CHAPTER – I
INTRODUCTION

1.1 Background

Milk can be defined as a whitish liquid containing proteins, fats, lactose, and various vitamins and minerals that are produced by the mammary glands of all mature female mammals after they have given birth. It serves as nourishment for their young. The process of management of extracting and collecting it from livestock for the purpose of using as a source of food to be consumed by human beings is known as milk production. In India, milk is primarily produced by rearing cows, buffaloes, goats, camels, sheep and yaks.

In ancient India, during the *Vaidic* period, cattle raising and milk production was a principal occupation. Apart from the treatment of animals, some information on animal husbandry is also available. According to *Matsya Purana, Manu, Apastamba* and *Parasara Samhitas,* and Kautilya's *Arthashastra,* drastic and severe punishments were ordained for cruelty to animals. Great authors like Atri, Parasara, and Gautama framed formal rules for cattle in plows. In *Agni Purana,* we find that Kings were envisaged to preserve the cattle of the country. The *Arthashastra* mentions a government official called Superintendent of Cattle and Horses whose exclusive duty was to supervise livestock in the country. The superintendent was expected to conduct cattle census. A systematic record was maintained under the following classifications: male calves, steers, tamable cows, oxen, bulls, cattle (fit for slaughter), buffaloes, female calves, heifers, pregnant cows, milch cows, barren cattle, *etc.* Under the fear of cattle lifters, the animals were kept in the care of the superintendent, giving him one-tenth of the dairy produce. (Majtdokhot, 1987)

'India ranks first in milk production, accounting for 18.5 percent of world production, achieving an annual output of 146.3 million tonnes during 2014-15 as compared to 137.69 million tonnes during 2013-14 recording a growth of 6.26 percent. Whereas, the Food and Agriculture Organization (FAO) has reported a

3.1 percent increase in world milk production from 765 million tonnes in 2013 to 789 million tonnes in 2014.'[1]

'The per capita availability of milk in India has increased from 176 grams per day in 1990-91 to 322 grams per day by 2014-15. It is more than the world average of 294 grams per day during 2013. This change represents a sustained growth and availability of milk and milk products for the growing population. Dairying has become an important secondary source of income for millions of rural households engaged in agriculture.' (Economic Survey 2015-16 pp 116)

'The success of the dairy industry has resulted from the integrated co-operative system of milk collection, transportation, processing and distribution, conversion of the same to milk powder and products, to minimize seasonal impact on suppliers and buyers, retail distribution of milk and milk products, sharing of profits with the farmer, which are ploughed back to enhance productivity and needs to be emulated by other farm produce/producers.' (Economic Survey 2015-16 pp 116)

As on March 2011, the Dairy Cooperative Network covers 346 districts of the country. It links over 1,44,246 village level dairy cooperative societies which are operating and collecting 21.99 million litres of milk per day and marketing about 18 million litres of milk a day. Approximately 22.45 million people work in the livestock sector, which is around 5.8 percent of the total workforce in the country according to the report of the National Dairy Development Board. In India, cows and buffaloes contribute a sizeable share of the income generation of the rural economy. In the rural economy of India, animal resource shares the second largest income generating source after land. India shares 57 percent of the world buffalo population and 16 percent of the cattle population. It provides regular employment to about 15 million people as principal occupation and 18 million as a subsidiary occupation. Women contribute 69 percent of the labour force in the livestock sector. The contribution of animal husbandry and dairy farming to total Gross Domestic Product was 3.9 percent in 2013-14 at current

[1]The Economic Survey 2015-16 presented on 26-February-2016 in the Parliament by union finance minister and published by Press Information Bureau Government of India.http://pib.nic.in/newsite/PrintRelease.aspx?relid=136849

prices as estimated by the Central Statistical Organisation (CSO) in 2015(Table 1.1). In India, the success of dairy cooperatives has been regarded as an impetus builder of increasing milk production as well as the steady contribution of the livestock sector to GDP covering around 4%.

Table 1.1Share of Agriculture and Livestock Sector in GDP

Year	GDP (Total)	GDP (Livestock Sector)	
	₹ Crore	₹ Crore	Percent share
2011-12	8195546	324013	4.0
2012-13	9252051	367318	4.0
2013-14	10477140	406035	3.9

Source: National Accounts Statistics-2015; Central Statistical Organisation; GOI

Milk production and marketing economics, the process itself comprise the dualistic nature, on the one hand, the primary production sector is agricultural in nature, on the other hand, the industrial sector comprises of sophisticated processing and packaging part. In India, milk production is considered to be a subsidiary business. However, this is the sector, in which the world's biggest dairy cooperative network has been established in India with 1,44,246 village level dairy cooperative societies.

The study on Milk Production and Marketing necessitates the area where marketable production of milk exists. Secondly, a study in the dairy sector without dairy cooperative remains incomplete. Therefore, to formulate pertinent and relevant basics for the study, it is necessary to mention the area of the study which fulfills the necessary condition. This chapter runs with the description of study area followed by milk production activities, review of the literature, the rationale of study and objective and hypothesis.

1.2 Study Area

In India, milk is produced in villages. Mostly cow and buffalo milk are available in the market. Milk is marketed by private contractors, cooperatives, and government organisation.

