CHAPTER II
REVIEW OF LITERATURE

2.1 INTRODUCTION

The review of the related studies enables the researcher to have an idea of the past studies and examine the untouched aspects of the areas studied earlier. Also, the value of any research work depends upon the review of literature concerned with that study. Hence, we shall have a bird’s eye view of some of the important studies in this area.

This chapter records the findings of the research studies conducted previously on the dairy production and marketing in various parts of India and other countries. Therefore a brief review of relevant and important pieces of literature connected with the present study on “An economic study on Dairy farming in Tirunelveli District, of Tamilnadu has been carried out. The review of literature has been presented under the following sub-heads viz. Characteristics of milk producers, channels of marketing, cost and productivity in the milk production and constraints in milk production and marketing.

2.2 REVIEW OF LITERATURE

2.2.1 Characteristics of the milk producers

Ogola, Lagat and Kosgey (2015), in their study titled, “Factors Influencing Smallholder Dairy Farmers Participation in Voluntary Compliance of Decent Work Practices: Case Study in Nakuru County Kenya”, explore the linkage between socio economic status of smallholder farmer and compliance to decent work standards. The study involved 123 farmers. Three index scales were constructed to measure decent work standards.

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work. These were based on a composite index concerning social security, social dialogue, and employment rights. Ordinal logistic regression analysis revealed that there was a significant relationship between decent work level, breed and education. Therefore policies that would address inadequate genetic capacity of animals and ensure improved literacy levels for the general populace can enhance decent work interventions. For education this can be support of adult literacy institutions. But along with these interventions, a general awareness campaign should still be carried out.

**Masuku and Belete (2014)**, in their study titled, “Economic Efficiency of Smallholder Dairy Farmers in Swaziland: An Application of the Profit Function”, analyse the economic efficiency of smallholder dairy farmers in Swaziland. Specifically, the study sought to describe the socio-economic characteristics of dairy farmers in Swaziland. The smallholder farmers are classified into: smallholder farmers, medium-scale farmers, and large-scale dairy farmers. The specific objectives of the study were to: estimate the economic efficiency of smallholder dairy farmers in Swaziland; identify factors affecting the economic efficiency of smallholder dairy farmers; and determine the profitability of the smallholder dairy enterprise. This was a descriptive survey and the target population was all smallholder dairy farmers registered with the Swaziland Dairy Board (N = 444). A purposive and random sampling techniques was used to select the respondents (n = 111). Three methods of data analysis were used, namely; descriptive statistics, econometric analysis (Stochastic Profit Frontier Function) and gross margin analysis. The mean level of Economic Efficiency (EE) for the famers was 79.8per cent. The farm’s location, pasture size, soil fertility, water availability, the farmer’s years of experience in dairy

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farming, membership to dairy farmers’ association and training on dairy farming are factors that influenced the level of EE for smallholder dairy farmers in Swaziland. The smallholder dairy farmers were economically efficient. The institutional factors, socioeconomic and farm characteristics do affect the level of EE among smallholder dairy farmers. The dairy farming enterprise is a profitable enterprise.

**Balak Chaudhary and Mukul Upadhyaya** (2013)³, conduct a study on, “Socio-Economic Impacts of Dairy Cooperative”, in Adarsha Milk Producer Dairy Cooperative, Mahuli, of Saptari district to find out socio-economic impact of dairy cooperative during May 2008 to Dec.2008. Response from 224 milk producing farmers were randomly collected, stored and analysed using Microsoft excel program. Different sources of income have been recorded and analysed with major category as main crop, cash crop, dairy goat farming and service in organizations. Among them, dairy was found to be the highest income contributor (55 per cent) to the rural farmers. Moreover, dairy was found to be the symbol of pride, prestige and religious priority for the studied community.

**Reddy Varaprasad, et.al.** (2013)⁴, carried out the study titled, “Studies on the Socio Economic Profile and Constraints Faced by the Farmers Rearing Jersey X Sahiwal Cows in Chittoor District of Andhra Pradesh”, Among the 190 farmers interviewed, 35.26 and 67.37 per cent of the farmers had dairying as main and subsidiary occupation respectively. Majority were (32.63 per cent) farmers holding 4.5 to 9 acres of land. Majority (77.35) of farmers possessing land were growing perennial non-legume fodders but not legumes. The family size ranged from 2 to 12 with an average of 4.58. Constraints faced by the farmers are low price paid by the

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procurement agencies per liter milk, high cost and non availability of feed ingredients, high incidence of repeat breeding, lack of sufficient grazing land, non availability of vaccines in time, non availability of adequate medicines in hospitals and incidence of Theileriasis and Mastitis were the major health constraints.

**Gebrekidan Tesfay et.al. (2012)** in their study titled, “Socio-Economic Characteristics and Purpose of Keeping Dairy Cattle in Central Zone of Tigray, Northern Ethiopia”, explore the socio-economic status of dairy producers in central Tigray Zone, Northern Ethiopia. A total of 160 dairy holding households were selected by systematic random sampling technique for the study. The study employed multiple methods of data analysis including descriptive statistics, Chi-square test, T-test, ANOVA, ranking and qualitative analysis. The finding of this study showed similar average family size across urban and peri-urban areas but an increasing trend in average family size was observed from small to large farms. Literacy rate was higher in urban areas than the peri-urban areas. Majority of the urban dairy farmers were business persons whereas farmers took the higher proportion in the peri-urban areas.

**Nahid Mohammed Tawfik Fawi (2012)** in their study titled, “An Economical assessment for the production profile of small dairy farms in Khartoum State”, performed in Khartoum state the capital of the Sudan where dairy farm producers were the target of the study. The study aimed at the economical assessment of the production profile of small dairy farms. Objectives of the study included: assessing cost-effectiveness and sustainability for domestic milk production in

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relation with the socioeconomic characteristics of smallholders; analyzing the rationale for integrating dairy production enterprises into farming systems and to identify the conditions needed for improvement; evaluating the economic performance and viability of smallholder milk production. The study was concluded with a number of recommendations some of which are: a number of improvements need to be introduced to alleviate constraints where publicly funded research and extension should focus on agricultural resource management that comprehensively furthers policy goals, and enhancing the design of investments in smallholder dairy schemes is required; dairy farms should not be considered as homogenous when addressing problems facing the dairy sector as they are differently endowed in productive resources ; rather than emphasizing output maximization above resource management, research and extension should find ways to use the dynamics of the existing production systems.

Prakash Kumar Rathod (2011)\(^7\), made a study titled, “Socio-personal profile and constraints of dairy farmers”. Dairy farming plays an important role in social and economical livelihood of the farmers. The factors like low productivity of local breeds, inadequate knowledge about balanced feeding and low conception rate through AI are the major constraints in dairy farming. The socio-personal characteristics of dairy farmers of Mudhol block in Bagalkot district were studied. The study revealed that majority (55per cent) of dairy farmers were middle aged followed by young (35per cent) since they played a major role in income generation for the family. These findings are in conformity with the findings of Thomaskutty (1975) and Kakoty (1980). Further the study showed that 55 percent of the farmers were literates who had education from primary school to the college which suggest

that the region has a good literacy rate of 66 per cent as per the Government of India census (2001). The study indicated that majority of the dairy owners were farmers (48 per cent), followed by labourers (29 per cent), business men (10 per cent) and government employees (8 per cent). Thangvel (1994) and Bharathy (1996) also reported similar findings. The present study exhibited that majority of dairy farmers (61 per cent) had low income followed by medium (36 per cent) and high income groups (3 per cent). Similar findings were reported by Bhople and Alka (1998).

Regarding the landholding, the data indicated that most of the dairy farmers were marginal farmers (33 per cent) followed by small farmers (28 per cent) and 18 per cent were large farmers. Interestingly, the study reported that 21 per cent farmers were landless. The study revealed that majority of the farmers (72 per cent) reported lack of timely Artificial Insemination (AI) facility followed by poor knowledge about Artificial Insemination (64 per cent), low conception rate through artificial insemination (57 per cent) and difficulty in heat detection (52 per cent).

Gangasagare, et.al. (2010)\(^8\) carried out the study titled, “Role of dairy co-operative society for improvement in dairy industry in Marathwada region”, being an investigation to review the situation of dairying in Marathwada with the objectives to study various trends of milk production and socio-economic status of the dairy farmers. The survey was carried out on 295 dairy farmers from the milk pocket area of eight districts of Marathwada region. Higher proportions of the dairy farmers were enjoying the benefits of co-operative societies. Twenty per cent dairy farmers believed in proper supply of quality feeds at subsidized rate, 74 per cent dairy farmers have availed the financial facility, and only 4 per cent get the technical advice from society.

Orhan Ozçatalbas, et.al. (2010)\(^9\) in their study titled, “The Analysis of Socio-Economic Factors in the Dairy Farming of Antalya Province of Turkey”, examine, important socio-economic factors in the dairy farming of Antalya province. Possible relationships between milk productivity of farms, being the Union membership of the farmer and number of cows with selected characteristics are investigated in the enterprises. The research results indicate that there are relationships between family size, experience in dairy farming and raising high yielding cows with the daily milk yield. A relationship between the farm size, age of the farmer and experience in dairy farming with the number of dairy cows was also found. According to the research results investigated factors did not any effect on the being a member of the union. A relationship has been observed with the variables in the scope of economic factors (technical and economic problem fields), total agricultural area, the share of the irrigated area, farm size, number of lactation days, total number of cows, quantity of daily sold milk, between level of daily milk yield; with total agricultural area, share of the irrigated area in the total area, share of fodder plants, farm size, quantity of daily sold milk, daily milk yield, problem fields, participation to decision-making, collaboration and assistance between the number of cows; with total agriculture area, share of irrigated area in the total area, farm size, number of cattle, keeping pedigree records, daily milk productivity, type of milk selling between being a member to the union.

Dhanabal M. (2009)\(^1\) has done a study titled, “Productive Efficiency of Milk Production in Tamil Nadu” and opined that dairy has an important role in improving the overall economic conditions of rural India. To maintain the ecological balance, there is need for sustainable and balanced development of agriculture and allied sectors. From our first plan onwards, planners have given priority to allied sector for the economic development of the rural sector. Dairy farming is described as a small industry which provides gainful employment opportunities. It comprises of about six percent of the national income.

