Milk Production and Marketing in Assam: Problems and Prospects, with special reference to Mayong Block of Morigaon District in Assam

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DECLARATION

I, **Bishnu Prasad Upadhaya**, do hereby declare that the subject matter of this thesis is the record of work done by me, that the contents of this thesis did not form the basis of the award of any previous degree to me or to the best of my knowledge to anybody else, and that the thesis has not been submitted by me for any research degree in any other University/Institute.

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ACRONYMS

AEP	Average Engagement of Persons
AH & Vety.	Animal Husbandry & Veterinary
AHD	Animal Husbandry & Dairying
AI	Artificial Insemination
ALDA	Assam Livestock Development Agency
ALPCO	Assam Livestock and Poultry Corporation
BCCP	Bovine Contagious Pleuropneumonia
CAGR	Compound Annual Growth Rate
CD Block	Community Development Block
CSO	Central Statistical Organisation
DHH	Dairy Household
EBA	Employment Based Analysis
FAO	Food and Agriculture Organization
FSB	Frozen Semen Bank
GM	Gopal Mitra
GOI	Government of India
GP	Gaon Panchayat
GVA	Gross Value Added
HF	Holstein Friesian
ICA	International Co-operative Alliance
ICAR	Indian Council of Agricultural Research
ICDP	Intensive Cattle Development Project
IFS	International Food Standard

ILRI	International Livestock Research Institute
KDCMPUL	Kaira District Cooperative Milk Producers Union Limited
LOC	Letter of Credit
LPD	Litre per Day
LPG	Liquid Petroleum Gas
MSNF	Milk-solid-not-fat
NABARD	National Bank for Agriculture and Rural Development
NDDB	National Dairy Development Board
NER	North-Eastern Region
NFSA	National Food Security Act
NGO	Non Government Organisation
OBC	Other Backward Caste
PGR	Professional Grazing Reserve
PPP	Public-Private Partnership
RAIC	Regional Artificial Insemination Centre
RCC	Reinforced Cement Concrete
REP	Relative Employment generated
RPR	Residues to Product Ratio
SC	Scheduled Caste
SHG	Self Help Group
SJDUSS	Sitajakhala Dugdha Utpadak Samabai Samiti
SNF	Solid Non Fat
ST	Scheduled Tribe

TMSS	Town Milk Supply Scheme
VGR	Village Grazing Reserve
WAMUL	West Assam Milk Union Limited

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.

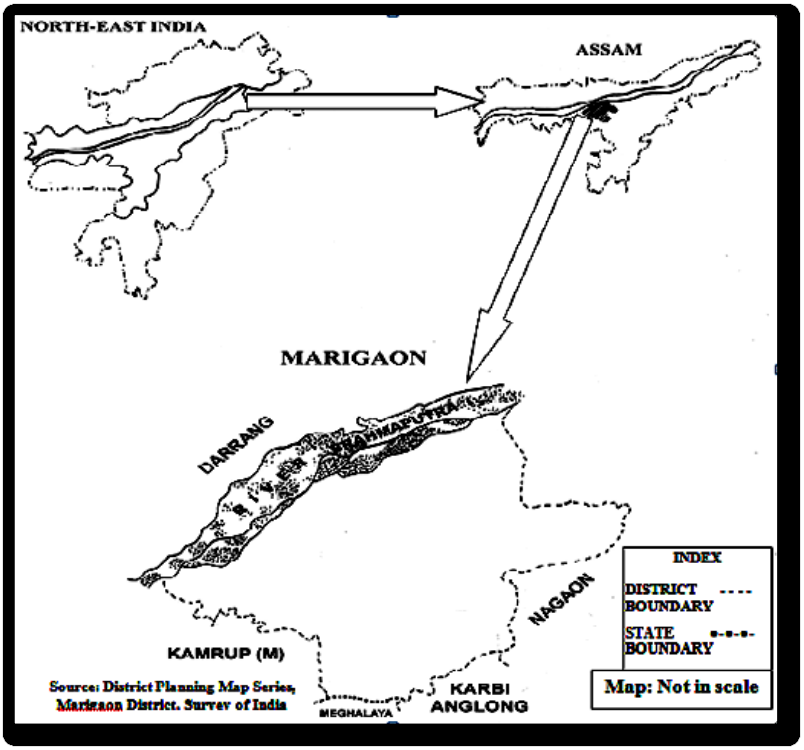
The state of Assam is divided into six agro-climatic zones based on factors like topography and terrain, ecology and climate, influencing land use pattern, crop-mix, cropping intensity and crop productivity and animal husbandry (Bhowmick, B.C.*et al.* 1999)

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

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CHAPTER – II
DATA COLLECTION AND METHODOLOGY

2.1 Introduction

Study on the 'Milk Production and Marketing problems and prospects in Assam with special reference to Mayong Block in Morigaon District' comprised of three sets of objectives and two hypotheses that we mentioned in Chapter I. Milk production activities has been regarded as the means of livelihood for the small and marginal holder and lend fewer people. Therefore, the investigation of production, income and employment are the basic issues of our study. Milk production and productivity, besides other entrepreneurial resources and procedure, is dependent upon the number of producing animals, their breed and health. The responsibility of animal health, breed development and progeny generation lies with the Department of Animal Husbandry and Veterinary (AH & Vety.), Departmental activities in regards to generating support services for dairy farming has been described briefly. Secondly the level of income and character of dairy farming as a secure and sustainable avenue of employment both depends on the realisation of proper return, and in turn, the returns depend upon the price of milk. Price of milk that farmer get depends on the structure of marketing. In the last hundred years, processing sector had been playing a much important role in milk marketing throughout the world. Developments in processing need a large volume of output of raw milk and capital. The scenario of milk marketing throughout the world is dependent on marketing institutions like producers' organisations or cooperatives. With the inception of the Dairy Development Department in Assam, formations of proper cooperatives were envisioned for the development of dairy sector in Assam (Government of Assam, 1999).In this regard, the study on cooperative has been the basis for the study of milk marketing. Dairy Development Department of Assam had installed a number of milk processing and preserving facilities at different places in the state. The installed plants and machinery form the important infrastructure of milk marketing. We had studied about those infrastructures thoroughly and discussed

briefly subsequently. For successful marketing of milk, the consumer's response for milk and milk product is very much necessary. We, therefore, structured data collection so as it fulfills our objectives of the study.

2.2 The scheme of data collection

To study, the marketing of milk, it is necessary to have a marketable surplus of milk in that area. The subsistence cattle rearing do not produce a marketable surplus. As such, to study 'milk production and marketing, its problems and prospects' a survey was conducted of 'milk pockets and milk shed areas' in the district of Morigaon. The survey observed that surrounding Mayong Block office covering the area within 15 km radius represents the milk pocket and milk shed area. The milk shed area also has an organisational structure for milk marketing, a continuously running Dairy cooperative society dealing in average milk volume 15000 litres per day at present.

The study is based both on primary and secondary data. The secondary data were collected from government publications, books, journals, newspapers, veterinary offices, National Dairy Development Board, Animal Husbandry & Veterinary Department, and others. Apart from this information, other necessary information was also gathered from the World Wide Web.