North Eastern Region of India is highly acknowledged for its rich biological diversity and cultural heritage. The region falls in the "The Eastern Himalaya" which is one of the world's twelve mega biodiversity hotspots. Majority of the people of the region are dependent on highland agriculture, forest based animal agriculture and natural resources for their livelihood sustenance.

The geographical area of Assam is 78438 sq. km. supporting 3.12 crore of the population as per 2011 Census. The cattle and buffalo population of the state as per 19th Livestock Census, 2012 were 103.08 lakh and 4.35 lakh respectively. During the year 2015-16, the total milk production in Assam was 885.63 million litres.

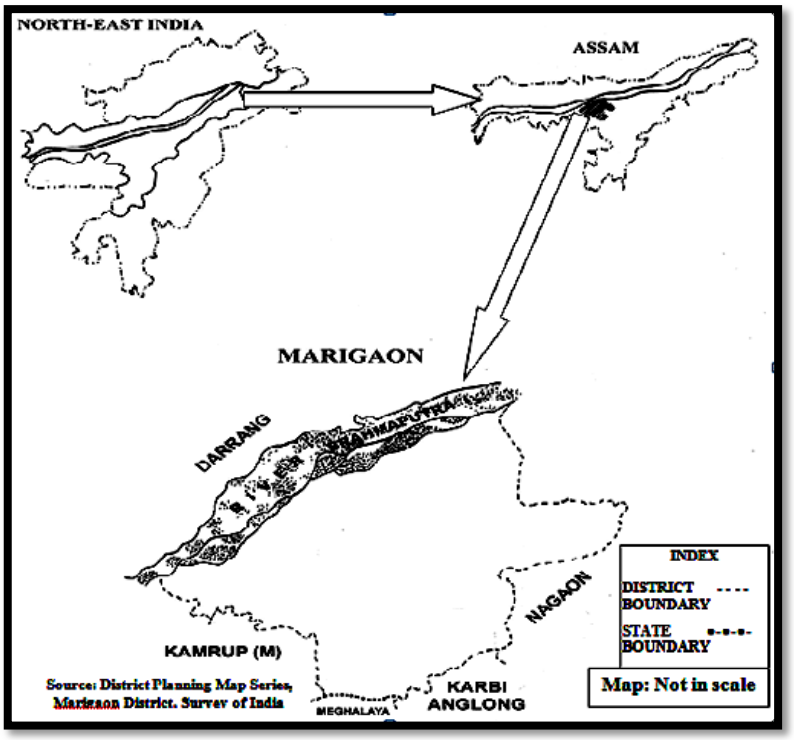
The state of Assam is divided into six agro-climatic zones based on factors like topography and terrain, ecology and climate, influencing land use pattern, crop-mix, cropping intensity and crop productivity and animal husbandry (Bhowmick, B.C.*et al.* 1999)

The agro-climatic zones are:

i. Barak Valley Zone: comprises three districts, *viz.* Cachar, Hailakandi and Karimganj.
ii. Central Brahmaputra Valley Zone: comprises mainly the undivided Nagaon district.
iii. Lower Brahmaputra Valley Zone: comprises of seven districts of Lower Assam.
iv. North Bank Plain Zone: comprises of Lakhimpur, Sonitpur and Darrang districts.
v. Upper Brahmaputra Valley Zone: comprises the whole of eastern part of the state beyond Nagaon and Sonitpur district.
vi. Hills Zone of Assam: comprises Karbi Anglong and NC Hills.

Morigaon district is geographically placed in the Central Brahmaputra Valley Zone with an area of 1551 sq.km. The district has been placed 5th in Assam in regards to the milk production per unit of area (Table 1.9) and it also has 60 year old dairy cooperative namely, Sitajakhala Dugdha Utpadak Samabai Samiti (SJDUSS) continuously run by the farmers. The district has mostly rural areas and a few growing towns like Jagiroad, Morigaon, Laharighat etc. Where, the Government of Assam since the 1960s had tried to implement its Dairy Development Schemes at the villages like Amlighat, Nellie, Mayong, etc. The dairy producers of the district are concentrated in Mayong CD Block around Jagiroad and Amlighat. The area comprises of substantial marketable milk production. Therefore, Mayong Block in Morigaon has been selected as a study area.

Map 1-1 Study Area



The study area is located between 26°5' N and 26°15' N latitudes and 92°10'E and 92°15' E longitudes. The district consists of 7 blocks, *viz.*, Bhurbandha, Laharighat, Mayong, Mairabari (Part), Kapili (Part), Batadraba (Part) and

Dulongghat (Part) and a total of 85 Gaon Panchayats. The present Morigaon district was formed as a subdivision of Nagaon district on 26th January 1972. This was upgraded to a district on 29th September 1989. The district has started functioning as a full-fledged district since 14th October 1989.

Morigaon district is situated in the Brahmaputra valley of Assam. With a total area of 1551 sq. km, it is the home of 957,423 persons as per the 2011 Census. It has one subdivision and six towns both statutory and census, 632 villages, seven Development Blocks, and 85 Gaon Panchayats. It is bounded by the mighty Brahmaputra in the north, Karbi Anglong in the south, Nagaon district in the east and the District of Kamrup (Metro) in the west.