Mandeep Singh et.al. (2008)\(^1\) in their study titled, “Economic Analysis of Crop Production and Dairy Farming on Marginal and small Farmers in Punjab”, reported the economic analysis of dairy farming has been reported for marginal and small farmers in Punjab for the year 2003-2004. Dairy farming has emerged as a major allied enterprise for supplementing the income of marginal and small farmers in Punjab. The study has suggested to further exploit the potential of off-farm sources towards meeting the domestic expenditure. Also, the technical efficiency of crops and dairy farming should be improved to provide more income to farmers.

Islam, S. Goswami, et.al. (2008)\(^2\) carried out the study titled, “Comparative Profitability of Cross Breed and Indigenous Cattle in West Bengal”, have analysed Tehatta-II block of Nadia district in West Bengal. There were 17 blocks in the Nadia district of which Tehatta-II block was selected purposely. Socio-cultural conditions, facilities for services and critical inputs. Most of the dairy farmers in study areas were


unorganized in milk production. Relevant information from the individual milk producers (dairy frames) has been collected through personal interrogation method with the help of a structured interview schedule prepared for the study. The study revealed that crossbred cows were more economical and gave higher yield than the indigenous cows and inclusion of a few crossbred cows can increase the income of a dairy entrepreneur and provide gainful and round the year employment. The animals maintained by joints family were not properly cared for while they were cared for properly by singly family.

Sintayehu Yigrem, et al. (2008) carried out the study titled, “Dairy Production, Processing and Marketing Systems of Shashemene-Dilla Area, South Ethiopia” of two hundred forty dairy producers. Both rural and urban producers in the four major towns representing the shashemence-Dilla area in Southern Ethiopia, were selected using a multi-stage sampling techniques, with the objective of characterizing dairy production, processing/handling, marketing systems as well as to prioritize constraints and opportunities for dairy development in the area. To characterize dairy marketing systems in the study area, a Rapid Market Appraisal (RMA) technique was employed. Dairy marketing systems were studied with the help of topical guidelines. Dairy producers were interviewed using a pre-tested and structured formal questionnaire. Two major dairy production systems, namely the urban and mixed crop-livestock systems were identified, and again classified into two categories based on the major crops grown as a cereal crop producing and earnest-coffee producing areas. The majority of producers (61.7per cent) in the mixed crop-livestock system

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process produced milk from home, while the majority of urban producers (79.2 per cent) produced milk for sale.

Radha Krishnan, et.al. (2008)\textsuperscript{14} in their study on, “Contribution of Livestock in Indian Scenario”, offer opinion on growing human population, rising per capita income and increasing urbanization are fuelling rapid growth in the largest livestock population in the world. Contrary to the large population of livestock in India productivity of Indian livestock is low compared to many developing countries.

Waghmare P.R. et.al. (2007)\textsuperscript{15} has done research on the subject: “Economic analysis of integrated dairy development Programme in Parbhani District”, opined that Milk production in India during 1950-51 was 17 million tonnes which has reached 78 million tonnes in 1997-98. Presently India ranks first in the world in milk production. The Operation Flood Programme was instrument in dairy development activities. These programmes are useful upgrading the standard of living of farmers.

Hasan Cicek, et al. (2007)\textsuperscript{16} in their study on, “Effect of some technical and Socio-Economic Factors on Milk Production Costs in Dairy Enterprises in Western Turkey” determine the technical and socio economic factors that may affect the cost in dairy enterprises. In this context, the annual production records (2005-2006) of 77 dairy enterprises running in Western Turkey were examined. Data were analyzed by using multiple regression models. Results showed that parameters such as education of the producers, scale of the enterprise, feed consumption, feed procuring and litter size had significant effect (P<0.05) pm the average milk costs. On the other hand, marketing, main occupation and age of the producer were found to be statistically

insignificant (P<0.05). It is concluded that controlling the technical and socio-economic factors were found to have important effect on decreasing the cost of the production as well as increasing the profitability of the enterprise.

Karmakar K.G. et.al. (2006) in their study titled, “Opportunities and Challenges in The Indian Dairy Industry”, pointed out that growth in milk production is likely to continue at the present rate of 4.4per cent in the near future. Who is going to handle this incremental milk? We must bear in both income and price. We must bear in mind both income & price elasticity account for approximately 15per cent of the total expenditure of food. Demand for milk, at current rate of income growth is estimated to grow at 7per cent per annum. Interestingly, demand for milk is expected to grow steadily over the next two decades as the low income rural and urban families who have higher expenditure elasticity would also increase their income due to new economic environment.

Dash, Sadangi, et.al. (2006) carried out the study titled, “Women dairy project – Balasore and Bharak districts of Orissa” and felt that the project created a good impact on dairy sector as a whole and on cross section of beneficiaries. It provided and assured market to milk producers, released them from the clutches of unscrupulous middle men by offering them a fair and transparent deal. The project, thus, created a favorable environment for higher production of milk. During two year period the milk production increased by 81 percent with the average daily production per pourer increasing from 2.6 liters to 4.7 liters. However, the impact was different on different categories of farmers with big farmers gaining up to the maximum. The project also introduced several technological changes such as artificial insemination.

fodder cultivation, urea treated straw, improved health care and dairy management in
the dairy sector, the adoption of which is likely to pick up in coming days. Similarly,
the project contributed to the capacity building of members in terms of awareness
generation, gain in knowledge, skill development through orientation and training
albeit to a varying degree. The project has created a motivating and enabling
environment for the members to move ahead and for women leadership to grow.

Jacques Somda, et.al. (2005) has carried out a research on the subject,
“Characteristics and economic visibility of milk production in the smallholder
farming systems in The Gambia”. They suggested that the domestic milk production
has been for a long time hindered by many factors including lack of interest from
decision makes, distorted economic policy and biotechnical constraints. For the last
20 years, many developing countries have been attempting to develop the domestic
milk production sector. However, research on the basic realities and the viability
status of enterprises within this sector remain largely unproved in many developing
countries. This study focuses on the characteristics of smallholder milk producers in
Gambia. Data were collected from 90 smallholder farm households to characteristics
milk producers and evaluate the profitability and viability status of this activity. Based
on current typology of frames and gross margin analyses at farm level, the study
identified two resource-based types of stallholder frames. The current milk production
system is surely viable. Constraints to increased productivity include lack of improved
technology at farm level and weak institutional support. Despite the low viability
status, it is show that milk production generates reliable incomes, which could be a
departure for most frames to intensity farming systems, particularly in areas where no
loan schemes exist for purchasing agricultural inputs.

visibility of milk production in the smallholder farming systems in The Gambia”, Agricultural
Isabelle Schluep campo et.al. (2005) conducted a research on the topic, “Dairy Food Consumption, Production, and Policy in Japan”. They explore and investigate Japanese dairy markets. They first provide an overview of consumer demand and how it evolved after World War II. Using historical data and econometric estimates of Japan’s dairy demand, they identified economic, cultural, and demographic forces that have been shaping consumption patterns. Then they summarized the characteristics of Japanese milk production and dairy processing and policies affecting them. They next describe the import regime and trade flows in dairy products. The analysis of the regulatory system of the dairy sector shows how its incentive structure affected the long-term prospects of various segments of the industry. The paper concludes with policy recommendations of how to reform the Japanese dairy sector.

Jeyachandra Reddy, et.al. (2004) conducted a research titled, “A Comparative Study of Cost of Milk production under Different Agro-Climate Regions in Semi-Arid Regions”. They analyzed the economics of milk production in three areas. Viz., Chittoor district in Andhra Pradesh, Erode District in Tamil Nadu and Kolar district in Karnataka involving aspects related to existing cost structure of milk production, profitability of crossbred dairy cows in the three states under the changed socio economic political scenario and also suggest method to improve the viability and profitability of these enterprises. The data were collected by survey method during the year 2003. Seventy five farmers were selected at each location giving due importance in the selection of all categories of households. The number of dairy cows

\[20\] Isabelle Schluep Campo and John Beghin (2005), “Dairy Food Consumption, Production, and Policy in Japan”, Center for Agricultural and Rural Development (CARD) at Iowa State University, pp. 44-55.

studied were 108 in Chittoor, 178 in Erode and 84 in Kolar districts. The net cost of maintenance of a cross bred cow per day worked out to Rs.3899, Rs.49.36 and Rs.48.88 in Andhra Pradesh, Tamil Nadu and Karnataka respectively. The cost per litre of milk worked out to Rs.5.48, Rs.7.20 and Rs.5.84 in the same order. Feed cost was the major component in gross cost which accounted for 63.88 per cent in Andhra Pradesh, 72.14 per cent in Tamil Nadu and 71.62 percent in Karnataka. The net profitability varied from 43 per cent in Tamil Nadu 70 per cent in Andhra Pradesh and 83 per cent in Karnataka. The variations among the three studied locations are due to variation in breed, feeding pattern, maintenance of animals, etc. The study has further brought out the fact that higher fat content provides higher price as milk is priced based on fat and solid-Net-Fat content by dairies. Hence proper scientific breeding procedure is to be followed to improve fat content in the milk as well as milk production per animal. Besides, scientific breeding, feeding, treatment and veterinary care and management would not only increase milk production and fact content in addition to reduction in cost, but also incomes of farmers. Thus dairy farming is considered and instrument for socio economic change in rural areas.

_Rakesh Saxena (2002)²²_ carried out the study titled, “Life Cycle Assessment of Milk Production in India”. In his view, Milk production in India in characterized by a large number of milch animals, a large number of milk producers, mixed farming and low productivity of milk per animal. Most of the total milk production in the country comes from indigenous cows (27per cent) crossbred cows (15per cent) and buffaloes (54per cent). Goats and other animals contribute only a minor share (4per cent) to the total milk production. The population of crossbred cows and buffaloes is kept largely for milk production while the population of indigenous cows in

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maintained for producing both milk and drought animals. About 58 per cent of total population of cattle and buffaloes in India in this study uses the LCA approach to estimate the environmental impact of milk production in terms of methane emissions. The study focuses only on bovine milk production as it accounts for about 96 per cent of the total milk production in India. The methane emissions in the study are estimated at the level of indigenous cows and buffaloes. The analysis of methane emissions in terms of per kg of milk production has been extended to methane emissions per rupee worth of milk production, as the prices of cow and buffalo milk are very different due to the different fat content. The environmental impact has been assessed in two steps: (1) inventory analysis and (2) impact assessment. Under the first step, and inventory has been taken of raw materials and associated emissions. The impact of these raw materials and emissions has been assessed under the second step. The raw materials used by cattle and buffaloes are divided into two categories, namely, (1) concentrates and (2) roughages. The roughages are sub-divided further into green fodder and dry fodder. The emissions of methane associated with bovine milk production take place mainly at three stages. Namely (1) enteric fermentation, (2) manure management, and (3) use of dung as domestic fuel. The study has used IPCC guidelines and is based largely on the secondary data available from various sources.