The secondary source of data that would help us to analyse milk production but the cost of milk production is not available. The 19th Livestock Census data so far published are not available on Blockwise,and the Census data limit themselves to the district level. Therefore, a systematic plan is made for a primary survey to collect the relevant data by visiting the households with a structured questionnaire in selected villages of Mayong CD Block. This method of data collection is not possible for an individual to cover the entire dairy households in the study area and the sample size must be kept at a modest level. This, in benefit, provides the opportunity for a comprehensive and complete study on family size, farming practices, inputs, income, expenditure, *etc.*

Moreover, for studying milk marketing, it was inevitable to study cooperative marketing. For the purpose the study was made on the genesis of cooperative system, inception of cooperative system in India, necessity of dairy

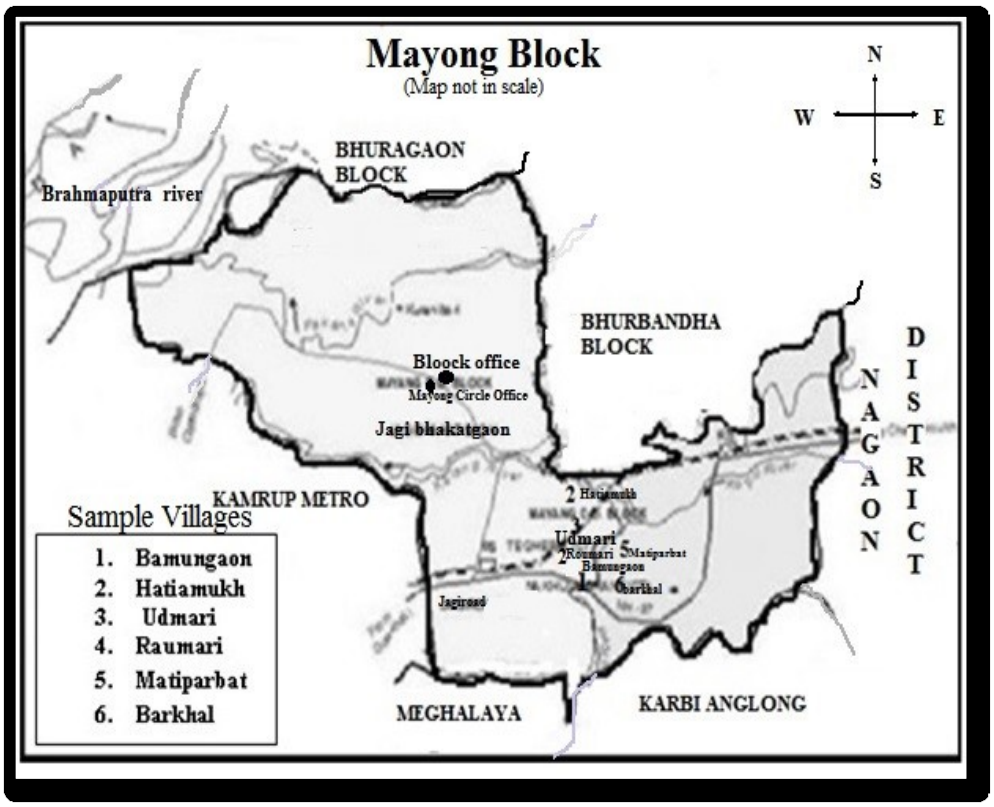
cooperatives, beginning of *Amul* (KDCMPU) and the beginning and structure of *Sitajakhala Dugdha Utpadak Samabai Samiti Limited* (SJDUSS), a leading dairy cooperative society in Mayong Block, under the study area. SJDUSS for its practical experience in procuring, processing, as well as marketing and its information was helpful to fulfill the objectives of the study.

2.2.1 Selection of sample villages

In the district of Morigaon, there are seven Community Development Blocks namely Bhurbandha, Laharighat, Mayong, Mairabari (Part), Kapili (Part), Batadraba (Part) and Dulongghat (Part). Among the seven blocks, Mayong Block has the highest number of villages and at present dairy farming is mainly concentrated in this block. National Bank for Agriculture and Rural Development (NABARD) reports that 'Dairy farming has tremendous potential in and around Jagiroad' which lies under Mayong Community Development (CD) Block; it also states 'Dairy processing unit can be set up at district level so that the value-added products can be produced on a commercial level, which will, in turn, enhance the income generation capacity of the farmers.' (NABARD, 2005-2006). Therefore, we decided to focus on the dairy cluster around Jagiroad under Mayomg CD Block in the district of Morigaon. In the area, Bamungaon (popularly known as Amlighat) has the highest concentration of Dairy Household (DHH). This was the village where the first formal dairy cooperative was formed in the state of Assam. The Dairy cluster of Mayong Block lies at Amlighat and surrounding villages. Moreover, the success of *Amul* evidently spells that to study marketing of milk with numbers of small holdings; necessitates studying cooperative milk marketing in the area.

At the initial stage, we met farmers and office bearers of SJDUSS, we were requested to incorporate villages so that all the sections of the society *viz.* SC, ST, OBC, minority as well as newly established and old farmers all would come into the coverage of the study. Therefore, we decided to select Bamungaon as the central village of our data collection. Taking Bamungaon at the centre, the primary data have been collected from six villages comprising Bamungaon, Hatiamukh, Udmari, Raumari, Matiparbat and Barkhal.

Map 2-1 Sample Villages in Mayong Block



2.2.1.1 Bamungaon (Amlighat)

Bamungaon village is situated 18 km away from Block office of Mayong and 31 Km away from district headquarter Morigaon. The National Highway passes through this village. It is in the Gova Gaon Panchayat (GP). The total geographical area of the village is 179.35 hectares. According to Census 2011 information, Bamungaon has a total population of 1,498 people, and the proportion of the female population is 47.26 percent. SC and ST population accounts for 1 percent each. There are 326 houses in the village, and the three fourth of the household belongs to the conventional dairy farmer. Jagiroad is the nearest town to Bamungaon which is approximately 9 km away. 72 percent of the total households depend on dairy cattle farming for their livelihood.

2.2.1.2 Hatiamukh

It is situated 8 km away from Mayong Block office and 25 km away from district headquarter Morigaon. Hatiamukh village falls under the Baghjap Gaon Panchayat. Jagiroad is the nearest town to Hatiamukh. The total geographical area

of the village is 323.71 hectares. According to Census2011, Hatiamukh has a total population of 1,644 peoples comprising ST and OBC. There are 360 houses in the village of which 11.66 percent were dairy households.

2.2.1.3 Udmari

Udmari village is located in Mayong Block of Morigaon district in Assam, India. It is situated 10 km away from CD Block office and 30 Km away from district headquarter Morigaon. The village has to depend on two different GPs, Gova and Baghjhap for its local planning. Jagiroad is the nearest town to Udmari which is approximately 6 Km away. The total geographical area of the village is 231.93 hectares. According to Census 2011 information, Udmari had a total population of 1,738 comprising 48.33 percent of the female population with population belonging to SC and ST were 13 percent and 36 percent respectively. There were 364 houses, and the numbers of dairy households were 12.91 percent.