1.3 Milk Production Activities

According to FAO (FAO, 2009)estimate, small-scale farming systems produce 80 to 90 percent of milk in developing countries. Where the activities are based on low inputs, so productivity per animal is quite low. The milk production activities by smallholders in these countries can be typologically divided into three systems on the basis of the ratio between the production of livestock and crop.

Table 1.2 Milk Production System

Sl.No.	Production system	Livestock(L)/ Crop(C) Production ratio
1	Pastoral production systems	$L/C \geq 4$
2	Agro pastoral production systems	$1 < L/C < 4$.
3	Mixed farming production systems	$L/C \leq 1$.

Source: FAO

Pastoral production system emphasises more on livestock production. The production system is characterised by quadruple or more than quadruple output or income from livestock production. In a pastoral production system, crop productions play a less significant role in livelihood earnings of the farmer.

The agro-pastoral production system is that where a farmer earns more from livestock and that production is less than four times of crop production. Crop production is less significant in this production system.

Mixed farming production systems are characterised by more output from crop production at least equal to livestock production or more resulting in the ratio between livestock production to equal or less than one.

However, the present dairying system in India could be classified into the following four types on the basis of landholding and style of animal keeping:

1.3.1 Rural smallholder dairying

In a country like India, cattle holding forms a part of a mixed farming system for manure, for cash crop production and milk for household consumption. Dairy animals are fed on grass, crop residues and cultivated fodder. Supplementary feeding is practised only when feasible.

1.3.2 Pastoral/Agro-Pastoral dairying

These systems are forest-based, and milk is often the most important subsistence item. Dairy production is generally associated with cropping, but nomadic pastoralists practice little or no agriculture and roam the land in search of grazing grounds and water (FAO, 2009). This type of pastoral dairying is still prevalent in the remote and hilly terrains of the north and northeast India.

1.3.3 Landless Urban dairying

In search of a profitable market, farmers migrate to nearby cities or towns which have given rise to this system of dairy activities. This kind of dairy activities located within and in proximity to the boundaries of cities are market-oriented productions, and dairy producers benefit from their closeness to markets. This production activity is based on purchased inputs and may encounter problems of feed supply and waste disposal. The concentration of milk production near urban centres may threaten human health.

1.3.4 Landless Rural or Peri-urban dairying

In recent years, particularly after the Second World War, pastoral/agro-pastoral dairy farmers have been trying to settle down leaving their nomadic ways of life. Such farmers are found around the rural foothill regions nearby forest areas where access to transport and communication facilities exist. Here it is to be mentioned that their earlier nomadic character leaves them with practically no

land. Therefore, they mostly depend on the forest for fodder required for their animals.

The post-liberalization market structures give rise to the possibility of some large-scale dairy enterprises. This increases the production system into five numbers of typology.

1.3.5 Present Position of World Milk Production

There is about 300 million rural and peri-urban poor in the world whose livelihoods depend on the daily income and nutrition they receive from milk production (World Bank, 2005). According to FAO, the world cow's milk production in 2014 stood at 652.35 million tonnes. The cow is the largest milk producing bovine in the world milk seconded by buffalo producing 652.35 and 107.76 million tonnes respectively. World milk production has been increasing at a steady rate.

Table 1.3 World Milk Production

(Million tonnes)

Year	Buffalo (%)	Cow (%)	Total
2009	88.86(12.57)	588.65(83.30)	706.69
2010	92.18(12.78)	598.98(83.02)	721.47
2011	95.83(12.97)	612.63(82.90)	738.96
2012	98.96(13.08)	627.28(82.90)	756.58
2013	102.42(13.39)	631.84(82.59)	765.06
2014	107.76(13.61)	652.35(82.39)	791.79

Source: FAO, various issues(Figures in Parenthesis show percentage value)

1.3.6 Milk Production in India

The Economic Survey 2015-16 presented on 26 February 2016 in the Parliament by the Union Finance Minister Shri Arun Jaitley emphasises that the Indian agricultural system is predominantly a mixed crop-livestock farming system, with the livestock segment supplementing farm incomes by providing employment, draught animals and manure. India ranks first in milk production, accounting for 18.5 percent of world production, achieving an annual output of 146.3 million tonnes during 2014-15 as compared to 137.69 million tonnes during

2013-14 recording a growth of 6.26 percent. Whereas, the FAOhas reported a 3.1 percent increase in world milk production from 765 million tonnes in 2013 to 789 million tonnes in 2014. (GOI, Press information, 2016)

Milk production in India is dominated by small and marginal landholding farmers and by landless labourers who, in the aggregate, own about 70 percent of the national milch animal herd. (Gupta 1983; 1987)