Triveni Dutt (2001) His study on, “Improving milk production in Cattle and buffaloes- vision and challenges”, opined that the Cattle and buffalo production is an integral form of rural economy and contributes substantially to the family income. Milk provides 63 per cent of animal protein and almost 100 per cent of animal fat in the diary diet of an average Indian. Milk contributed 66.8 per cent of the total value of

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output from livestock (1998 – 99). In addition to milk products for human consumption cattle and buffaloes also provide animal power for agricultural operations and rural transport needs. The draught animal power, which is valued at Rs.4000-95000 million is not included in the total value of output from livestock. The 75 million draught animals (mostly cattle and buffaloes) contribute 20per cent of energy input into crop farming. Although there has been large reduction in contribution of draught (DAP) from 72per cent in 1961 to 23per cent in 1991 mainly due to mechanization, the requirement of DAP shall continue to be around 20per cent in years to come. Milk production in 1998-99 was estimated to be 74.7 million tones, which is less than 10per cent of world production. Around 54per cent of this total milk comes from buffaloes, 42per cent from cows and 4per cent from goats. Large increase in milk production has been due to increase in number and change in composition of cattle mainly due to increase in number of crossbreds.

Hegde (2001)24 did a study on, “WTO Challenges for Indian Dairy Farmers”. He pointed out that there is very little breathing time for Indian farmers to face the challenge of importing milk and products under WTO. Our farmers are not prepared to solve them well on time. It is necessary to deduce the cost of milk production by increasing the productivity of our animals. We also need to reduce the cost of handling of milk and processing by reducing intermediary agencies and by adding value to the produce. The quality of the milk should be of international standard which can be improved through screening of the livestock against important diseases and maintaining clean surroundings in the dairy farm. Finally, the policy of producing low fat milk for general consumption while the high fat buffalo milk can be supplied to a selected category of customers interested in high butter fat. We need to discuss

with the farmers and understand their problems and solve them at the earliest. Surely, we also need to strengthen our farmers associations to acquire new technologies understand the milk marketing scenario at the international level and find suitable solutions. We hope the task is within our reach for solving.

Rawal and et.al. (2001)²⁵ for the research work titled, “Participation of the Rural Poor in Dairy Co-operatives: A Case study from Gujarat”, analyzed that the comparison of caste, education and land holding of MS farmers with NMS farmers points to a larger proportion of households belonging to the backward caste, being less educated and holding lower size of land are not able to participate in dairying. A recent study of two dairy co-operatives in Gujarat argued that inequality in land ownership, caste, illiteracy and undemocratic functioning of co-operatives are the barriers to entry. Illiteracy might not be factor in Kerala but land ownership could be one, as among the lower size-class of land owners smaller proportion seem to be keeping cattle.

Gautam Kakaty et.al. (2001)²⁶ In “Employment and income opportunity in Dairy enterprises of Assam – A Case Study”, feel that animal husbandry plays a pivotal role in the agrarian economy of India. It is closely interlinked with the socio-economic matrix of rural society. The development of livestock sector has been receiving significant priority in India in the last two to three decades. Dairy sector contributes significantly in generating employment opportunities and supplementing the income of small and marginal farmers providing by them food security.

Narayana (2001)\textsuperscript{27} in his study on, “Dairying in Malabar: A Venture of the Land owning based on Women’s work?”. opined that the work status of the adult population has no significant difference between MS farmers and NMS farmers could be observed. Women, however, devoted considerable amount of time for dairying, irrespective of whether they reported as working or not working and giving the reason as housewife. Time disposal studies do help to bring this aspect of work and show that women’s role in cattle keeping is great. The initiatives undertaken such as Malabar Rural Development Foundation for improving the quality of dairy farmers are welcome as they go beyond the landless as their participation in dairying is low. This needs to be kept in mind while planning welfare interventions.

Manob Kanti Bandyopadhyay (1996)\textsuperscript{28} carried out the study titled, “Dairy Co-operation and Rural Development (with special reference to comparative study between the Kaira District Co-operative Milk producers’ Union limited and the Himalayan Co-operative Milk producers’ Union Limited)”, pointed out that maximum people of thickly populated India live in villages. Majority of them are involved in agriculture in India as the old method of cultivation is still vogue here. Rearing of cattle animal is also an additional source of income of the villagers in our country. We get from our ancient history that the domestication of the cow and the buffalo dates back to nearly 4000 years. Scriptures of India refer to the wealth through the world Godhan’. Maximum properties of cows and buffaloes of the world are seen in India. This amount is too inadequate to meet the country’s demand. The supply of milk in some parts of India is higher than the local demand. On the other hand, supply of milk

in the rest of the country as well as urban areas is much lower than the demand. In 1965, National Dairy Development Board (N.D.D.B) was set up with the object of meeting the increasing demand of milk especially in urban areas as well as developing the rural economy through the enhancement of the milk production in the country.

Miriam Sharma et.al. (1993)²⁹ in the study regarding “Assessing the impact of dairy ‘development’ on the lives and health of women in rural Rajasthan (India)”, are of their opinion that following the proclaimed success of cooperative dairy schemes in other parts of India (Operation Flood based on the Amul model), the Rajasthan government is attempting a similar scheme. A key of the project are to bring women into the mainstream of dairy development in order to improve their economic, nutritional, and social status. For this purpose a special program was initiated to train poor rural women in ‘dairy camps’ on how to care for their milch animals. Successful completion of such ‘camp’ training then qualifies the women for a loan to buy an animal in her name. It is hoped that a part of the milk obtained will go to the village dairy cooperative. The major aims of this program are to: remove milch animals from the cities; encourage production of more milk for the cooperative dairies; encourage modern techniques of animal care; put control of the income from milk-selling in the hands of the women who care for the animals by permitting them to own the animals and hence contribute to their ‘independence’ and ‘development;’ and to encourage self-sufficiency for the weaker sections by providing loans to the poor. Data for this paper were collected during fieldwork in a village in Alwar District, Rajasthan and specifically from observation and participation in the two-week dairy ‘camp’ there. Eighteen women were selected on poverty criteria to

participate in the program. The general situation of these women is analyzed within
the context of a critical discussion of the dairy movement in India, in general, and the
intended effects on the lives of the village women, in particular, with special attention
to the impact on their workload, nutritional intake and, ultimately, overall health.
Concluding remarks are addressed to the broad issues of government development
programs and why more of the same type of development strategies persist in the face
often-repeated failures.

Uma Shankari (1989)\(^{30}\) in her research work, “What is Happening to Cows
and Bulls of Sundarapalle?”, opined that in the given the context of a prolonged
drought, in which the little income they derived from dairying went a long way in
meeting their survival needs, it is no wonder that the farmers of Chittoor district in
Andhra Pradesh who studied here had a positive attitude to the crossbreed
programme. But while the crossbreed cow is clearly a superior milch animal to the
local breed and the local breed cow is fast becoming redundant for all categories of
farmers, the fact that the bullocks cannot be dispensed with drives at least a few of the
farmers to maintain bullocks. The losses from the bullocks are made up by the gains
from the crossbreed cows. The landless, however, tend to maintain local breed cows
even if it means far lower incomes since the investments and risks involved are
smaller.

Moran.J.B.(1987)\(^{31}\) in his study on, “The Indigenous Cattle and buffalo of
South East Asia: their past, present, and Future” viewed that cattle and buffalo play an
important role in the agriculture of south East Asia, providing both milk and meat and
also traction for ploughing and transport. The native breeds vary considerably in their

\(^{30}\) Uma Shankari (1989), “What is Happening to Cows and Bulls of Sundarapalle?”, Economic and
Political Weekly”, May 27, P.1164.

\(^{31}\) Moran.J.B. (1987), “The Indigenous Cattle and buffalo of South East Asia: their past, present, and
characteristics, not only in their inherent qualities but in their response to varying systems of management, some very primitive. Improvement is clearly possible by cross-breeding, but it appears that is most likely to be achieved within existing native breeds, rather than by introducing exotic ones developed to thrive under very circumstances.

Babita Bohr (1987) has done a study on, “Milk production, marketing and consumption pattern at peri urban dairy farms in the mountains: a case from Lohaghat in Uttaranchal”, He opined that dairy farming is one of the most important economic activities in the rural mountain areas of Uttaranchal and is closely intertwined with farming systems. Rural communities fondly relish daily products. Dairying again is the main purpose of animal husbandry in mountain areas. Apart from ensuring nutrient supplies to the families owning dairy farms, dairying also offers promising employment opportunities and handsome economic returns. In Uttaranchal mountains, dairying is especially a promising economic activity for smallholders who constitute the majority of farming communities in the region. Smallholder dairy farming is increasingly gaining importance as a source of family income in mountain areas for quite some. However, contributes of smallholder dairy farming accrued to the community and farming accrued to the community and farming system are still not well recognized. India’s emerging as the top milk producer in the world is largely due to smallholder, rather than intensive, dairy farming linked with the marketing system.

2.2.2 COST AND PRODUCTIVITY IN THE MILK PRODUCTION

Saravanakumar et al. (2009)\textsuperscript{33} has done research on the subject: “Evolving Milk Pricing Model for Agribusiness centers: An Econometric Approach” and viewed that “That tow-axes pricing policy is followed normally in the dairy business centers of Tamil Nadu. Though it is scientifically rational, it ignores the input prices, technology and government policies. For sustaining the growth momentum and achieving an annual average growth of 7-8 per cent in the next five years and considering that dairying is practiced as a component of mixed farming systems, it becomes imperative to take into account the interrelationship among the enterprises and general economic factors while fixing the milk price. In this study, development of a price determination model has been reported. It is based on the cost of production and takes into account price and non-price factors, viz. technology, and projected different price scenarios of milk for the coming years. The study undertaken in Tamil Nadu state, is based on primary data collected for the year 2002-03 and has been found that to maintain constant returns to the production cost of milk, the milk price would need an upward adjustment of 9.97 per cent, whereas to provide constant net monetary income, the milk price would need an upward adjustment by 10.30 per cent for buffalo milk. Considering 2002-03 as the base year, the estimated price for milk per liter is expected to be Rs.23.64 at constant monetary income and Rs.23.15 at constant return to production cost in the year 2009-10. The results of the paper are illustrative of the utility approach in generating consistent price sets for milk in response to alternative policy interventions.