2.2.1.4 Raumari

Raumari village is situated 16 km away from Mayong block and 36 Km away from district headquarter Morigaon underDeosal Gaon Panchayat. Jagiroad is the nearest town to the village. The total geographical area of the village is 289.12 hectares. According to Census 2011 information, Raumari has a total population of 1388, and the female populations account for 48 percent, SC 3 percent, ST 20 percent. There are 277 houses in Raumari village, of which 15 were dairy houses.

2.2.1.5 Barkhal

Barkhal village is situated 32 Km away from sub-district headquarter Marigaon and 32 Km away from district headquarter Morigaon. Barkhal is in Nellie GP under Morigaon Circle but in Mayong CD Block. Jagiroad, approximately 10 km away is the nearest town to Barkhal. The total geographical area of the village is 155.43 hectares. According to Census 2011 information, Barkhal has a total population of 1,776 peoples comprising 48.42 percent of the female. There are about 355 houses in Barkhalvillagecomprising more than one third SC population. The numbers of dairy household in the village were 13.

Table 2.1Sample villages and numbers of sample Dairy Household (DHH) under the study area

Name of Village	Bamungaon	Hatiamukh	Udmari	Raumari	Matiparbat	Barkhal	Total
Total number of Household	326	360	364	277	480	355	2162
Population	1498	1644	1738	1388	2597	1776	10641
Female percentage	47.26	49.63	48.00	48.00	51.00	48.42	-
SC percentage	1.00	4.00	13.00	3.00	0.00	33.00	-
ST percentage	1.00	42.00	36.00	20.00	0.00	0.00	-
No. of DHH	235	36	47	15	46	13	392
Percentage of DHH to total household of sample village/ area	72.08	10.00	12.91	5.41	9.58	3.66	18.13
No. of sample DHH	103	15	21	6	20	6	171
Percentage of sample to total DHH of sample village	43.83	41.67	44.68	40.00	43.48	46.15	43.62

Source: Worked out with Survey data and Census2011data

2.2.1.6 Matiparbat

Matiparbat village is located in Morigaon Circle and Mayong CD Block. It is situated 20 Km from Block office, away 26 km from Circle Office, and district headquarters Morigaon. Morigaon is the nearest town to Matiparbat which is approximately 26 Km away. The village is in Dakhin Dharamtul GP. The total geographical area of the village is 151.97 hectares. According to Census 2011 information, Matiparbat has a total population of 2,597 peoples. The village is inhabited by the Mohammedan households. The proportion of the female population is 50.94 percent. There are about 480 houses in Matiparbat village of which 46 were DHH.

2.3 Data collection

To collect the Data from the villages described in previous sub-sections, the households which keep animals with the intention of earning income from the sale of milk were attributed as Dairy Household (DHH). At the first visit to the villages, adopting purposive sampling to full the specific criteria that the household selected rares animal for the purpose of producing and selling milk. DHH was enumerated with the name of the head of the household. It was decided to select170 households with the help Lottery. In the process 103, 15, 21, 5, 20 and 6 samples were selected from the villages Bamungaon, Hatiamukh, Udmari, Raumari, Matiparbat, and Barkhal respectively. We finally decided to take one extra sample household from ST village Raumari so as the ratio of representation becomes uniform from DHH of all the social category of population. Thus, the total sample size became 171 and 43.62% of DHHs found representation.

2.3.1 Cost of Milk Production

The factor costs of production always play a vital role in any kind of production process. Production and marketing of milk are also similarly dependent on the cost of production, the cost of production determines how profitable would be the prevailing market price and in turn, has its effect on Income and Employment from dairy Farming or the business of milk production. Therefore, the investigation of the cost of milk production was the most important part of our study.

The expenditure incurred on feeds, Fodder, paid labour, family labour, depreciation on fixed assets, equipment and cost of miscellaneous recurring expenses are the components of cost of milk production. Data on the prices of different inputs were calculated on the basis of prevailing market prices. The cost of production has been worked out as:

$\sum C = c_1 + c_2 + \cdots + c_n$, where $c_1, c_2, \ldots, c_n$ are the cost components of milk production.

$\sum X = x_1 + x_2 + \cdots + x_n$ $\Sigma X = x$, where $x_1, x_2, \ldots, x_n$ are total milk production of sample household.

Therefore, the average cost of production is given by $\hat{C} = \frac{\Sigma C}{\Sigma X}$

2.3.1.1 Components of Cost

The actual components used in the study area were considered for the evaluation of components of costs; for the purpose, the process described in the 'Manual Animal Husbandry Statistics' (GOI, 2011) had been kept in mind. The descriptions of the components are given below.

a. Feed and fodder cost

Generally, at the time of cost calculation, feed and fodder are not differentiated. But in practice feed and fodder has different meaning among the dairy cattle farmers in Assam and other parts of India. Various kinds of grains, cereals and coarse pulses, oilseeds and other seeds of floras and product and by-products thereof used as animal diet are feed. It does not contain leaves and stems. On the other hand, all the body of floras either dried or green used as animal diet is fodder. Therefore, we have collected data on feed and fodder separately and added up at the time of the final calculation.

The value of feed and fodders fed to milch stock are obtained by the sum of the product of quantities and their corresponding prevailing market price. For feeds purchased from the market, the cost has been worked out on the basis of present market rates at which these are purchased. In the case of homegrown feeds and fodder, the cost of the quantities fed to animals is worked out using the prevailing present market prices. The quantity of feed and fodder taken on the basis of information received from households.

b. Cost of labour

It includes paid as well as unpaid (family) labour cost on stall operations. The actual amount paid to the different types of hired labour is taken as paid labour. For family labour other than the entrepreneur, the cost is worked out on the basis of actual working hours and prevailing local wage rates. However, the entrepreneurs were regarded as profit claimant. Wherever hired labour was provided with other facilities, the money expended to provide those facilities is added upon cost.

c. Cost of veterinary care

Average expenditure incurred by DHH on veterinary facilities, such as Artificial Insemination (AI), service charge by the facilitator, expenditure on medicines, vaccines, *etc.* have been summed up to arrive at the cost of veterinary care.

d. Depreciation on assets and equipment

It includes the depreciation on items like an investment in the housing of animals, and equipment such as feeding troughs, chaff cutter, milking cans, *etc.* This component is calculated on the basis of the average price of the article at the prevailing market rate.

e. Miscellaneous expenditure

It includes recurring expenditure like the cost of repairs, purchase of ropes, electrical charges for the stall and other utensils *etc.*

f. Interest on capital

It is generally worked out at the prevailing bank rates of interest per annum for fixed and working capital.

Among the above-mentioned cost items, item c, d, e, and f are summed up as contingencies at the time of final calculation.

2.3.2 Data on production and income

In our study areas, we have observed that the dung produced do not have its economic value except the farmer's household production of biogas for their own use. This part is not monetised hence the data were not available. Therefore, the incomes of the farmer in the study area were of two types, income from milk production, and income from animal production.