Milk production in India as analysed by Final AHD Report 2012 (GOI, AHD Final Report 2012), has increased tremendously during the last four decades; from around 20 million tonnes in the 1960s to 116 million tonnes in 2010-11. 'It grew at an annual rate of 4.4 percent during the 1990s, which however decelerated to 3.8 percent during 2000s. The per capita availability of milk more than doubled during this period, from 128 g/day in 1980-81 to 267 g/day in 2010-11 and 322 g/day by 2014-15. The significant growth in milk production during the 1980s and 1990s was due to Operation Flood which emphasised introduction of improved breeding technology and germplasm, along with the development of dairy cooperatives and horizontal integration of milk markets. Buffaloes, cows and goats contributed 53.4 percent, 43.2 percent and 3.5 percent to the total milk output in 2009-10, and their respective milk production in India has increased tremendously during the last four decades, from around 20 million tonnes in the 1960s to 32 million tonnes in 1980-81 and further to 116 million tonnes in 2010-11.'(GOI, AHD Final Report 2012). It grew at an annual rate of 4.4 percent during the 1990s, which however decelerated to 3.8 percent during 2000s. The total milk productivity has remained almost unchanged. In India, important milk producing bovines are buffalo, cow and goat. More than 50 percent of the milk produced in India comprises buffalo milk and cow shares around 45 percent of the total production in India. Table 1.4 depicts milk production in India by bovine.

Table 1.4 Milk production in India by bovine (in million tonnes)

Year	Total	Buffalo (%)	Cow (%)	Goat (%)
2009	116.42	59.76(51.3)	52.20 (44.84)	4.46 (3.83)
2010	121.85	62.35 (51.2)	54.90 (45.06)	4.59 (3.77)

2011	127.90	65.35 (51.1)	57.77 (45.17)	4.78 (3.74)
2012	132.43	67.68 (51.1)	59.81 (45.16)	4.95 (3.74)
2013	137.69	70.44 (51.2)	62.19 (45.17)	5.05 (3.67)
2014	146.31	74.70 (51.1)	66.42 (45.40)	5.18 (3.54)

Source: FAO, various issues. (Figures in parenthesis show percentage value)

1.3.7 Milk Production in North East India

The North-Eastern Region (NER) of India occupies about seven per cent of the total land area comprising the states of Assam, Arunachal Pradesh, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim and Tripura and shoulders four percent of total population of the country. More than half of the geographical area of NER is covered by forests, which are mostly under private or community ownership. This region is characterised by technologically lagged, low input-low output and mixed subsistence farming system, and is mainly dominated by smallholders. Table 1.5 shows the total production of milk in the region was 1,327 thousand tonnes, and state wise productions were Arunachal Pradesh 46, Assam 829, Manipur 82, Meghalaya 83, Mizoram 20, Nagaland 76, Sikkim 50, and Tripura 141 thousand tonnes in the year 2014-15.

Table 1.5 Milk Production in the NER States

State	Milk Production by year (in '000 tonnes)					
	2009-10	**2010-11**	**2011-12**	**2012-13**	**2013-14**	**2014-15**
Arunachal Pradesh	26	28	22	23	43	46
Assam	756	790	796	800	815	829
Manipur	78	78	79	80	82	82
Meghalaya	78	79	80	81	82	83
Mizoram	11	11	14	14	15	20
Nagaland	78	76	78	79	81	76
Sikkim	44	43	45	42	46	50
Tripura	100	104	111	118	130	141
Total	1171	1209	1225	1237	1294	1327

Source: Department of AH, D & Fisheries, Ministry of Agriculture, GoI

1.3.8 Milk Production in Assam

Assam in North East Region (NER) culturally is a bit of milk habit state. It produces the highest volume of milk in the region. This is the only State in NER with an excess processing capacity of milk. The Assam Dairy Policy 2008 states that 'the commercial dairy farms concentrate mostly in the urban /peri-urban areas due to easy access to market and accessibility to required concentrated feed inputs. Urban / Peri-urban commercial farming is mostly dominated by traditional dairy farmers of the Nepalese community. The farms are small to medium in size. Most preferred breeds in the region are Jersey and Holstein Friesian. The farmers, in general, follow a management style which is a blend of inherited traditional knowledge and modern scientific understanding. Besides Peri-urban farming, good numbers of commercial dairy farms are emerging in the rural areas too with the support of Government and Non-Government Organisation backed capacity building projects and financial assistance schemes.'(Assam, Dairy Policy 2008, 2008) The peri-urban region enjoys the nearness of Market; however, the dairy farmer of the distant interior area has to depend on the different agencies of milk marketing or private trader.

Table 1.6 Milk production in Assam

Year	Production in '000 tonnes
2009-10	756
2010-11	790
2011-12	796
2012-13	800
2013-14	815
2014-15	829

Source: Dept. of AH,D& Fisheries, Ministry of Agriculture, GoI

1.3.9 Milk Production in Morigaon District:

The milk production in Morigaon district was 26.89 million litres in the year 2010-11 and had increased to the level of 27.68 million litres in 2015-16. The average daily production of milk in Morigaon district was 73680, 62978, 75361, 68339, 79727 and 75834 litre in the year 2010-11, 2011-12, 2012-132, 2013-14, 2014-15 and 2015-16 respectively. It can be observed that the milk production in

the district is not steady, and abruptly comes down in some years. This is for the fluctuation of production in flood areas.