Haese et al. (2009)\textsuperscript{34} in their article, “Efficiency in milk production on reunion Island: Dealing with land scarcity”, analysed the efficiency on dairy farms in Reunion Island, a French overseas district located in the Indian Ocean. On this island, dairy farming is promoted with financial and technical support from the European Union, with the French and local governments aiming at reducing dependency on imports of milk powder and dairy products and creating employment. A critical factor for increasing the local milk production is the limited availability of arable land because of the small size and the volcanic nature of the island. In this paper, we study the efficiency levels of dairy production of 34 farms by using a data envelopment analysis approach. The average technical efficiency score of farms, assuming constant returns to scale, was 0.927, with 19 out of 34 farms not being efficient. The technical efficiency with variable returns to scale specification was 0.951. The efficiency with which farmers used their land (sub vector efficiencies) was estimated in the second model. The average sub vector efficiencies calculated with constant returns to scale specification was 0.951. The efficiency with which farmers used their land (sub vector efficiencies) was estimated in the second model. The average sub vector efficiencies calculated with constant returns to scale and variable returns to scale models were lower than the technical efficiencies. The farmers on the efficiency frontier had a relatively higher milk production, milk production per cow, and land surface more than those who were less efficient. Possible on-farm strategies improved feeding systems, farms having their own heifer breeding, and improved genetics.

Mathialagan, et.al. (2009) in their study titled, “Effect of feeding supplements of SNF content in Milk”, conducted with the objective of training the farmers on feeding technologies for improving the SNF content of milk in milch animals and to assess its impact at the field level. About 159 woman dairy farmers cum self help group members belonging to ten different villages of Namakkal district were selected for the study. A benchmark survey was conducted for all the women dairy farmers on cost effective supplementing diet with minerals. The results indicate that 46.37 per cent of cow milk samples had less than 8.0 per cent of SNF content. When the SNF content falls below 8.0 per cent the payment for the milk will be calculated based on the fat content of the milk as per the price policy of milk co-operative societies. In such cases, the farmers would get a lower price of Rs.6.50/- per litre instead of Rs.8.75/- litre if milk.

Rhone, et.al. (2008) have done a study on, “Comparison of two milk pricing systems and their effect on milk price and milk revenue of dairy farms in the Central region of Thailand” and analysed and investigated determinates of how milk pricing system, farm location, farm size, and Month and year affected farm milk price (FMP), farm milk revenue (FMR) and loss in FMR of dairy farms in the Central region of Thailand. A total of 58,575 milk price and 813,636 milk yield records from 1034 farms were collected from November of 2004 to 2006. Farms were located in the districts of Muaklek, Pak Chong, Wang Muang, and Kaeng Khoi. A fixed linear model was used to analyze milk price of farms. Two pricing system were defined as 1 = base price plus additions /deductions for milk fat percentage, solids-non-fat, and bacterial score, and 2 = same as 1 plus bulk tank somatic cell count (BTSCC). Farm

Mathialagn, Chandrasekaran and Manivannan (2009), “Effect of feeding supplements of SNF content in Milk”, Tamil Nadu Veterinary and Animal Sciences, Vol.5, No.1, Jan-Feb, pp.28
size (small, medium, and large) was based on the number of cows milked per day. Results showed that FMP were lower ($p < 0.05$) in pricing system 1 than in pricing system 2. Most small farms had higher ($p < 0.05$) milk prices than medium and large farms across in both pricing system. Large farms lost more milk revenue due to deductions from bacterial score and BTSCC than small and medium farms.

Doyon, et.al. (2008)\textsuperscript{37} in their study titled, “Milk Marketing Policy options for the Dairy Industry in New England”, viewed and opined that the New England dairy farmers are under intense price pressure resulting from important growth in milk production from lower cost of production in Southwest state as well as by retailers’ market power. Agricultural officials and legislative bodies in New England and in other Northeast US states are aware of these pressures and have been reacting with emergency in an attempt to address perceived excess retailing margins for fluid milk. In this paper, we suggest that a sigmoid demand relationship exists for fluid milk. This demand relationship would explain fluid milk asymmetric price transmission, high-low pricing, and the creation of a large retailing margin (chain surplus) often observed for fluid milk. It is also argued that a sigmoid demand relationship offers an opportunity for state legislators to help North-east dairy farmers capturing a larger share of the dollar of the consumers through various policy options. Therefore, 5 milk market channel regulatory mechanisms (status quo, price gouging, supply control, fair share policy, and chain surplus return) are discussed and compared. The supply control mechanism was found the most effective at redistributing the chain surplus, associated with the sigmoid demand relationship for fluid milk, to dairy farmers. However, this option is unlikely to be politically acceptable in the United States. Second-best options for increasing dairy farmers share of the consumers’ dollar are

the fair price policy and the chain surplus return. The former mechanism would
distribute the chain surplus between retailers, processors, and frames, whereas the
latter would distribute it between consumers, retailers, and framers. Remaining
mechanisms would either transfer the chain surplus to retailers (status quo) or to
consumers (price gouging).

**Kedija Hussen, et.al. (2008)** in their study titled, “Cow and camel milk
production and marketing in agro-pastoral and mixed crop-livestock systems in
Ethiopia”, stated that the Ethiopia holds the largest ruminant livestock population in
Africa. Productivity has remained low and its contribution to the national economy is
limited compared to its potential. The overall milk production system in Ethiopia
could be broadly classified as pastoral and agropastoral, crop–livestock mixed and
peri-urban and urban dairy production systems. Cattle, camels and goats are the main
livestock species that supply milk. Total annual milk production from about 10
million milk animals is estimated at about 3.2 billion liters, Information is very
scantly on the milk production and marketing system in the lowland areas in general.
This study was therefore undertaken in the lowlands of Mieso distaict to (1)
characterize the milk production and marketing system, (2) Identify major constraints
for the development of market-oriented dairy production, and (3) formulate
recommendations for further development interventions.

**Saravanakumar et.al. (2008)** conducted a study titled, “Technical
Efficiency of Dairy farms in Tamil Nadu” which was carried out to evaluate dairy
farm households in terms of efficiency of milk production using stochastic frontier

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38 Kediya Hussen, Mohammed Yousuf1 and Berhanu Gebremedhin (2008), “Cow and camel milk
production and marketing in agro-pastoral and mixed crop-livestock systems in Ethiopia”,
Presented at the Conference on International Research on food Security, Natural Resource
Management and Rural Development held at University of Hohenheim, on October 7-9.

production methods. The data for the data for study comprised of fixed investments on dairy farms, quantity and price of feeds and fodders fed to individual animals, labour utilization pattern, veterinary and miscellaneous expenses, quantity of milk produced and price realized etc. collected from 160 sample households across flush and lean season for the year 2002-03. The coefficients for the value of green fodder and concentrate were found to be statistically significant with a relatively higher magnitude implying their greater and significant role in crossbred cow milk production. The technical efficiency of crossbred cow farms ranged from 72.30 to 97.90 percent with an average of 82.10 percent. The study indicated that there existed a scope to increase milk production of an average farm to 16.32 percent for crossbred cows and 14.04 percent for buffaloes without incurring any extra expenditure on these farms.

**Srikanth Reddy et.al. (2006)** presented a paper titled, “An Economic Analysis of Production Consumption and Marketed Surplus of milk in Karimnagar District of Andhra Pradesh –a case Study”, This make and an attempt to quantify the level of consumption, production, and marketed surplus of milk in Karimnagar district of Andhra Pradesh, Better feeding followed by congenial weather conditions during the winter has positive effect on milk production. It was also interesting to note that in relative terms marketed surplus was more in summer (ranging from 58.5 percent to 60 percent) compared to that in rainy season (50 percent to 56 percent). On an average marketed surplus during the year ranged between 55 percent in the case of small farmers to 57.2 percent in the case of medium farmers. But in all the categories of farmers the consumption of milk was above recommended level. i.e. 250 gm / day / person. With the disposal of marketed surplus of milk through different agencies it

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was evident that the co-operatives and milk vendors emerge as major procurement agencies (more than 70 percent) in all categories of farmers. Majority of the small and medium farmers preferred milk vendors while large farmers preferred milk co-operatives to sell their surplus milk. The large family size, education level of family had influenced the consumption pattern of milk. These lead to consume more, resulting in shrinkage of marketed surplus.

**Pranajit Bhowmilk, et.al. (2006)** presented a paper titled, “Gains from Crossbreeding of Dairy Cattle in the North East: Micro Evidence from Tripura” and analysed that the net cost of milk production from crossbred cows is nearly half of the same from local cow, thus in the economic interest of the farmers, strategies aimed at crossing nondescript cattle with superior germplasem should be intensified by the concerned state department. The contribution of technological component in higher milk production for cross breed cows is about 68 percent, thus, propagation of crossbreeding in the region has the potential to ensure reasonable returns of investment. The annual value of inputs saved in one district alone, covers 87 percent of the expenditure on dairy development made by the state in four years. Therefore, from the planners’ perspective also, it is a winsome proposition.

**Bhowmilk (2006)** made a study on, “Economics of milk Production and Analysis of Technological Change in Dairying in South Tripura” and opined that the Cost and returns from milk production were estimated separately for local and crossbred cattle. The gross cost of maintenance was worked out as the sum of fixed and variable costs items. The net cost was arrived at by deducing the value of dung

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from gross cost per milch cattle per day was divided by the average milk yield per day of the respective breed. The net return was calculated by deducting gross cost from gross return.

**Chauhan, et.al. (2006)** presented a paper titled, “A study on the Economics of Milk Processing in a Dairy Plant in Haryana” and examined the economics of manufacturing of different dairy products, viz. ghee, full-cream milk, standardized milk, toned milk, double-toned milk, skimmed milk and ice-cream (processing only) have been reported. The study has been conducted in an ISO-9002 dairy plant situated in the north-eastern part of Haryana. It has been observed that all the products, except the double-toned milk are being produced above the recommended breakeven level. A comparison of unit manufacturing cost with unit price received by the plant for different products has revealed that ice-cream manufacturing has been the most profitable proposition among different dairy products, and standardized milk has provided the maximum profit margin among the milk pouches manufactured during the study period, 2000-01. The double-toned milk has revealed a loss. Therefore, the study has suggested that the quantity of double toned milk production should be raised at least equal to the recommend break-even level to avoid losses, if there is a market demand for this product or the resources of this product could be shifted to some other profitable products.

