cow			Local cow			Young Stock						Bullock	He buffalo	Total
		In milk	Dry	Preg. heifer	In milk	Dry	Preg. heifer	In milk	Dry	Preg. heifer	Buffalo		CB cow		Local cow				
											Male	Female	Male	Female	Male	Female			
Total Nos																			
Green Fodder	Name																		
	Qty(Kg)																		
	Rate(Rs/Kg)																		
Dry Fodder	Name																		
	Qty(Kg)																		
	Rate(Rs/Kg)																		
Concentrates	Name																		
	Qty(Kg)																		
	Rate(Rs/Kg)																		
Min-mix	Name																		
	Qty(Kg)																		
	Rate(Rs/Kg)																		
Grazing	Hr./Day																		
	Charges /Month																		
Vety. Exp (Rs)																			
Grand Total																			

A) MISCELLANEOUS FARM INCOME

Items of income		Unit/Qty	Value (Rs)
Dung	As fuel/ qty		
	As manure/qty		
Hiring out of bullock pair labour			
Cess for irrigation water			
Hiring out of family labour	Male		
	Female		
	Children		
Sale of livestock during the year	Milch animal		
	Culled animal		
	Heifer : Preg		
	Heifer : Non-Preg		
	Calves (Male)		
	Calves (Female)		
	Young		
	Bull (for work)		
	Bull (for Breeding)		
	Sheep and goat sale		
	Cocoon sale		
	Marketing channel		
	Reason for sale		
Sale of equipments			
Hiring out Thresher			
Hiring out of Tractor/Trolley			
Hiring out of dairy equipments			
subsidiary occupation			
garden /trees			
Off-farm income			
Grand Total			

B) Returns from milk production

Details of animals in milking	No of animals	Total milk produced	Morning				Evening				Grand total
			Fed to calf	Consumed at home	Sold in the market	Price /litre	Fed to calf	Consumed at home	Sold in the market	Price /litre	
Buffalo											
CB cow											
Local cow											

9) BANKING AND OTHER FINANCIAL INSTITUTIONAL DETAILS OR CREDIT DETAILS

Details of capital investment

livestock	No	Own investment	Funding agency	Funded amount	Subsidy
Buffalo					
CB					
Local					
Goat					
Sheep					

Year when loan sanctioned	Amount	Interest rate	Installment	Repaid	Borrowed

10) CONSTRAINTS IN MILK PRODUCTION:

Please give your opinion about the constraints, which act as bottleneck in improved dairy farming /enterprise.

Sl. No.	Items	Very Serious	Serious
	A) BREEDING AND DISEASE MANAGEMENT CONSTRAINTS		
1.	Lack of A. I. facilities.		
2.	Distant location of A.I. center and veterinary hospital		
3.	Problems of repeat breeding		
4.	Non-availability of veterinary staffs		
5.	Inefficient services at the A.I. centers		
6.	Distant location of A.I. centers		
7.	Non-availability of semen of desired breed at proper time		
8.	Lack of good transportation facilities.		
9.	Presence of scrub bulls in the area.		
	B) SOCIO-PSYCHOLOGICAL CONSTRAINTS		
10.	Ignorance of co-operative society		
11.	Lack of democratic awareness and harmony among members		
12.	People of lower class are not allowed to participate in society meetings and problem of castism		
13.	The occurrence of nepotism and favoritism		
14.	Superstitions belief of farmers.		
15.	Lack of faith in modern medicine.		
16.	Prefer natural services than A.I.		
	C)TECHNICAL CONSTRAINTS		
17.	Lack of knowledge in different areas of improved dairy farming practices.		
18.	. Decline in milk yield after		
19.	Lack of knowledge about fodder cultivation and fodder seeds.		
20.	Inadequate knowledge about balanced Feeding to animals		
21.	quality of roughages		
	D) MARKETING CONSTRAINTS		
22	Non-existence of milk cooperatives in the locality.		
23.	Purchase of milk by the societies on FAT percent basis and no consideration of SNF basis		
24.	Exploitation by middlemen.		
25.	Problems in transportation of milk to the Co-op		
26.	Ignorance of the necessity of obtaining health certificate from veterinarian for the animals to be sold or purchased		
27.	Ignorance of the importance of keeping record of milk sold		

28.	Ease of selling milk to middleman who besides collecting milk from the door-steps also provided incentives in the form of advance payment		
29.	Low prices of milk offered by MPCs		
30.	Irregular payment of milk purchased by MPCs		
31.	Ignorance of keeping money in Bank		
32.	Non-provision of incentive by MPCs		
33.	Lack of interest in feeding animals due to low price of milk.		
34.	Small, scattered and unorganized producer.		
35.	Lack of adequate linkages and coordination among the various agencies.		
	E) ECONOMIC CONSTRAINTS		
36.	High cost of compound feed		
37.	Purchase price of cattle		
38.	Non-availability of feeds on credit basis		
39.	Non-availability of subsidized feeds		
40.	Problems in receiving payment milk		
41.	Poor resources for green fodder cultivation		
42.	High cost of green fodder		
43.	High cost of veterinary medicines		
44.	Costs of maintenance of crossbreeds		
45.	Non-availability of bank services in the area		
46.	High capital investment for housing of animals.		
	F) MISCELLANEOUS CONSTRAINTS		
47.	Discrepancy in readings of FAT and SNF between the union and society		
48.	Lack of good rapport between the supervisors and members of the society		
49.	Lack of community approach for effective adoption of dairy farming practices		
50.	More benefits by growing cash crops than fodder		
51.	People do not consider dairy farming as a profitable business		

H) CREDIT FACILITIES FOR DAIRY FARMING

1. To buy animal
2. Shelter construction
3. Milking machine
4. Cooling machine
5. Others

I) PROBLEM FACED BY DIVERSIFIED FARMING

1. Choosing the enterprise combination

   Crop/dairy/horticulture/goat/sheep/business/professional

2. The selected combination of enterprise is competitive/complements/substitute

2a) Selection of enterprise is out of **Necessity/profitability**

3. Dairy farming as a enterprise taken up **full capacity/partial**

4. If partial, what are the constraints for expansion

Labour/ capital/seed availability/marketing/management/others

5. Income of dairy farming is from

Sale of milk/milk production/sale of animal

5a) what are reason for sale of above

Price attraction/regular income/any other reason

6. What are steps to increase the income from?

Dairy farming/ crop/ /horticulture/goat/sheep