Table 1.7 Milk production in Morigaon District (in litre)

Year	Annual Production	Average production/day
2010-11	26893200	73680
2011-12	22987055	62978
2012-13	27506905	75361
2013-14	24943793	68339
2014-15	29100227	79727
2015-16	27679583	75834

Source: Dept. of AH & Vety., Assam

Table 1.8 Milk production by bovine in Morigaon district in 2015-16

In litre

Crossbreed cattle Milk	Indigenous cattle milk	Buffalo milk	Goat milk
10530024 (38.04)*	14793724 (53.45)	1226720 (4.43)	1129115 (4.08)

Source: Dept. of AH & Vety., Assam
*Figures in parenthesis show percentage share to the total production

According to Dept. of AH & Vety., Assam, the crossbreed cattle produces 10530024 litres of milk accounting 38.04 percent of total milk production in the year 2015-16. The production of milk in the district by indigenous cattle, buffalo and goat accounted to be 14793724, 1226720 and 1129115 litres sharing 53.45 percent, 4.43 percent and 4.08 percent respectively.

Area wise milk production in Assam of the different district have been calculated and presented in table 1.9. This shows that in comparison to coverage of the land area, the district of Morigaon produces reasonably higher volume and the production was 18.76 tonnes per sq. Km. in 2014-15. This shows that the district produces 18760 litre of milk per square Km. It is a significantly higher volume of milk per unit area. Only the districts Nalbari, Darrang, Bongaigaon, and Barpeta are producing more than Morigaon. They produce 30410, 24790, 21790, and 20440 litres per square Km of their land area respectively. That is, the milk

production activity in the district got more importance than those districts less milk per unit area. That is, Morigaon is the comparatively important district in Assam in regards to milk production.

Table 1.9 District wise annual milk production per sq km of land area in Assam in 2014-15

Sl. No.	Name of District	Total Milk (in litres)	Area (Sq Km.) approximate	Milk production in '000 Litre/Sq Km
1	Nalbari	31988957	1052	30.41
2	Darrang	39286575	1585	24.79
3	Bongaigaon	23819054	1093	21.79
4	Barpeta	46639431	2282	20.44
5	Morigaon	29100227	1551	18.76
6	Kanmganj	31435110	1809	17.38
7	Kamrup	68688863	4060	16.92
8	Dhubri	34687459	2176	15.94
9	Lakhimpur	33435519	2277	14.68
10	Hailakandi	19214220	1327	14.48
11	Chirang	15209772	1070	14.21
12	Jorhat	39489907	2851	13.89
13	Goalpara	25147064	1824	13.79
14	Sibsagar	34587284	2668	12.96
15	Nagoan	49763454	3973	12.52
16	Cachar	43444970	3786	11.47
17	Udalguri	22654688	2012	11.25
18	Sonitpur	54487846	5204	10.47
19	Dibrugarh	33819757	3381	10.00
20	Tinsukia	34965794	3790	9.23
21	Golaghat	32089370	3502	9.16
22	Dhemaji	26351672	3237	8.14
23	Baska	19655411	2457	8.00
24	Kokrajhar	22262805	3296	6.75
25	Karbi Anglong	44679794	10434	4.28

Sl. No.	Name of District	Total Milk (in litres)	Area (Sq Km.) approximate	Milk production in '000 Litre/Sq Km
26	N C Hills	16087130	4890	3.29
	Assam	832720776	77587	10.73

Source: Generated with data from Directorate Animal husbandry and Statistical handbook of Assam.

1.4 Review of Literature

The studies related to dairy development, *viz.*, milk production, milk marketing, processing of milk, animal wealth, animal agriculture, veterinary services *etc.* have received considerable attention from researchers, economists, politician, social workers, administrators, planners and policymakers throughout the world. Literature has been published both in book forms and in journals. It is not possible to study or to review all the works related to dairy farming. Depending on the time and cost factor, the present researcher has gone through various research studies, a few of which have been mentioned below.

On the study of Veterinary Medicine and Animal Keeping in Ancient India, Somvanshi (2006) observed that the origin of livestock wealth is as old as the evolution of human society. India is the land of cows since time immemorial. In the famous text, the *Arthashastra* (the science of economics) composed by *Kautilya*, the guide and political advisor of Emperor *Chandragupta Maurya*, a lot of information is available about different animals.

Rajendran & Mohanty (2004) in their research work 'Dairy Co-operatives and Milk Marketing in India: Constraints and Opportunities rural milk production and marketing' state that 'the 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**.'**

A study of dairy cooperative developments in India (Kumar *et al.* 2015) found that 'the role of dairy cooperatives in the procurement of milk and

providing necessary services to the dairy farmers make them distinct among the other channels of milk marketing. The dairy farmers selling the milk to the dairy cooperatives get fair prices of their product'. These cooperatives also 'provide financial security'. In the study, they also acknowledge as 'quiet evident' and 'important' that 'the role played by dairy farming in the sustenance of landless and poor people in the village economy'. 'Marketing of milk through the organised sector involves government and co-operatives agencies while the unorganised sector involves the private organisations. A major part of milk is marketed through the unorganised sector, and the organised sector has a meagre share.'

'Milk Marketing under Cooperative and Non-Cooperative Marketing Channels: Evidence from West Bengal' (Sarker and Ghosh 2010), a study carried out to 'investigate the price spread, marketing costs, marketing margins, marketing efficiency, and profit efficiency among market middlemen under cooperative and non-cooperative marketing channels in the domestic trade market of liquid milk in West Bengal' found that, 'although the inter-market (and intramarket) price variation for liquid milk under the cooperative marketing agency is not far from uniformity, and all marketing agencies under cooperative channels receive much lower abnormal profit per unit of milk as compared with non-cooperative channels, the cooperatives fail to provide much economic benefit, either to the producer or to the consumer, because of the burden of much higher fixed cost per unit of liquid milk.