**Ashok Shivagaje, et.al. (2004)** in their study titled, “Milk production in India”, stated that India’s estimated milk production in the year ending March 1999, 74 million tones, was 13 per cent of the world’s milk production. This has been appreciated by the United Nation’s Food and Agriculture Organization (FAO), which

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has declared India as the world’s largest producer of milk. FAO-estimated milk production of 71 million tones by USA in the same year is placed second in the list. Data on estimates of milk production in the world and India during 1985-2000 reveal that a linear regression \( Y = a + bt \), where \( t \) is the year and \( Y \) the estimate of milk production, is the best fit to the data. For India, the estimates of \( a \) and \( b \) are 41.14 and 2.28 respectively, and for the world they are 501.85 and 3.80 respectively. This implies that an annual increase in estimate of India’s milk production is found to be 2.28 million tonnes (\( P<0.01 \)), whereas it is 3.8 million tonnes (\( P<0.01 \)) for the world. Assuming that the rate of increase will remain the same for the year 2010, estimates of India’s milk production will be 100.52 million tonnes, whereas the world’s milk production is as a result of increase in national GDP. In order to meet the demand, it is essential to have consistent increase in milk production, which will be possible on successful implementation of ‘Operation Flood’ and evolution of new animal breed.

**Kham Chand et.al. (2004)** in their study titled, “Livestock Population: Composition and Trends in Arid Rajasthan”, analyze the livestock composition, population pattern and factors affecting it in the arid zone of Rajasthan. For the purpose of study, secondary data of livestock population pertaining the animal census year 1961,1966,1972,1977,1983,1988,1992 and 1997 were collected. For the estimation of fodder availability, data on crop production, hallow land, culturable waste and policy area etc. were collected for the year 1996-1997. The requirement of fodder and nutrient intake was also estimated for the region. The study revealed an increase in buffalo population in the region while a sharp decline was observed in percent share of cattle in the total livestock population. The major deficiency of fodder was felt in the case of bovine in the array region. The factors responsible for increase

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in buffalo’s population are increasing cropping intensity and rural population density in the arid region while the same factors resulted in a decrease in cattle population. The arid region farmers also adopted buffalo as drought resistance strategy since unproductive buffalo can be sold during drought, which does not affect the religious sentiments as in the case of cattle. The study recommends storage of foliage produced in good monsoon year for use in the deficit period. The government of India is also implementing a scheme for this region for developing and rejuvenate the pasture land to be available on the large scale to improve the livestock situation in this region.

**Prashant Khare Sharma et.al. (2003)** in their study titled, “Marketing Analysis of milk production in Bhopal District of Madhyapradesh” feel that of their option, milk collection was higher in healthy season (from September to February) and lower in unhealthy season (from March to August). In spite of more production in the month of July and August, the producer members of the society were not in position to transport their product due to lack of all weather roads. As the distance of the milk producer’s co-operative society increases form the dairy plant, the volume of milk collection decreases, the milk collection was higher in those societies, which are well connected to the dairy plant. The variable cost was the main component of cost of milk production and the maximum cost incurred in the purchase of feed and fodder and in labour management. Low price of milk was the most important problems in the collection of milk, followed by lack of cold storage, delay in payment, inadequate water for animals, lack of all weather roads, small quantity of marketable surplus of milk, improper treatment, lack of cross breed animals and uncertainty of electricity. Hence, efforts should be made to solve all there constraints.

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White, et.al. (2002) in their study titled, “Milk Production and Economic Measures in confinement or pasture system using seasonally calved Holstein and jersey cows”, examined total lactation performance of dairy cows in two feeding systems: pasture-based and confinement. Spring and fall calving herds were used and each seasonal herd had 36 cows on pasture and 36 cows in confinement with 282 Holstein and 222 Jersey cows included over seven seasonal replicates. Pasture-fed cows received variable amounts of grain and baled haylage depending upon pasture availability. Confinement cows received a total mixed ration with corn silage as the primary forage. Data were collected on milk production, feed costs, and other costs. Pasture-fed cows produced 11.1 per cent less milk than confinement cows. Across treatments, Jerseys produced 23.3 per cent less milk than Holsteins, but calving season and various interactions were not significant. Feed costs averaged $0.95/cow per day lower for pastured cows than confinement cows. Feed costs were lower for Jerseys than Holsteins and for cows calving in spring. Income over feed costs averaged $7.05 ± 0.34 for confinement Holsteins, $6.89 ± 0.34 for pastured Holsteins, $5.68 ± 0.34 for confinement Jerseys, and $ 5.36 ± 0.34 for pastured Jerseys; effects of breed were significant but treatment, season, and interactions were not. Economic factors such as labor for animal care, manure handling, forage management, and cow culling rates favored pastured cows. Higher fertility and lower mastitis among Jerseys partially offsets lower income over feed cost compared with Holsteins. Milk production was lower in this study for pasture-based systems but lower feed costs, lower culling costs, and other economic factors indicate that pasture-based systems can be competitive with confinement systems.

47 White, Benson and Washburn (2002), “Milk Production and Economic Measures in confinement or pasture system using seasonally calved Holstein and jersey cows”.
Hemme, Garcia et.al. (2002) in their study titled, “A Review of milk Production in Bangladesh with Particular Emphasis on small-scale Producers”, express their opinion 130 million people in Bangladesh should consume at least 120 g of milk per day (as fluid or processed in any form), the annual milk demand would be about 5.70 million tons. This estimate of milk demand in Bangladesh demand is over two and half times FAO’s recorded national milk production for the country (for 2002). Therefore, meeting Bangladesh’s potential milk demand is a huge national task and the question arises how well-positioned Bangladesh is to meet this milk demand. This study shows that the 2 cow farms (BD-2) not only cover full economic costs, but can produce milk at a cost almost as low as the larger farms included in the study. This should be very encouraging for more than 7.2 million Bangladeshi families involved in small scale cattle rearing, of which few make a profit and most consider it a highly risky activity. The small farm (BD-2) is competitive at the national level but not at the international level. The cost of milk production of all farms in comparison to larger farms in India, Pakistan and Oceania is around 50per cent higher. Assuming a liberal trade of dairy products in the future all farms analyzed will have to improve the production systems significantly to gain from the growing demand of dairy products in the country. Further studies of small dairy farms in Bangladesh need to include a land-less milk production system, a typical goat milk production system and a more exhaustive evaluation of the non-cash benefits obtained from dairy cattle (like draught power). Moreover the cost reduction potential of the farms by improvements in farm management should be analyzed.

Khem Chand, et.al. (2000) in their study titled, “Economic Analysis of Commercial Dairy Herds in Arid Region of Rajasthan”, revealed that milk production in commercial dairy herds is an economically viable and profitable enterprise in Bikaner city. It generated around 973 man-days of gainful employment per year in an average dairy herd. The contractual procurement and auctioning system of milk has helped a lot in increasing the number of dairy herds in the city, the optimum herd size analysis has suggested the scope for further increases in the number of milch animals in the dairy herds. Though these dairy herds have helped in increasing the supply of milk, they have created many problems too. The herd owners many times set their animals free, which generally choked due to disposal of animal waste in it. These problems are created by around 40 percent of dairy herds which are maintained inside the city. The shifting of dairy herds to the outskirts of the city can solve the problem. Another way to improve upon the situation is by developing a modern dairy complex along the lines of Aarey milk colony, Mumbai with provision of good infrastructure facilities.

Rougoor, et.al. (2000) in their study titled, “The relation between breeding management and 305-day milk production, determined via principal components regression and partial least squares”, investigated the relation between breeding management and 305-day milk production. Second goal of the study was to investigate advantages and disadvantages of principal components regression (PCR) and partial least squares (PLS) for livestock management research. Multicollinearity was present in the data set and the number of variables was high compared to the

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number of observations. Out of 70 variables related to breeding management and technical results at observations. Out of 70 variables related to breeding management and technical results at dairy farms. 19 were selected for PLS and PCR, based on a correlation of $\geq 0.25$ or $\leq -0.25$ with 305-day milk production. Five principal Components (PCs) were selected for PC-regression with 305-day milk production being the goal variable. Related variables were combined into one so-called synthetic factor. All synthetic variables were used in a path-analysis. The same path-analysis was worked out with PLS. PLS forms synthetic factors capturing most of the information for the independent X-variables which are useful for predicting the dependent Y-variable(s) while reducing the dimensionality. Both methodologies showed that milk production per cow is related to critical success factors of the producer, farm size, breeding value for production and conformation. Milk production per cow was the result of the attitude of the farmer as well as the genetic capacity of the cow. It was found that at high producing farms the producer put relatively much emphasis on the quality of the udder and less on the kg of milk. Advantages of PLS are the optimization towards the Y-variable, resulting in a higher R$^2$, and the possibility to include more than one U-variable. Advantages of PCR are that hypothesis testing can be performed, and that complete optimization is used in determining the PCs. It that PLS is a good alternative for PCR when relations are complex and the number of observations are small.

Prasad (1999) made a study titled, “Seasonal Variations in Buffalo Milk Production in Rnaga Reddy District of Andhra Pradesh”, observed that the concentrates contributed as an important input in the milk production having
significant and positive regression coefficient for all the breeds of buffaloes. The dummy variables for the both the winter and rainy seasons had negative regression coefficients for the local and graded buffaloes but for the murrah buffaloes the same were positive and significant for both the seasons. This shows that more yields are realized in the summer season for local and graded buffaloes while higher yields are realized in the winter and rainy seasons for murrah buffaloes. This clearly demonstrated that the summer season contributed significantly to the milk yield in the case local and graded buffaloes, while the winter and rainy seasons significantly facilitated the murrah buffaloes in increasing the milk yield as compared to the other season. The higher milk yield among the local and graded buffaloes during the summer season might be due to the reason that a majority of these buffaloes might have calved during the summer season itself on the sample farms. Inter-seasonal fluctuations in milk production can be minimized by adjusting the calving dates of buffaloes. The milk yield of the animals can be stabilized through advance planning of calving dates of ensure continuous milk production on the farm through adjustment of mating dates of the buffaloes. This means that at a given time all the buffaloes would not go dry and at least one or two animals would be giving milk to the dairy farmers.