2.3.2.1 Income from milk production

Milk production data were collected according to the daily production of milk during the period of the survey. Data on home consumption of milk were also recorded separately and added with the milk sale to arrive at the total production of milk of farming household. For the cross reference, we had checked cooperative passbook for those household associated with the cooperative. By

multiplying the output of milk and the price of milk, we arrived at the daily income of the farmer household.

2.3.2.2 Income from animal production

Income from dung generally is not the source of income in this area. The household biogas plants are the only means to utilise dung economically. As such the value of fuel produced does not form a part of the nominal income. The income on account of sale of cattle either productive or unproductive has been calculated as Animal production and data were collected on an annual basis.

2.3.3 Data on value addition

During the study, data on value addition and the product has been collected from a DCS, SJDUSS to judge whether it can be one of the components of a better marketing strategy.

2.3.4 Data on consumers view

Another set of primary data have been collected from the regular milk consumers of Kamrup Metro area which is the biggest milk market with future prospects to assess the possibility of further market expansion. Data were collected from 100 milk customers of SJDUSS in Guwahati city supplying questionnaires to them.

2.3.5 Data on farmers' price

Similarly, data on the price paid to dairy farms by SJDUSS, and price received by it from the Government patronised milk processing institutions since 1980 were collected from the record books of SJDUSS, after minute observation of records *viz.* balance sheet, bill register, challan[2] register, duplicate challans *etc.*

2.3.6 Data on Government support services

Services provided by the government for veterinary care, breed development *etc.* by the Animal Husbandry & Veterinary department are attributable to support services for better production and the services as well as infrastructure created vis-à-vis milk processing and preserving infrastructure by the Directorate of Dairy

[2] Receipt for payment or delivery.

Development Department are attributable to support services for marketing. We collected the information on those support services from secondary sources and discussed in the relevant section.

2.4 Data on employment

Secondary data on employment of milk marketing as well as dairy farming is not available in any level *viz.* Block, District and State. During the review of the literature, it was seen that a joint study by the International Livestock Research Institute (ILRI), Market-oriented Smallholder Dairy Project and the FAO, Animal Production and Health Division'Employment Generation through Small Scale Dairy Marketing and Processing had applied employment based analysis (EBA). For the analysis of employment generation in dairy marketing, they had considered 'jobs created per unit of milk handled on a daily basis'. The analysis was first proposed by Taylor (2001) and was 'simply a tally of the number of jobs created by some economic activity per some defined units of output' (Omore, *et al.*, 2004). Similarly, in our study to analyse an employment avenue's daily average of jobs created on a farm per unit of milk produced annually and in milk marketing, jobs created per unit of milk handled on a daily basis have been considered. The sum of jobs created on the farm and in marketing would be the total employment.

The number of total persons engaged in milk production activity of the sample household was determined from the survey data. We also have the volume of milk production of sample households. If Total volume milk production be $TMPP_L$ in period L and Regular Average Engagement of Persons in milk production activity during that period be REP. The constant of Relative Employment generated (RE_P) by one unit of output of milk is given by

$$RE_P = \frac{REP}{TMPP_L} \sim \frac{\text{Regular Average Engagement of Persons on farms}}{\text{Total Milk Production}}$$

Taking the above constant(RE_P)the approximate number of total farm level direct employment through dairy cattle farming is given by:

A. Total on-farm Employment on milk production

$\sim$ (Total production of milk $\times \mathrm{RE_P}$)

Similarly, the total milk handled daily, and the number of jobs created by the dairy cooperative society of the study area will be considered to determine the unit of employment per unit of milk handling.

$$\mathrm{RE_M} = \frac{REP_M}{\mathrm{TMHD}} \sim \frac{\text{Regular Average Engagement of Persons in marketing}}{\text{Total Milk handled per day}}$$

B. Total off-farm direct Employment through milk Marketing

$\sim$ (Total marketable production of milk $\times \mathrm{RE_M}$)

Finally (A+B) provide an approximate level of direct employment generation through milk production and marketing.

In this way, the sum of employment generated on the farm and in marketing would indicate the total employment. The employment generated in Morigaon district and in Assam were calculated with the help of this method, wherever the purpose of analysis calls for.

2.5 Methods/technique of analysis

From the questionnaires, we transferred data to spreadsheets (Microsoft Excel) in 171 rows (one row for each household) and varying columns. Columns were shaded with different colours to facilitate for picking them up to transfer to other sheets for constructing Bar Diagram, Pie Charts, Histograms, Trendlines and calculating percentages, ratios *etc.* as the requirement of analysis called for. The information processed with the help of appropriate statistical tools in Microsoft Excel. Besides MS Excel, we took the help of SPSS for the following analysis.

Secondary Data are also analysed with the help of Graphs, Diagrams, and ratios for Compounded Annual Growth rate and other.

2.5.1 Test of Means on independent samples

For the Comparison of means, we have taken the help of SPSS the test runs on statistical principle by computing the means in the two samples: X_{A} and X_{B}. Where, $d_{iA}=|x_{iA} - \bar{x}_A|$and $d_{iB}= |x_{iB} - \bar{x}_B|$ represent the absolute deviations of the sample values around the respective mean. Sample means and sample variances were given by $\bar{d}_A$, $\bar{d}_B$, and, v_A , v_B respectively with the *pooled*

variance, v_p for the two samples, with n_A and n_B cases, a weighted average of the individual variances is given by

$$s_p^2 \equiv v_p = \frac{(n_A - 1)v_A + (n_B - 1)v_B}{n_A + n_B - 2}$$

The test Statistics for the *t*-test is

$$t^* = \frac{\bar{d}_A - \bar{d}_B}{s_p \sqrt{\frac{1}{n_A} + \frac{1}{n_B}}} \sim t_{n-2} \ ;$$

SPSS provides a precise result. (P & de Sá, 2007)

2.6 Limitations of Data

Employment data on milk production activities are not available at any level *viz.* National, State or district. The farm level employment data estimated with the help of constant of relative employment generated (RE_P) would inherit the limitations associated with the sample survey itself.

Professional Milk production through dairy farming until recent had been considered the profession of uneducated, unskilled laymen and resource poor's business. Farmers do not have a convention to keep a book for their day to day business. The tendency of not divulging the basic information relating to the facilities they received from the government or from cooperative and even the status of income, made data collection more laborious. The farmers were able to provide information about expenditure on hey only on an annual basis, whereas the milk production on daily, feed expenditure for ten days by some and on monthly by some other. Again, the farmers themselves are confused about the part of expenditure attributed for different factors involved, *e.g.,* the payment made to the labour employed has many purposes, *i.e.* working in the farm, fetching fodder from forest and others. The farmers depending on the family labour to run the farm, if purchases green fodder, counts it as contingency expenditure. Therefore, utmost care was taken to smoothen the data on the required scale before filling up the questionnaires.