In a comparative study of 'Marketing Efficiency of Dairy Products for Co-operative and Private Dairy Plants in Tamil Nadu' (Rangaswamy and Dhaka 2008) found, 'The marketing efficiency of the cooperative dairy plant for all dairy products has been observed relatively less than that of the private dairy plant, except toned milk'. The study has suggested that the cooperative dairy industry are to be developed in a 'sustainable manner' and 'the cooperative dairy plants should formulate long-term vision and strategy.' The study has also observed that 'value addition in dairy products should be done without compromising the quality and consumer-oriented market research and development should be accorded greater attention.'

The study 'Economic Analysis of Production and Marketing of Milk In Tamil Nadu' Producers' share was '65.96 percent of consumers price' (Edhayavarman, 2011) and the producers' share in consumers rupee was about 58 percent in Bihar (Singh, *et al.* 2012) for all categories of herd since all are marketing their milk through co-operatives only.

The research report of FAO (2009) reveals that more men than women own livestock, and households headed by men have larger livestock holdings than households headed by women. This is particularly true in the case of large animals.

Kumar & Staal (2010) in their study on Assam dairy sector stated that milk trading was the domain of men in Assam too.

Mburu *et al.* (2007) in their study in Kenya found that "Farmers were making much more profit from milk due to higher milk prices offered by itinerant traders" than organized sector procurer.

Naneenya *et al.* (2008) in their work entitled 'Dairy Performance and Intensification under Traditional and Economic Efficiency, Farm Plans in Uganda' found that in all dairy systems, quantities of manure applied are lower than those deposited on farms. It is also observed that sensitivity analysis on labour price shows that potential increase in wage rates more adversely affects the long-term sustainability of fenced and zero grazing systems compared to other systems.

Chawla *et al.* (2009) studied that 'Cow milk in India has a fat content of about 3 to 4 percent and milk-solid-not-fat (MSNF) content is about 8.5 to 9 percent. Buffalo milk has similar MSNF content, but the fat content is about 5-6 percent. Most of the packed milk sold in India is not natural but is reconstituted milk, which has been formulated to achieve a standardized percentage of fat and MSNF. In some countries, it is necessary to mention on packaged milk, if it is reconstituted milk. Not so in India, where it is necessary, by law, that standardized milk has 4.5 percent fat and 8.5 percent MSNF. Packed milk in India is therefore sold as standard, toned, double-toned or skim-milk, without mentioning whether the milk has come from a cow or buffalo'.

Lekasi *et al.* (1998) during their study 'Manure Management in the Kenya Highlands' assuming that all cows are lactating throughout the year and found the value of manure produced in 1996 was equivalent to 28, 33 and 34 percent of the annual milk production on small, medium and large farms respectively. The value of manure found to act as a form of security against risks represented and provided additional revenue to the farms.

The Dairy Policy, Assam (2008) views that for the profitability of dairy farms there is a need to develop livestock market and the market for cow dung based vermicompost and other.

Zwilling, (2008) in his research work 'Costs to Produce Milk in Illinois' found that in Illinois the cost of production of milk is higher than that of the net price received.

Karanja (2003) in his research work found that despite the high-intensity nature and high productivity, the smallholder zero grazing farmers had the highest cost of production per litre. He also makes an observation that labour is the most critical cost item in the zero grazing system of dairy farming in Kenya.

Eckles (1911) in his book 'Dairy Cattle and Milk Production' writes that 'sufficient and satisfactory labour is the main problem for a dairy farm'. This problem of satisfactory labour is found to be a common phenomenon even today as stated by the farmer during our survey in Morigaon district of Assam.

Cicek (2007) in their study on 'Effects of Some Technical and Socioeconomic Factors on milk production Costs in Dairy Enterprises in Western Turkey' found that the costs are influenced by some technical and socioeconomic factors in milk production, and the success in business administration depends on managing costs.

Singh and Sharma (2011) in their study **'**Measurement of Technical Efficiency in Dairy Sector of India'**,** observed that the technical efficiency of milk producers is influenced positively by the innovativeness, economic status and schooling, whereas negatively by the age of the milk producers.

Kumar and Steven (2010) observed through their study ‘Is traditional milk marketing and processing viable and efficient? An empirical evidence from Assam, India’ that raw milk trading and processing offers good opportunities for income generation to small-scale milk traders and processors.

Sirohi, *et al.* (2009) in their study ‘Formal Milk Processing Sector in Assam’ found that the created infrastructure in Assam is either mostly defunct or grossly under-utilized. The performances of the majority of milk plants are weak due to operational losses.

The literature reviewed on Milk Marketing in India Indian Society of Agribusiness, (2007) expresses that the unorganized sector of milk marketing has more public confidence than that of the organised sector on account of the freshness of their products, and poor willingness of consumers to pay the extra costs of formal processing and packaging.