Bennett, et.al. (1999)^52 in their study titled, “Economic Considerations for Dairy Waste Management System”, conducted a comparative analysis of two nutrient management systems of Missouri dairies. Annual ownership and operating costs were computed for herd sizes of 100-1,000 cows. A break-even analysis was also provided for irrigation systems used with the lagoon system. Lagoon systems consistently handled dairy nutrient at a lower cost than liquid tank system for all herd sizes. Even

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though nutrients from lagoon systems, the liquid system’s net cost was 1.5 to 2.4 times greater than the lagoon system’s net cost, depending on herd size. The liquid tank system also required a 5 to 10 times larger Plant filter area than the lagoon system. This can be an important consideration for operations with limited acreage. Dairies with more than 300 cows benefited from purchasing a traveling gun irrigator rather than relying on a custom operator to remove nutrients from lagoon systems.

**Rajendran et.al. (1998)** in their study titled, “Present Scenario of milk Production in India”, pointed out the present Scenario of milk Production in India. India’s agriculture has been dominated by the belief that its base is in crop production. Also, the focus should be shifted from quantity to quality in the daily diet by enhancing the intake of animal proteins, the major source of which are milk, eggs and meat. In recent years, one unfortunate trend has seen the decreasing per capita availability of pulses, the only major source of protein for the large majority of the population. The nutritional demand has to be bridged rapidly and the milk, egg and meat provide affordable alternative sources of protein. Recently, the annual rate of the growth in milk production has been encouraging which has gone up from 4.5 percent in the seventies to 5.7 percent in the eighties. Today, Indian ranks as the world’s second largest milk producer after USA. The present per capita availability of 214 grms/day (78 Kgs / Year) is much higher than the average of 26.27 kg/ year for the developing courtiers in Asia / Pacific region. Today milk is India’s second most important agricultural commodity in terms of value its output, ranking after paddy, but much above wheat.

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Verma, et.al. (1997)\textsuperscript{54} in their study titled, “Variations in the quality of market milk and its impact on the efficiently of milk marketing system”, conducted a study in Karnal town of Haryana to ascertain deterioration in milk quality during marketing and to estimate real margins in milk trade, it was reported that in the lean seasons milk supplied to consumers by producers directly was of better quality at an average price of Rs.5.68/- per liter than that was sold to Halwai and vendor at Rs.4.75/- and Rs.4.04/- per liter respectively. Raju (1992) on consumer’s perceptions about milk Marketed by Vijaya cooperative Dairy in Hyderabad revealed that Vijaya dairy milk had powdery smell which used to easily get curdled compared to vendor milk and buffalo farm milk. Consumers judged the quality of milk fat content, color and taste, thickness, freshness, hygiene, curd formation and flavor of the raw milk. A majority of consumers, irrespective of all income groups, considered thickness, taste curd formation to be most important factors in judging the quality of milk. In Orissa, Omfed milk was perceived better than unbranded milk on thickness criterion whereas it lagged behind on taste and freshness.

Pander et.al. (1993)\textsuperscript{55} in their study titled, “Genetic evolution of lactation yield from test day records on incomplete lactation”, argued that the genetic prediction of heifer’s 305-day lactation yield from complete test day records or from records in progress was investigated. The accuracies of genetic indices predict breeding value for total yield from all 10 test day records of milk, fat and protein yields were 0.71, 0.66 and 0.67, respectively. These accuracies were slightly higher than if indices were computed to predict phenotypes and from these breeding values of 305-day records. The accuracy for a repeatability model (giving equal weight to


each record) was not far below that of an optimal index. Inclusion of records in progress in genetic evolution was investigated using a repeatability model and phenotypic index to predict the phenotype for complete lactation from test day records. Approximate expansion factors to equate the genetic variance of past records to that of complete records and weights to give to past records in genetic evaluation using an animal model were derived. For genetic prediction of higher lactation yield from test day records, records, a reputability model giving equal weight to each record could be used without increasing computational facilities and could easily be incorporated.

**Hansen et.al. (1993)** carried out the study titled, “An Economic Model for Analyzing Alternative Dairy Waste Handling Systems”, felt that the primary objective of his study was to develop a series of worksheets to analyze the economic, financial, risk, and environmental impacts of alternative nutrient management methods of a representative western Washington dairy farmer. They considered total waste that must be handled, facilities and equipment associated with each alternative, transportation of manure to storage, storage procedure, transport to land, and soil incorporation. He examined capital investment required, annual costs, financing, cash flow, nutrient values of the waste, and financial and environmental risks. The dairy selected by Hansen needed a larger nutrient handling system to accommodate expansion for 69 additional mature cows and 42 additional heifers. He considered two alternatives: (1) add second lagoon, use a solid separator, and purchase a big-gun pumping system for distribution of liquid nutrients on land, or (2) add a second lagoon without a solid separator, and hire a custom service to pump liquid nutrients from the lagoons. Alternative 2 had a lower capital investment, a net annual cost

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advantage, a lower net annual cash outflow and lower financial risk because of less dept, alternative I had a lower risk of environmental damage because of excess lagoon capacity.

Garsow, et.al. (1992)\(^{57}\) in their study titled, “Impact of Michigan Dairy Manure handling alternatives”, examined seven liquid handling systems and one solid manure handling system for three Michigan dairy herd sizes ranging from 60 to 250 cows. They found that investment costs for the least expensive system could be less than a fifth or the most expansive system. Yet more stringent manure handling regulations could cause some producers to leave the industry because the additional costs of improved manure handling systems could force these break-even price above the expected milk price. The likelihood of a producer leaving the industry depended on the farm’s current financial position and performance.

Oltenacu, et.al. (1989)\(^{58}\) in their study on, “Factors Associated with Seasonality of Milk Production in New York State”, elucidate the effect of the base-excess seasonal pricing plan on pattern of production and the role played by various factors related to management and to breeding practices on seasonality of production were investigated. A mail survey of randomly selected group of farmers in New York State provided the data; 1061 farmers responded to the questionnaire. Seasonality coefficient (difference between spring and fall production as a proportion of fall production) was used a measure of seasonal production pattern. Three major conclusive were: 1) the use of a base-excess plan in addition to the Louisville plan reduced seasonality when compared with the Louisville plan alone: 2) seasonality was

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associated with region, type of housing, and here production; and 3) farmer’s production in other seasons was an important cause of seasonality.

Morgan, Russell et.al. (1987)\(^{59}\) in their study on, “Economic Comparisons of Alternative Waste Management Systems on Tennessee Dairy Farms”, emphasized the need for reliable and complete cost and benefit data in their evolution of nutrient management systems for Tennessee dairy farms. Considering alternative her sizes, they computed direct construction and installment costs, annualized costs, and stability of cost/return relationship of different nutrient system. They also conducted a sensitivity analysis of nutrient loss rates of different nutrient management system during storage and varying nutrient values after application to land. The noted the substantial cost of all nutrient management system and the fact it could be expected to increase significantly should more stringent environmental regulations be applied to the dairy farm sector (as they have now been applied in Washington).

Young, et.al. (1986)\(^{60}\) in their study titled, “Production, Consumption, and Pricing of Milk and its Components”, compare the production and consumption of milk fat, milk protein and lactose for 1970, 1975, 1979, and 1983 to determine whether production and consumption were balanced and, if not, to determine how balance might be achieve. Rations of these components in milk produced remained virtually constant from 1970 to 1983. However, increased cheese consumption during this period resulted in increased per capita consumption of fat and protein despite reduced consumption of these components in other dairy products. Because lactose is not in cheese, lactose consumption declined. Because of these changes, imbalances of production and consumption of milk component now exist and are due almost entirely


too much lactose being produced. Because of small variation of lactose percentage, this imbalance could be reduced by increased fat and protein percentages. Milk pricing should encourage this by emphasizing fat and protein (not solids-not-fat). Fat and protein differentials should differ from market to market and should be based on utilization. Milk pricing is reviewed, and a procedure for determining blend differentials is outlined.

**Emerson Babb (1981)** made a study titled, “Analysis of Regional Milk and Production Costs”, analyzed the relationship between milk prices and production costs as sources of change in the level and geographic distribution of United States milk production. Milk prices and direct and total costs of production from 1974 to 1980 were estimated as a function of distance from the upper Midwest by ordinary least-squares regression. Milk prices and costs increased with distance of production areas from the upper Midwest, but the increases were less than transportation costs. The cost and price changes during 1974 to 1980 provided a strong incentive for increased milk production in all regions. Change in milk prices and cost of production did not encourage production expansion in higher cost regions relative to expansion in higher cost regions relative to expansion in the upper Midwest.

**Vijay Gorakh Patil (1981)** made a study titled, “Marketing Analysis of milk Production in Shirpur Tehsil of Dhule District of Maharashtra (India)” and conducted a random sample survey study on fifty dairy farmers eight villages of Shirpur Tehsil of Dhule District of Maharashtra (India). He wanted to know the cost of production of milk in the study area. The total cost of milk production per cow/buffalo was Rs.113.87 in which the variable cost was 83.76 percent (Rs.95.38) and remaining

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Rs.16.24 percent (Rs.18.49) was fixed cost. In variable, the cost of feed stuff was 73.39 percent (Rs.70). Labour cost was 15.73 percent (Rs.15.00), the cost of medical treatment was 2.62 percent (Rs.2.50) and interest on working capital was 8.26 percent (7.88). Finally it was found that the cost of milk was Rs.9.10 per liter in the study area. Dairy farming has been recognized as an important source of income and is more remunerative in comparison to crop production in India. Milk production in India is predominantly the domain of small frames in mixed farming system. Scientific dairy management helps the framer to channelize his limited resources to maximize returns from his dairy farm. The important of dairying lies not only in products but also it bring about significant changes in socio-economic structure of rural economy. The National Commission on Agriculture (1976) observed dairying as an additional enterprise for improving the status of rural masses especially weaker sections consisting of small, medium &landless labourers. It therefore, becomes essential to examine the production cost of milk.