2.7 References

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CHAPTER –III
PRODUCTION, EMPLOYMENT AND INCOME FROM DAIRY FARMING

3.1 Introduction

Milk production in developing countries has been regarded as a tool to combat malnutrition and poverty alleviation. In ancient India, milk is thought to be *Amrit* or nectar of among all the food items. 'Cattle raising is also a component of many farming systems that are not mainly livestock-oriented since cattle utilize crop by-products and provide a store of capital and a source of draft power', manure and dietary(Alderman *et al.* 1987). At present, the utility of cattle as draught power has been reduced and it is generally used on the fragmented plots of land. Therefore, the cattle rearing at present naturally have become the activity of milk production, meat production, biogas and bio-manure production. Recently the biopesticide prepared by using cow urine is becoming popular. This generates the scope of varieties of production in the process of dairy farming generating the possibility of more employment and income.

In Assam, there are different directorates for animal husbandry and dairy. Department of Animal Husbandry and Veterinary (AH & Vety.) looks after the animal health and breeding *etc.* This is attributive to production and productivity. The post-production activity has been the responsibility of the Department of Dairy Development and is attributive to marketing. The infrastructures under the Department of AH & Veterinary forms the support services of the production side. However, the infrastructure created under the Department of Dairy Development, *viz.,* processing plant, chilling *etc.* and the whole system of dairy cooperatives forms the support services of the marketing side.

The milk production of PGRs had encouraged the Government of Assam at the initial stage to take up dairy development programme in the state (Dutta, 2011,2017). Which can be regarded as the genesis of Department Dairy Development in Assam. Therefore, it is necessary to study the graziers, how problems of dairy cattle have been evolved.

This chapter deals with the production side of milk; worldwide milk production, milk production in India, milk production and activities of milk production in Assam with its genesis, description of grazing reserves in Assam, departmental activities and support services created in the state and in Morigaon district, milch animals in Assam, milk production in Assam and in Morigaon district and in study area. The marketing side infrastructures and support services comprising cooperatives and genesis of cooperative are planned to discuss in the next chapter, the milk marketing.

3.2 World Milk Production

'Throughout history, in search of socioeconomically feasible and nutritionally superior sources of food, man has domesticated some milk-producing dairy species, and selected and bred them to produce large volumes of milk in excess of the necessary amounts needed to nourish the animal's own offspring. This surplus production of milk beyond nourishing the young has become the foundation of the modern dairy industry.' (Park and Haenlein, 2006).

In the recent past, the share of world milk production in developing countries have been increasing. World milk production has increased by more than 50 percent in the last three decades, 'from 500 million tonnes in 1983 to 769 million tonnes in 2013' (FAO 2017). Most of this increase is of the rise in the number of milk-producing animals rather than the increase in productivity. The countries of the developing world bear 'a long tradition of milk production'. In ancient India since *Vaidic* period cattle raising and milk production was the main occupation. Cattle raising for milk has been the tradition of Indian sub-continent. The living standard began to go up with time; this led to the interest of rural masses towards animal husbandry making India largest milk producer in the world. Most of the countries depend on bovine and small ruminants. In some places, other animals are also kept for milk. The USSR is known to be the milk deficit region where reindeer are also milked during late summer and autumn.

FAO assesses present world milk production facts as follows: (FAO 2017)

i. Since the 1970s, most of the expansion in milk production has been in South Asia, which is the main driver of milk production growth in the developing world.

ii. Milk production in Africa is growing slower than in other developing regions, because of poverty and in some countries adverse climatic conditions.

iii. The countries with the highest milk surpluses are New Zealand, the United States of America, Germany, France, Australia and Ireland.

iv. The countries with the highest milk deficits are China, Italy, the Russian Federation, Mexico, Algeria and Indonesia.

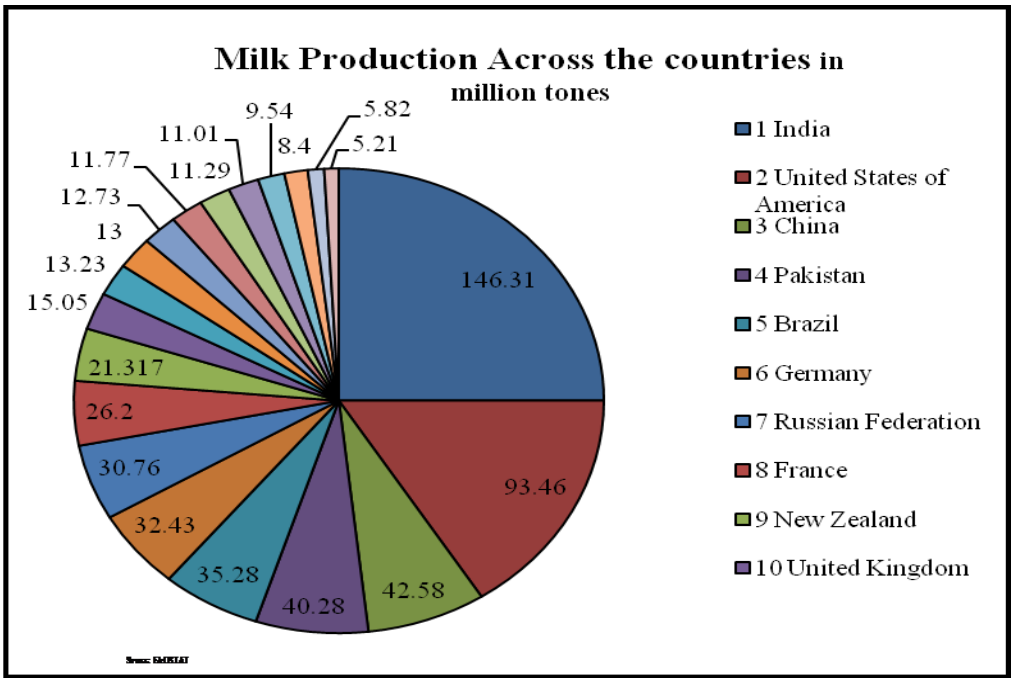
Table 3.1Milk Production across the countries

Sl. no	Country	Milk production in Million Tonnes					
		2009	2010	2011	2012	2013	2014
1	India	116.43 (16.48)	121.85 (16.89)	127.90 (17.31)	132.43 (17.50)	137.69 (18.00)	146.31 (18.48)
2	United States of America	85.88 (12.15)	87.47 (12.12)	88.98 (12.04)	91.01 (12.03)	91.28 (11.93)	93.46 (11.80)
3	China	40.39 (5.72)	41.16 (5.71)	41.80 (5.66)	42.64 (5.64)	40.51 (5.30)	42.58 (5.38)
4	Pakistan	34.36 (4.86)	35.49 (4.92)	36.66 (4.96)	37.86 (5.00)	39.11 (5.11)	40.28 (5.09)
5	Brazil	29.23 (4.14)	30.86 (4.28)	32.25 (4.36)	32.45 (4.29)	34.41 (4.50)	35.28 (4.46)
6	Germany	29.20 (4.13)	29.65 (4.11)	30.36 (4.11)	30.71 (4.06)	31.36 (4.10)	32.43 (4.10)
7	Russian Federation	32.57 (4.61)	31.84 (4.41)	31.64 (4.28)	31.75 (4.20)	30.52 (3.99)	30.76 (3.88)
8	France	23.52 (3.33)	24.25 (3.36)	25.29 (3.42)	24.88 (3.29)	24.57 (3.21)	26.20 (3.31)
9	New Zealand	16.48 (2.33)	17.01 (2.36)	17.34 (2.35)	19.13 (2.53)	19.47 (2.54)	21.32 (2.69)
10	United Kingdom	13.85 (1.96)	14.07 (1.95)	13.85 (1.87)	13.84 (1.83)	13.94 (1.82)	15.05 (1.90)
11	Afghanistan	11.79	12.87	13.19	13.13	13.36	13.23