A review study on ‘Common Milk Adulteration in Developing Countries Cases Study in China and Sudan’ concludes that ‘The high nutritional value and its relatively low cost compared with other protein sources’, ‘has made it form a significant part of the diet of many populations worldwide’ and ‘the global increased demand has made milk prone to massive levels of fraudulent activity’. They found milk adulterated with inferior, cheaper materials or hazardous chemicals, including pond water, reconstituted milk powder, cane sugar, urea, melamine, glucose, and detergents’ (Salih *et al.* 2017).

In the study of 'Business And Livelihoods in African Livestock Investments to overcome information gaps' Ugo Pica-Ciamarra, Derek Baker, Nancy Morgan, Cheick Ly and Simplice Nouala in 2014 said, 'Data on employment in livestock production and trade would also be of significant value to policymakers, as full-time jobs represent a major way out of poverty for the disadvantaged' and ‘The literature, with few exceptions, provides little information about employment creation by the various models of livestock production and marketing.' The study also observed, 'Investments are needed to quantify the employment opportunities that can be generated along different livestock value chains, including on farm, off-farm and nonfarm jobs'. The study suggests that data on employment in

livestock production and trade should be quantified. For the purpose, the 'Governments, regional institutions and the international community should jointly collaborate to collect and systemize critical livestock information' (Pica-Ciamarra, Ugo; *et al.* 2014).

Omore, *et al.* in a study report of International Livestock Research Institute and Food and Agriculture Organisation of the United Nations, entitled 'Employment Generation through Small-Scale Dairy Marketing and Processing' said, 'In the case of milk and dairy products, the existence of large informal markets for raw milk or traditional products is based on several key factors: the unwillingness of resource-poor consumers to pay the additional costs of pasteurisation and packaging, and the preference for traditional products, including raw milk'. The study further observed that data were 'not available to understand the broader sector level employment generation effects of the overall milk market, but only employment examples within certain selected market channels'. Therefore following the line of D. F. Taylor (2001), they 'aim in the analysis to assess the relative employment generated in the dairy market activities. Jobs created per unit of milk handled on a daily basis, which fits closely with standard measures of flow and capacity in the milk industry'. (Omore, *et al.*, 2004).

Meena *et al.* (2009) in their study on 'Impact of Dairy Cooperatives on Income and Employment Generation of Milk Producers on Alwar District of Rajasthan' found that average net income was significantly higher among the member group of Cooperatives than non-member group.

A comprehensive study of the Assam Dairy sector by International Livestock Research Institute (ILRI, 2007)comes to a conclusion on marketing front that the fresh milk is the most preferred liquid milk product and is generally consumed by most Assam-based consumers. Most urban and rural households usually or occasionally consume fresh milk, and the widely accepted practice is to purchase raw milk and boil it before consumption. (ILRI, 2007)

'In Assam, Nepalese introduced commercial dairy farming for which they were accorded recognition as "graziers" under the Assam Land Revenue

Regulation 1886 and "professional grazing reserve" lands were set apart for their cattle in all Assam valley districts.' (Dutta, 2017)

In the dairy sector, thrust has been given by almost all the Government in States on replication of Anand Model. Assam is unable to raise its structure alike in Gujarat or Karnataka or Punjab (Kumar, 2016).

The Literature mentioned above and other generates the perception that milk production not only provides employment to the smallholder, and landless farmers. It is also known that the genesis of professional dairy cattle farming in Assam was established culture prior to 1886. However, to date, a big research gap has been found in Assam investigating milk production and marketing.

1.5 The rationale behind undertaking this Study

The animal resources occupy an important position in the agricultural economy in Morigaondistrict. It provides a steady source of income to the people of the district enabling the improvement of the standard of living. The dairy sector serves as an effective avenue for solving unemployment and underemployment problem of the districts. It restricts the migration of rural poor and low-income groups from rural to urban areas in search of jobs. It is also the most significant employment generation area for the people of the study area (Upadhaya, 2012). It is the truth that the balanced development of the rural economy is possible with an even distribution of livestock among landless labourers and marginal farmers. Same is true to the Peri-urban area since it provides regular income to the farmer. The dairy development programme can improve the economic standard of men and women belonging to the economically disadvantaged group. It helps women and children of such groups to overcome the problem of malnutrition (Upadhaya, 2012). In Assam, generally, the marginal, small landholders and landless agricultural labourers rear the cattle and other livestock in an orthodox way possessing one or two animals per household along with a few fowls, ducks and pigeons *etc.* and in such a way sharing a large portion of total cattle population. These farmers mostly sell the excess milk, meat and eggs. Our study area includes rural as well as Peri-urban areas of Jagiroad Town, where people keep milch cattle as their primary source of livelihood producing a substantial amount of milk

(Upadhaya, 2012). National Bank for Agriculture and Rural Development (NABARD) reports that 'Dairy farming has tremendous potential in and around Jagiroad, Amlighat and Jhargaon where farmers can be motivated to form SHGs or co-operatives to take-up dairy farming. The dairy processing unit can be set up at the district level so that the value-added products such as butter, Ghee and Curd can be produced on a commercial basis, which will, in turn, enhance the income generation capacity of the farmers.' (NABARD, 2005-2006). This also indicates that animal resources can occupy an important position in the agricultural economy in Morigaon district of Assam. The presence of a system of Grazing land, particularly of Professional Grazing Reserve (PGR) confirmed that Assam had the historical background of professional dairy cattle farming. The climate of the State, area covered by forest and vegetation and particularly the presence of Grazing lands were in favour of cattle farming. Moreover, the support services by the Department of Animal Husbandry & Veterinary as well as Dairy Development Department were there to enhance milk production, productivity and to channelise milk marketing system. Yet, Assam had been dependent upon other State for fulfilling its milk demand.