2.2.3 Channels of Marketing

Daniel Block (2009) made a study titled, “Public health, cooperatives, local regulation, and development of modern milk policy; the Chicago milkshed 1900-1940” and understood that the agricultural policy in the United States was often structured around conflicts and relationships lay within particular production regions. These regional solutions may evolve into national policies. This paper explores a historical example of this, the development of fluid milk policy and the fluid milk economy in the Chicago milk shed between 1990 and the New Deal. This example is particularly interesting because it was the part of the rise of the post-World War II

modern food system. Both urban and rural groups were important in this development. Urban groups took a particular interest in milk production and regulation due to its importance as a nutritious but highly perishable staple. Rural groups responded to urban attempts to control production practices by organizing cooperatives. Negotiations and strikes resulted in an agreement in 1929 that was positive for farmers, the Chicago Department of Health, and other major entities in the milkshed. It attempted to place regulatory barriers around the milkshed. However, it soon failed due to improvements in transportation technology and new distribution systems that allowed for cheaper retail prices. The group then proposed a marketing plan to the USDA, which became the ancestor of the federal milk marketing order program. This story sheds light on the manner in which local interest groups and internal politics within the U.S. Department of Agriculture combined to shape New Deal agricultural legislation.

**India Post (2008)**

“Milk production reaches 111 million tonnes by 2010”, opined that the demand for value added milk products, such as cheese, dahi (Indian yoghurt) and probiotic drinks is increasing at a double digit rate. At present, India seems to be self-sufficient in meeting its requirement for milk and milk products. However, given that demand is growing faster than supply, there could be serious issues with respect to self-sufficiency in the near future. Any increase in milk production is dependent on the farm gate price received by the producer. Farm gate prices have increased by more than 50 percent in the last three years. Focused efforts would be required on two fronts increasing farm size (Currently the average number of animals per producer is three to four), and increasing productivity of milk producing animals. Global milk production, approx.655 million tonnes in 2006/07, is

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estimated to be growing at 1.6 percent per annum. India ranks second in terms of milk production after the EU-27 and accounts for 15 percent of global production. Annual milk production in India was at 100.9 million tonnes in 2006-07 and was growing at 4 percent per annum. The market for liquid milk, as well as value-added dairy products, is still largely dominated by the unorganized sector. India has an insignificant share of the global dairy trade, less than 1 per cent, despite being a leading producer of milk.

Rangasamy et al. (2008)\(^6\) in their study titled, “Marketing Efficiency of Dairy Products for Co-operative and Private Dairy Plants in Tamil Nadu – A Comparative Analysis”, analysed the marketing of milk and milk products by dairy plants of co-operative and private sectors in Tamil Nadu and compared. The study is based on the data collected for toned milk, standardized milk, full cream milk, flavoured milk, butter and ghee from the selected co-operative and private dairy plants of the Coimbatore district for the financial year 2001-2002. It has been found that the marketing cost for toned milk is the same in both the dairy plants, whereas it is higher for standardized milk, full cream milk and flavoured milk in the co-operative dairy plant. The marketing cost has been found less in the cooperative plant for products like butter and ghee. All the dairy products earn more marketing margins in the private sector than in co-operative dairy plant, except for toned milk. The marketing efficiency of cooperative dairy plant for all dairy products has been observed relatively less than that of private dairy plant, except for toned milk. The study has suggested the development of co-operative dairy industry in a sustainable manner, and the co-operative dairy plants should formulate long-term vision and strategy. The study has observed that value addition in dairy products should be done

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without compromising the quality and consumer-oriented market research and development should be accorded greater attention.

**Kamat (2008)**\(^6^6\) made a study titled, “Dimensions of Dairy Marketing”, has emphasized on the market-oriented dairy development. In his opinion it can alone ensure success of dairy units whether they are in public, private or co-operative sector. There is a great need to institutionalise milk trade from then stage of production to marketing.

**Sharma, et.al. (2007)**\(^6^7\) in their study titled, “Potential and prospects of Dairy Business in Uttarakhand: A Case study of Uttaranchal Co-operative Dairy Federation Limited”, felt that India is the leading milk producer in the world and the dairy cooperatives are the backbone of Indian dairy industry. This study has analyzed the inefficiencies existing in improving milk production, procurement pattern, marketing channels, and price spread of a dairy cooperative, Uttaranchal Cooperative Dairy Federation Ltd (UCDFL), also known as the Kumaun region of Uttarakhand and has proposed a model for eliminating these inefficiencies. It has been found that UCDFL is focused mainly on liquid milk marketing and has not adopted product diversification, which is the need of the day. Nainital and Almora districts of Kumaon region have been selected for the study; these cover almost 40 per cent of cattle population in the division, except Udham Singh Nagar. It has been found that due to insufficient margins, the number of agents working for other private dairies has increased. Different marketing channels for milk have been identified and price spread has been calculated for all the channels. Lack of business development

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services related to dairy industry has been found leading the farmers to disassociate from Anchal. The study has suggested that Anchal should evolve a definite policy with regard to procurement of milk in both lean and regular periods and to sustain its members, incentive package should be provided. Anchal should find ways to establish fodder banks at strategic locations for providing fodder during emergencies and periods of fodder scarcity. Local sale of milk at the society level should be encouraged to increase the popularity of Anchal brand.

Denford Chimboza et.al. (2007) in their study titled, “Measuring the determinants of brand preference in a dairy product market”, felt that branding was increasingly being used as a strategy for managing markets in developed countries while developing countries still lag behind. The objective of this study was to assess the level of brand awareness and factors underlying brand preference of dairy brands in Chitungwiza and Harare urban markets in Zimbabwe. A total of 90 respondents who included individual and institutional consumers were selected using judgmental and simple random sampling respectively. Primary data was collected using structured interview schedules developed for each category of consumers. Consumer product awareness indices, cluster analysis and factor analysis were the main tools used in the analysis. The findings of the study showed that 52per cent of the respondent consumers were aware of ARDA dairy brands despite having come across few ADRA DDP advertisement. Four factors were identified as key determinants of dairy product choice namely promotion, price and availability of product, attractive packaging and product quality. There is need for agricultural marketers to incorporate these findings in the formulation of responsive marketing strategies.

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Edward V. Jesse, et.al. (2006) in their study on, “The Dairy sector of India: A Country Study”, opined that, in the third in depth country study, the Babcock Institute study team discusses India’s dairy sector. India is an interesting case study because it has the world’s second largest population marking it the world’s largest milk-production system in which most of the milk produced is conducted on the farm or distributed through informal channels. This system of production, combined with Indian policies that encourage self-sufficiency and restrict dairy imports, leaves much unused potential in the Indian dairy market.

Fengxia Dong (2006) made a study titled, “Outlook for Asian Dairy Markets: The Role of Demographics, Income, and Prices”, presented a 10-year outlook for major Asian dairy markets (China, India, Indonesia, Japan, South Korea, Malaysia, the Philippines, Thailand, and Vietnam) based on a world dairy model. Using the world dairy model, the paper also analyzes the impact of alternative assumptions of higher income levels and technology development in Asia on Asian dairy consumptions and world dairy prices. The outlook projects that Asian dairy consumption will continue to grow strongly in the next decade. The consumption decomposition suggests that the growth would be mostly driven by income and population growth and, as a result, would raise world dairy prices. The simulation results show that technology improvement in Asian countries would dampen world dairy prices and prices and meanwhile boost domestic dairy consumption.

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**Stukenberg, et.al. (2006)**\(^71\) in their study on, “Major Advances in milk marketing government and Industry Consolidation”, suggested that the Federal dairy programs have been instituted to assist dairy farmers in marketing their milk. Milk marketing licenses were issued for city markets in 1933 during the depression. Federal Milk Orders replaced licenses in 1937 with enactment of the Agricultural Marketing Agreement Act. Low prices returned in the late 1940s and Congress passed the Agricultural Act of 1949 creating the support program for milk. Congressional involvement in milk marketing was minimal until passage of the 1977 Farm Bill. A support price adjustment to seek favorable political responses from farmers resulted in higher prices and ultimately higher production. Large expenditures and burdensome supplies caused Congress to make major changes to both programs. Other milk marketing programs have evolved from Consolidation of the dairy processors and producers have lead to a reduction in the number of marketing orders.

**Rajendran and Samarendu Mohanty (2004)**\(^72\) carried out the study titled, “Dairy Co-operatives and Milk Marketing in India Constraints and opportunities”, explained that the operation Flood and dairy co-operatives emerged in India as the largest rural employment scheme, enabling the modernization of the dairy sector to a level from where it can take off to meet not only the country’ demand for milk and milk products but can also exploit global market opportunities. This study reviews the existing status of milk marketing and dairy co-operatives in India and provides recommendations to meet future challenges. The results of the study indicate that 80 percent of the milk produced by the rural producer is handled by an unorganized sector and the remaining 20 percent is handled by an organized sector. It is found that

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the dairy co-operatives play a vital role in alleviating rural poverty by augmenting rural milk production and marketing. Involvement of intermediaries; lack of bargaining power by the producers; and lack of infrastructure facilities for collection, storage, transportation, and processing are the major constraints which affect the prices received by producers in milk marketing. Milk quality, product development, infrastructure support development, and global marketing are found to be future challenges of India’s milk marketing.

Kurup (2003) made a study titled, “Livestock sector in Orissa”, viewed that the price realized by farmers from informal sector was Rs.9.5 to Rs.10 per litre, whereas cooperatives paid between Rs.8.00 and 8.50. Further, the middlemen who bought from them made instant cash payments whereas it took 12-15 days to realize payments from the cooperative system.

Samajdar, et.al. (2003) in their study titled, “Milk production by forest dwellers: A Case of Vangujjars of Uttaranchal”, about the livestock husbandry of the Vangujjars of Uttaranchal observed that even though they possess sound experience about various aspects of animal husbandry, they were vulnerable to and open for exploitation by the middlemen to whom they sell milk despite the existence of cooperatives in that area. They are often riddled with debt and stand marginalized. The study recommended that the cooperatives should come forward to find out the reasons for Vangujjars’ apathy towards cooperatives and involve them as society members.

Ray et.al. (2000)\(^{75}\) in their study titled, “Dairy industry in Rajasthan: Problems and Prospects”, conducted a study in Jaipur city and reported that local milkmen supply fresh raw milk at the doorsteps or the vendor who in turn supplies it to households. The prices varied from Rs.13-20 per litre for cow’s milk depending on adulteration of milk with water and the category of customer. The price generally realized by small farmers from the local vendor was about Rs.10-12 per litre, whereas they got only about Rs.9-10 from the cooperatives. Some middlemen also deployed Daily wage workers to collect milk by using bicycles, jeep or camel cart to collect milk from the doorstep and take it to different selling points in nearby major cities.