Sl. no	Country	Milk production in Million Tonnes					
		2009	2010	2011	2012	2013	2014
		(1.67)	(1.78)	(1.78)	(1.74)	(1.75)	(1.67)
12	Poland	12.47	12.30	12.43	12.68	12.74	13.00
		(1.76)	(1.70)	(1.68)	(1.68)	(1.67)	(1.64)
13	Netherlands	11.66	11.81	11.84	11.89	12.44	12.73
		(1.65)	(1.64)	(1.60)	(1.57)	(1.63)	(1.61)
14	Indonesia	11.37	11.48	11.72	11.76	11.83	11.77
		(1.61)	(1.59)	(1.59)	(1.55)	(1.55)	(1.49)
15	Mexico	10.71	10.84	10.89	11.04	11.12	11.29
		(1.52)	(1.50)	(1.47)	(1.46)	(1.45)	(1.43)
16	Argentina	10.37	10.63	11.55	11.34	10.97	11.01
		(1.47)	(1.47)	(1.56)	(1.50)	(1.43)	(1.39)
17	Australia	9.39	9.02	9.10	9.48	9.52	9.54
		(1.33)	(1.25)	(1.23)	(1.25)	(1.24)	(1.20)
18	Canada	8.21	8.24	8.40	8.56	8.39	8.40
		(1.16)	(1.14)	(1.14)	(1.13)	(1.10)	(1.06)
19	Ireland	5.23	5.33	5.54	5.39	5.58	5.82
		(0.74)	(0.74)	(0.75)	(0.71)	(0.73)	(0.74)
20	Romania	5.81	5.06	5.16	4.98	5.02	5.21
		(0.82)	(0.70)	(0.70)	(0.66)	(0.66)	(0.66)
World		706.69	721.47	738.96	756.58	765.06	791.79

Source: FAOSTAT (Downloaded on 8th February 2017)
(Figures in parenthesis show percentage values.)

Figure 3.1 Milk Production across the countries (million tonnes)



3.3 Milk production in India

India is the world's largest milk producer, with more than 18.48 percent of global production, followed by the United States of America (11.8%), China (5.38%), Pakistan (5.08%), and Brazil (4.45%).

Officially, milk production activity in India is regarded as a subsidiary source of income. Almost all authors have unanimous that the milk production activity is mostly carried out by the small and marginal farmers as well as resource-poor landless farmers. As such, the resource-poor farmers hardly have another source of income. However, for most of the resource-poor, it is a primary source of livelihood. On the other hand, except North Eastern hills the milk production activity has been the tradition of Indian sub-continent since time immemorial.

'India's livestock sector is one of the largest in the world. It has 56.7 percent of world's buffaloes, 12.5 percent cattle, 20.4 percent small ruminants, 2.4 percent

camel, 1.4 percent equine[3], 1.5 percent pigs and 3.1 percent poultry. In 2010-11, livestock generated outputs worth ₹ 2075 billion (at 2004-05 prices) which comprised 4 percent of the GDP and 26 percent of the agricultural GDP. The total output worth was higher than the value of food grains.' (GOI, AHD Final Report 2012, 2012).

The AHD working group report also mentions livestock as an important source of livelihood for small and marginal farmers and has been contributing not less than 15 percent of their household income. It is more in the states like Gujarat (24.4%), Haryana (24.2%), Punjab (20.2%), and Bihar (18.7%).

In India, at least 50 percent of the total population is entirely dependent on agriculture and allied sector. The share of agriculture is slowly going down and it is less than 20 percent of the GVA[4] of the nation. In the year 2011-12 the share of Agricultural GVA to total national GVA was 18.5 percent whereas the share comes down to the level of 17.4 percent in the year 2014-15. However, the share of livestock sector is increasing slowly it was 4 percent of total GVA in the year 2011-12 reached the level of 4.4 percent in the year 2014-15.

Table 3.2Share of Agriculture & Allied and Livestock Sector GVA

(At current prices in ₹Crore)

Year	GVA (Total)	GVA(Agriculture& Allied)		GVA(Livestock Sector)	
		Amount	Share (%)	Amount	Share (%)
2011-12	8106656	1501816	18.5	327301	4.0
2012-13	9210023	1680797	18.2	357254	4.1
2013-14	10380813	1902452	18.3	429662	4.1
2014-15	11472409	1995251	17.4	500405	4.4

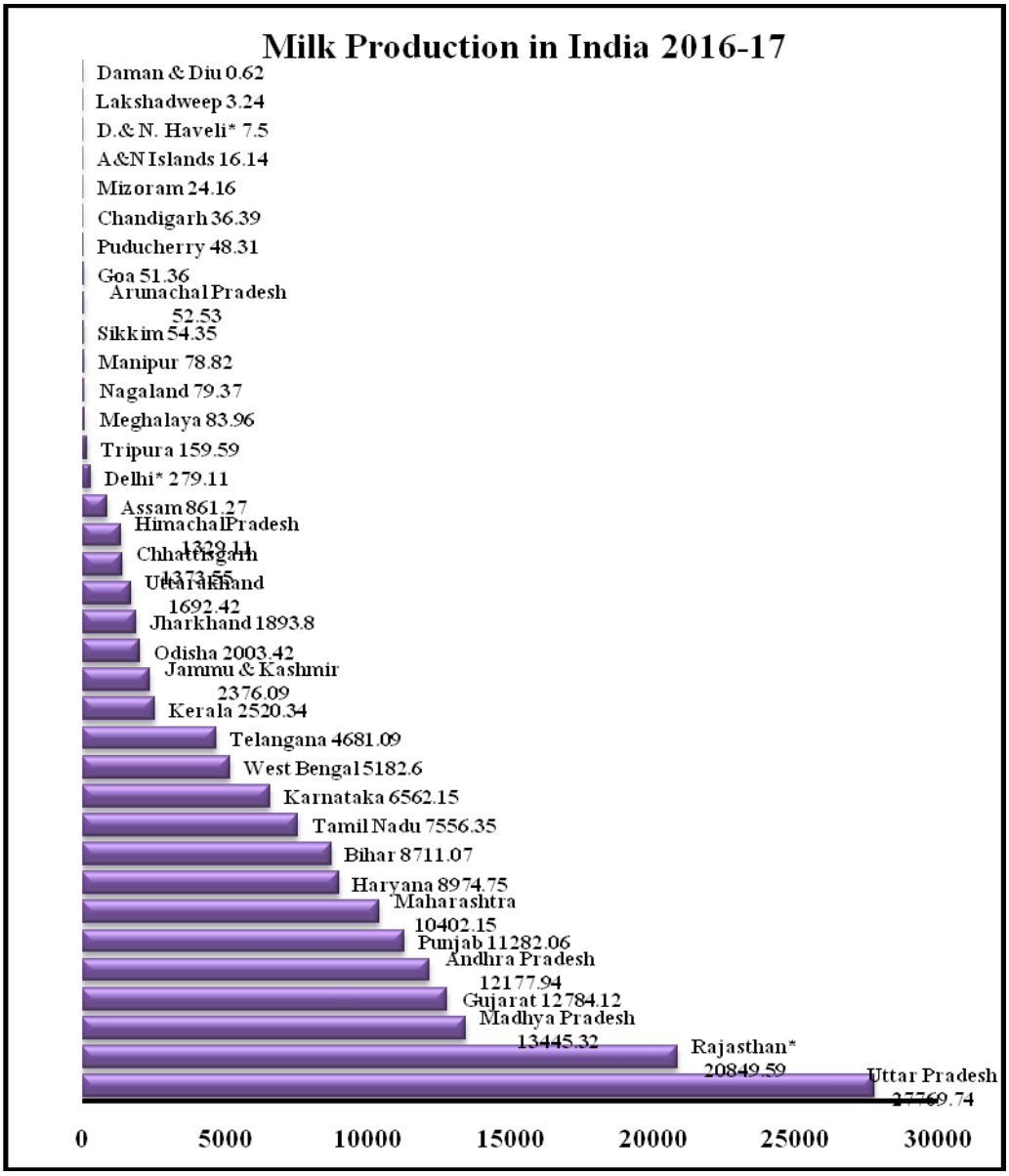
Source: National Accounts Statistics-2016; Central Statistical Organisation; GoI