Moreover as stated by many farmers, problems of dairy cattle farmers can be mentioned as follows:

i. The grazing area had srinked substantially thereby generating fodder shortages.
ii. The prices of cattle feeds are high.
iii. There is a shortage of veterinary facilities.
iv. Processing and Marketing facilities are not in the hand of dairy farmers. With a highly perishable commodity like milk, farmers have to depend on other processor or milk trader.
v. The processor or traders are not providing the remunerative price of milk to the farmer.

However, many cattle farmers had been still carrying the legacy of Professional Cattle Grazing and settled in different parts forming some milk pockets. One such milk pocket had been present in Mayong Block of Morigaon District in Assam.

The cattle farmers of Morigaon district were concentrated in the present Mayong block since the 1940s. They formed *Sitajakhala Dugdha Utpadak Samabai Samiti Ltd*. (SJDUSS) a Dairy Cooperative Society for the sake of their sustenance in the year 1958 and running to date satisfactorily.

However, in the last few years, the dairy farmers of the region repeatedly expressed dissatisfaction, stating that the cost of producing milk was too high in comparison to the price of milk. We enquired Sitajakhala Dugdha Utpadak Samabai Samiti Ltd. (SJDUSS) regarding farm gate price of milk. They stated that due to the lack of infrastructural facilities, on the one hand, the society is unable to reap the benefit of value addition and the other side that the cooperative had to supply procured milk at a price lower than that of its procurement price to Government aided processors. Amidst the situation, the cooperative had been paying the maximum possible price to the farmer. Therefore, it was in this backdrop the proposed study "Milk Production and Marketing in Assam: Problems and Prospects with special reference to Mayong Block of Morigaon District in Assam" is considered relevant.

1.6 Objectives

For the study of the Problems and Prospects of Milk Production and Marketing in Assam, it is necessary to study the level of production, level of income and employment. If the products are not marketed optimally farmers may not get a remunerative price, without remunerative price net income cannot be generated without net income livelihood can't be kept secured and thereby employment. On the other hand, milk is a perishable commodity; produced twice daily farmers cannot afford to go out twice for marketing, therefore, as a facilitator of the dairy farmer it is inevitable to study the role of Dairy Cooperatives. The result of these two sets of objective can provide means to assess the state of affairs for the improvement of dairy farming in Assam.

Therefore, for this study the objectives taken are as follows:

1. To study the level of milk production, income and employment in the study area

2. To Study the Milk marketing and role of Dairy Cooperatives
3. To assess the state of affairs for the improvement of dairy farming

1.7 Hypotheses

During preliminary discussions, numbers of the farmer of the study area have stated that due to high cost and low return, the dairy farming no longer remains a profitable business and on the other hand, some farmers seemed quite satisfied with the accruing return. Farmers have been pursuing dairy farming for a livelihood. Average income level always affects livelihood. Therefore the cause of dissatisfaction, thereby disincentive will be investigated through average or mean income.

Two hypotheses will be tested in the course of study:

1. High cost and low return from the production of milk creates disincentives in the occupation of dairy cattle farming.
2. There is ample scope for Employment Avenue in Milk production and marketing.

Not only the Morigaon district but whole the state of Assam has an unemployment problem. The possibility of expansion of dairy farming activity can provide Employment Avenue, and the possible level of employment would identify the scope.

1.8 The scope of the Study

Dairy Development plays a vital role in the economic development of the districts of Morigaon and Kamrup Metro. Morigaon is one of the backward districts in Assam. The district experiences low industrialisation, low agricultural production and productivity, low level of human resource development, low per capita income, population explosion, unemployment and underemployment, low capital formation and low standard of living. The district can go ahead with the dairy development programme to solve the issues mentioned above.

There exists a sizeable low-income group of the population with or without land holding amidst the population of the high-income bracket with other business or service. Dairying is not only one of the means of solving the unemployment problem of peri-urban areas it also helps in fulfilling the demand for milk in town and city areas comprising Guwahati. The unfulfilled demand for milk in the region can further generate employment avenues through milk and milk product business. The scope of the study can be summarised as follows:

1. It will help in raising income and employment avenues to the small, marginal and landless farmers of the Study area.
2. Milk is a nutritious food and as such, the dairy development helps in reducing the problem of malnutrition.
3. The study area enjoys the nearness of Guwahati city, Morigaon and Nagaon town as well as developing township area of Jagiroad with significant demand for milk and milk product to market the surpluses.

1.9 Chapter Plan

I. Introduction.
II. Data collection and Methodology.
III. Production, Employment and Income from Dairy Farming.
IV. Marketing of Milk.
V. Problems and Prospects of dairy farming in Assam.
VI. Summary of Findings, Conclusion and Recommendations

1.10 References

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