Sharma (2000)\(^{76}\) made a study titled, “Marketing of milk – An opinion survey of consumer perceptions, Rajahmundry, AP”, conducted an opinion survey in Andhra Pradesh regarding the consumer perception and attitude towards the different sources of milk purchase. It revealed that a majority of the families purchase milk from private vendors due to non-availability of Dairy milk within the reasonable distance from the consumer’s residence. Several households reported that the housewives are unable to collect the milk in person from the milk booths as it involves time and energy and they are forced to employ servants for collection of milk from the booths which involves additional cost and delay. Further, they also expressed dissatisfaction with the present arrangement of milk supply from the booths and suggested home delivery. Nearly 60 percent of the families felt that the home delivery of milk in polythene sachets is advantageous and indicated willingness to pay additional costs/service charges for the same. So, the Co-


operatives may have to seriously think about the system of home delivery of milk in order to bring more consumer families under its fold. Other reason for household preference to private vendor was non-availability of milk in small packing of less than half litre with the Dairy as several small families and those belonging to lower income groups strongly felt that such facility is essential to enable them to purchase the Dairy milk. It is also true with small size families irrespective of their economic stats. Similarly, It was also noticed that in Orissa, a majority of higher income group (85.6) per cent were not purchasing OMFED milk due to absence of home delivery, poor taste, less cream, bad smell and non availability of credit structure in co-ops. There was also strong correlation between income and proportion of home delivered milk. For example, in Orissa, the percent of milk that was home delivered increased from 40 percent for those with income less than Rs.4,000 to 63 percent for those with income more than Rs.10,000.

Shah (2000)\textsuperscript{77} made a study on, “An Enquiry into Producer Members”, Perception towards Working of milk co-operatives in Maharashtra”, and opines that the predominance of middlemen in this area was mainly due to the non-existence of co-operative infrastructure. Generally, the middlemen advanced money to needy milk producers and procured milk at a low price round the year. It was reported that 75 percent of marketed surplus of small producer’s production was cornered by them. Similar observations were reported in a study conducted in Jalgaon and Kolhapur districts of Maharashtra.

Owango, et.al. (1998) in their study titled, “Dairy co-operative and policy reform in Kenya: effects of livestock service and milk market liberalization”, felt that liberalization in the dairy industry in Kenya was currently under way in several forms. The urban milk market monopoly of the Kenya co-operative creameries had been lifted. Clinical veterinary and artificial insemination (AI) services are no longer publicly supported in many areas. Private sector response to these reforms was expected to be the greatest in the high potential market-oriented daily zones of central province, where the daily farmers’ co-operative societies play a central role in meeting the needs of daily producers. A survey conducted by the authors measured the changes between 1990 and 1995 in milk marketing and service provision by the daily co-operatives. Tabular and GIS analyses were used to evaluate the survey data. Dramatic changes in milk market patterns are apparent, in ways unintended by the policy reforms. Most notable has been a large increase in the role of the unregulated raw milk market. This helped increase real milk prices paid to producers by up to 50per cent, but also led to a steepening of the price gradient with distance from urban consumption centres. Large increases were observed in the provision of veterinary and AI services by the dairy farmers’ co-operatives societies, whose producer client base and credit facilities may enable them to compete effectively with the independent private sector. Market liberalization therefore expanded the role of the raw milk market and the participation of the dairy farmers’ co-operative societies in milk marketing and the provision of input services.

Deepak Shah (1997) made a study titled, “Co-operative Dairying in Maharashtra Lessons to be Learned”, and opined that though milk production in Maharashtra over last decade had increased by leaps and bounds, only 25 per cent of the milk co-operatives were economically viable in the state. Differential price structure and mismanagement of co-operatives has led to poor procurement of milk resulting in vast regional imbalances in terms of milk production. For the smooth functioning of the Milk co-operatives, it is not enough to give remunerative prices to the produces but the co-operatives themselves should take over the onerous task of ensuring necessary inputs so as to improve productivity and overall genetic stock of milch animals.

Pawar et.al. (1995) in their study titled, “Comparative efficiency of Alternative milk marketing agencies in Western Maharastra”, examined the marketing efficiency of three channels – private, cooperative and government – in Western Maharashtra. Their results suggest that private dairies paid somewhat higher prices to producers and still managed to supply milk to the consumer at competing prices. This was due to higher efficiency in procurement, processing, transportation and distribution.

Kalsi, (1992) made a study titled, “Let’s All Do It-Market More Milk” and felt that the unorganized sector usually scores over the organized sector on account of the consumers’ confidence, the richness of milk as indicated by “Malai” on milk, the freshness of their products, their ability to give credit and the low overheads.

Raju (1992)⁸² made a study on, “Market survey of liquid milk in Hyderabad” and opined that the general practice of milk vendors in Hyderabad was that they finance the producers for purchasing milch animals and other personal needs and thereby bind the producer to sell milk to them round the year.

Richard F. Fallert, et al. (1978)⁸³ in their study titled, “Food Chain Integration and Fluid Milk Marketing”, examined the major structural changes in marketing occurring with the integration of food chains into the processing and distribution of fluid milk. Thus, the objectives of this study were 1) to determine the extent of vertical integration by food chains and 2) to explore the implications of such for the dairy industry. The study was confined to the Southern Region. Response to a survey indicated that 60per cent of the food chains were involved in some type of vertical integration with 84per cent of thesis initiated during the past 15 yr. Lower cost and uniform merchandising were the most prominent reasons for having some type of central milk buying programs. Vertical integration leads to increased market power of food chains and can affect both price and market structure. The actual vertical integration of food chains into fluid milk processing through ownership of processing facilities tends to increase the barriers to entry into a market. For processors, the barrier is the non-availability of market outlets. For the food chain, the number of stores and ownership of processing facilities for fluid milk necessary to compete economically may be the barrier. A continuation of these structural trends can be expected.

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2.2.4 CONSTRAINTS IN MILK PRODUCTION AND MARKETING

Shisode, et.al. (2009)\textsuperscript{84} in their study titled, “Evaluation of constraints faced by farmers in adoption of dairy cattle manage mental practices”, felt that the constraints expressed by the dairy cattle owners of Rajarambapu Patil Sahakari Dudh Sangh Ltd. Islampur as regards the reproduction, nutrition, management, health, economic and milk distribution were genuine. Some remedial measures like trainings, exhibitions, brain storming sessions, poster presentations, radio talks and programmes on Doordarshan could be taken up to create awareness in dairy farmers and to impart knowledge to them to undertake new animal manage mental practices to increase the milk yield.

Peter Enderwick (2009)\textsuperscript{85} made a study on, “Managing Quality Failure in China: lessons from the Dairy Industry Case”, analysed the problem of “quality failure” in china using as an illustration the recent case of melamine contaminated dairy products. This conceptual paper examines whether it is possible to anticipate the incidence of quality fade and, if so, what can be done to minimize the likelihood of such problems occurring. Drawing on theoretical frameworks of alternative transactions governance modes, the discussion highlights the interaction between environmental operating conditions and effective governance modes. The discussion suggests that it is possible to anticipate quality and safety problems and identifies the key environmental conditions in China that contribute to the problem of quality deterioration. Analysis of three primary transaction governance modes – contracts, hierarchy and trust – and local operating conditions reveal a dairy industry which, in contrast to many of the developed economies, is highly fragmented, politicized,


ineffectively regulated and characterized by corrupt and opportunistic behaviour. The dairy industry case provides a concrete application of recent conceptual analysis of quality and safety concerns in emerging markets. This case allows the derivation of recommendations on appropriate management practices for maintaining quality in the challenging business environment of China.

**Albert Christopher Dhas (2008)** made a study titled, “Determinants of work Animal Density in Tamil Nadu: An Econometric Analysis”. In his opinion, from independence, size and composition of bovines in Tamil Nadu showed differential growth pattern. The total bovines population showed an increasing trend up to the early-Sixties and thereafter stagnant till the early Eighties. While the milch animal stock increased steadily, the work animals showed a declining trend from seventies. These trends not only indicate the growing importance of dairy animals but also the competitive linkage between work and milch animal population. The work animal stock to highly influenced by the agro-climatic, institutional and economic factors and an analysis of capturing them is attempted in this paper. Initially, the changes in the size and composition of bovines, work animal population and its density since independence are traced. Subsequently, the factors determining work animal population and its density are examined using regression models. Two regression analyses are made; one representing phase I (1956-1974) and the other for phase II (1977-1994). Phase I basically represents the period when mechanization in agriculture had been at the early stages and phase II represents the period when mechanization (both energisation of irrigation and tractorisation) was at a relatively higher level. The study revealed that while the agro-climatic and irrigation factors had played a major role in shaping the work animal density during the period prior to mid-

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Seventies, the technological, economic and institutional factors played a major role in recent years.

**Satbir Singh, et.al. (2008)**  
“Efficiency and Productivity Analysis of Cooperative Dairy Plants in Haryana and Punjab States of India” felt that, since the 1970s, the policy of Indian government has been to promote dairy development on the basis of the cooperative organizations. During the 1990s the dairy industry in India was liberalized. This study examines the impact of the liberalization policy on the cooperative dairy plants in India. Data envelopment analysis (DEA) and the Fisher index approach are applied to measure economic efficiency and total productivity changes, changes respectively. The data involves 65 observations from a complete panel of 13 cooperative dairy plants from 1993/94 to 1996/97. The (vi) Producers got only 71.84 per cent share in consumers rupees, which can be increased by reducing their cost of milk collection from producers to consumer. In the collection of milk highest profit earned by the Diary Plant (6.66 per cent), followed by milk producer’s co-operative society (2.34 per cent) and retailer of milk distribution (2.06 per cent) share in the consumer’s rupees, which can also be increased by the quantity and quality of milk. (vii) Low price of milk the most important problems in the collection of milk, followed by lack of cold storage, delay in payment, inadequate water for animals, lack of all weather roads, small quantity of marketable surplus of milk, improper treatment, lack of cross breed animals and uncertainty of electricity. Hence, efforts should be made to solve all there constraints. (viii) Lack of cold storage is main problems faced by milk producer’s co-operative society followed by lack of all weather roads, private trading and local politics. Hence, efforts should be made to solve all the three constraints.

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