[3]Horse like animals

[4]Gross Value Added (GVA) = GDP - product taxes + product subsidies

Milk production varies from state to state in India. Uttar Pradesh producing 27769.74 thousand tonnes of milk in the year 2016-17 tops the nation in volume of milk production whereas Punjab tops in availability with 1032 grams per capita. From the point of per capita availability, only nine states have availability more than the national average of 337 grams in the year 2015-16. Among the NER states, Assam records the lowest growth rate of milk production with 1.86 percent, whereas Arunachal Pradesh records highest growth rate with 90.80 percent. In the Indian scenario in terms of growth rate of milk production, Lakshadweep tops the nation with 174.64 percent, and Assam attains the 23rd position. Of course, it is to be noted that higher growth rate of state like Sikkim, Arunachal Pradesh, Lakshadweep *etc.* have less impact on the total supply scenario of the Nation as their volume of output is negligible in comparison to the total volume in the country.

Figure 3.2 State wise milk production in India



3.4 Activities of Milk production in Assam

3.4.1 The advent of professional cattle farming in Assam: the genesis behind

Until the last part of the 18th century, the cattle keeping in social purview were cultural in nature and not attached to the motive of profit or livelihood. It was the advent of British rule in Assam, which generated the demand for milk for supplying to the soldiers. Beforehand, there was no concept of professional dairy

farming in the state. With the advent of British rule, the professional cattle rearing had begun.

It had run without any socio-political complication until the 1940s. It has been evidential that before the "Grow more food" Campaign by the government, Assam was a land abundant state. Peasants in Assam enjoyed traditionally the free right to graze in common village lands and forests. Therefore, the fodder cultivation neither was the habit nor was considered common to agrarian activities' (Guha, 1977). 'It was only in the colonial context, 1817 to be precise, that migrations of the Gorkhas to Assam' had begun as Graziers as well as soldiers in the wake of the Treaty of Segauli (1815-16). With the deployment of the Gorkhas in the Sylhet operations as a part of the Cuttack legion, later known as the Assam Light Infantry (Sinha 1990). 'These soldiers after their retirement from service were encouraged to settle in the foothills, forest fringes, as well as in other strategic points; creating certain compact pockets of Gorkha settlements' (Sinha 1990). This had provided the basis for the rapid professionalism of dairy cattle farming in greater Assam. That led the British India Government to envisage for revenue from cattle farming in the region. The free right of cattle grazing was curtailed during the British regime, through tea plantation and levying Grazing Fees (Guha, 1977) through Assam Land and Revenue Regulation, 1886. The government of Assam had drawn the distinction between 'professional grazing' and 'village grazing'. In 1888 'A grazing fee per head of horned animals was introduced' and set apart the categories of land as Village Grazing Reserve (VGR) & Professional Grazing Reserve (PGR).

In the North East Region, **'**the local tribes do not have a tradition of cattle rearing; and the milk neither was a part of dietary habits nor considered vital as food. Even among indigenous people of the Brahmaputra Valley, cattle rearing were not integral to the farming system and had never given the kind of importance that the villagers of Northern India attach to**'** (Dutta 2011). 'For this very reason, the British encouraged migration of graziers to Assam. They came with their cattle to different parts of the North-east and set up *'khutis'* or small dairy units around urban areas. Large tracts were notified as "professional grazing reserves" and allotted to Gorkha graziers under the Assam Land Revenue

Regulations, 1886 on payment of fees' (Dutta, Rangan, 2017). During the period, Captain Woodforde who ran the Upper Shillong Government cattle farm introduced cross-breeding of local cows with Holstein Friesian bulls in the mid-1930s; which gave birth to a mixed breed of high milk yielding cows that locals of present Assam define as "Shillong" breed. (Dutta 2011). The breed had attracted more graziers to settle down in the region. The progeny was known as *Belaaite* by the peri-urban farmers of Shillong and were reared around the peri-urban areas in the stall feed system.

In the context, the then government encouraged Gorkhas in and out of the state for professional grazing beside their job as soldiers, so that revenue collection could be raised and soldiers could be facilitated with the supply of milk. In 1888, the grazing fee was 8 *annas* per annum per head of buffaloes and 4 *annas* per head of cows' (Nath, Lopita, 2006). For the purpose of increasing revenue, in the early 19th century, the provincial British Government and later the local administrations continuously encouraged the graziers to immigrate to this region of the country. In this regard, Amina Passah (2003) in her article, Gorkha's in Meghalaya: Diaspora and Identity, observed that 'the immigration of these graziers is, encouraged by the Syiems (chiefs) who levy a grazing tax on immigrants- a tax which they cannot levy on their own subjects and the immigration of Gorkha graziers is thus a source of considerable profit to them'. The Syiemships of Mylliem, Khyriem and Nongkhlaw entrusted with the power to collect Grazing fees, Housing fees (Dohory Khajna), and cultivation tax since British period and perpetuated even after independence (Upadhaya, Bishnu Prasad, 2017). Later most of that farmer shifted to the peri-urban areas of Guwahati city forming catchment of procurement of milk for Town Milk Supply Scheme, Guwahati. In this regard, Jugal Saikia found 92.3 percent of the farmer migrated from Meghalaya since 1971-72 in his study 'Economics of Informal Milk Producing Units in Guwahati City' (Saikia, 2009).

3.4.2 PGR and VGR and fate of Graziers

The discussion of milk production in Assam remains incomplete if we skip the discussion on erstwhile Grazing reserves and professional graziers. The numbers of cattle harder were large in Assam during the British period. Therefore,

the provincial Government envisaged for government revenue out of those graziers. At the initial stage, the government had divided the part of the open forest and uncultivated wasteland as Village Grazing Ground (VGG)/VGR and PGR and brought under the purview of grazing tax. The graziers were levied Grazing Fees on both the categories of Grazing land 'until the Government notification No. 2001-R dated 23 June 1937' (Chhetry, D B, 2009), thereafter, only on PGRs.

3.4.2.1 Graziers in old Darrang District

The old district of Darrang was home to the largest number of herdsmen since the middle of the nineteenth century. The present Silabandha, Borbhogia, Murhadal and Nagshankar Mauzas, as well as Hetou Chapari, Bhetamara, Choulkhowa Chapari, Balimari, Chiring Chapari, Lengrimara, Bangalputa and Dakhin Chapari were a grazing reserve. In that reserve, the considerable concentration of graziers was there earning a livelihood. (Chhetry, D B, 2009).

Later, unable to withstand the onslaught of the encroachers, the graziers ultimately disposed of their animals and shifted to safer destinations such as Udalguri, Rowta, Orang, Habigaon, Majbat, *etc.* Today, there are no graziers left at these locations where only four to five decades back, they held sway. (Chhetry, D B, 2009)

3.4.2.2 Kaziranga and Professional Graziers

A sizeable number amongst professional graziers were believed to have been in Kaziranga since 1880 or before. In those days, demand for milk being negligible, the only option left was to convert it into curd or ghee and explore linkages for marketing the product. They paid grazing tax and obtained in return unshackled grazing right over an extensive area. This was, indeed, an idyllic situation for the graziers. However, it did not last long. 'A proposal to declare Kaziranga a reserved forest was initiated during 1903-1904' (Chhetry, D B, 2009) and 'finally an area measuring 57,263.60 acres was declared a reserved forest on 3 January 1908' (Prakash, 2007). Later, more areas were added in 1913 and 1917. The graziers, who paid grazing fees, entailed considerable deliberation and delay of the evacuation order, the Chief Commissioner ultimately decided in favour of

constituting the reserved forest. Then in 1920, the Government ordered the graziers to vacate the reserve within twenty-four hours, and the forest officials burnt down their huts and drove them away (Guha, 1977; Bhandari, 1996).

3.4.2.3 Burachapori: A Home to Professional Graziers

An important and in a way, a much sought-after destination of Professional grazier was Burachapari, the second largest river - island in Assam next to Majuli, lying to the south of Tezpur town. 'Settlement of graziers was believed to had commenced at Burachapari around 1870 (Ghimire, 1983). As per records in the office of the Deputy Commissioner, Sonitpur, Burachapori PGR was constituted vide Government notification No 3129R, dated 31-10-1916 (Ghimire, 1983).

On the basis of settlement and production of Burachapori, the Tezpur Graziers' Association was set up in 1933 and later renamed as the Assam Graziers' Association with Chhabilal Upadhyaya as Chairman (Bhandari, 1996). The establishment of the Graziers' Co-operative Dairy on 7th February 1955at Tezpur was another significant event in the history of Dairying and milk business revolving around Burachapari (Ghimire, 1983).

Burachapori PGR has witnessed many ups and downs during its nearly nine-decade-old eventful existence. Encroachments had begun in Burachapori since the early thirties of the 20th century when landless people from East Bengal started to make their presence felt. During 1933-1941, large-scale encroachment hit Burachapori. 'Lambodar Kalita and Prasad Singh Subba organised a meeting at Tezpur to work out strategies, and they adopted a resolution for the eviction of encroachers but to no avail.' (Bhandari,1996).

'Government ended the Professional Grazing Reserve status of Burachapari on 10.09.1975 when it was declared a forest reserve with 4406.25 hectares of land' (Ghimire, 1983). Of course, here the graziers were allowed to continue where they were and carry on their trade as before, subject to the observance of specific conditions and payment of grazing tax to the Forest Department, which was Rs.6.00 per buffalo and Rs.3.00 per cow per annum. In 1988, the Government

decided to include Burachapari within the Laokhowa Wildlife Sanctuary without any rehabilitation. (Chhetry, D B, 2009)[5]

3.4.2.4 Barpeta PGRs

As in Sonitpur, large numbers of cattle-breeders were in the erstwhile Barpeta subdivision (now district) of the old Kamrup district since before Professional Grazing Reserves were constituted there. There was wide open grazing space extending from the railway track near Barpeta Road town in the south, up to the Bhutan border to the north and from Mandia to the far west up to the foothills of Baghbor. Population being minimal, there was no pressure on land.

Barapeta PGR was constituted on 02.11.1920 by curving out 13,892 *bighas* from two non-cadastral (NC) villages, Barapeta and Khudnabari.[6] 'Where, the share of "Barapeta NC" was 10,497 *bighas*.' (Chhetry, D B, 2009). 'Like Burachapari, Barapeta PGR with enough grassland and the bank of river Beki attracted a considerable number of cattle breeders.' During the period, upcoming urban growth centres at Sorbhog and Athiabari held out the promise of adequate scope for marketing of milk-products'.

Barapeta PGR also could not ward off the general climate of the encroachment of grazing reserves pervading throughout the province. Evictions were carried out, but the Grazing Reserve was never free from encroachment. 'The dereservation process started in 1962 when the Government ordered for taking out 6,000 *bighas* from the PGR vides order no. RSG 150/ 55/ 76/ 107 dated 22.2.1962,[7] for settlement of landless people (Chhetry, D B, 2009). With the dereservation of PGRs, the sway of grazier reduced to the minimum.

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[5] Cited from '*Grazing Reserves and Nepali Graziers in Assam',* by D B Chhetry (2009) i*n 'History and Culture of Assamese Nepali',* Guwahati, Assam: Department of Historical Antiquarian Studies, Government of Assam. Where he mentions that, the information was collected from Mr. J B Hagjer, IAS, Secretary, Department of Forest, Govt. of Assam. In 2001, he interviewed Late Somnath Ghimire, Chandmari, Tezpur, Distt. Sonitpur. This researcher also had a discussion with Somnath Ghimire in October 2009.

[6] (Chhetry, D B, 2009) found from Entries in Grazing Register in the office of Deputy Commissioner, Barpeta District.

[7] D B Chhetry stated that as entries in Grazing Register, maintained by Deputy Commissioner, Barpeta District (Chhetry, D B, 2009).

3.4.2.5 Govindapur PGR

'Govindapur PGR was created in the present district of Barpeta on 23.9.1922 out of the land of Konora and Mandia NC areas comprising 20,872 *bighas*. It was extended to the foothills of Baghbor. All graziers of Barpeta, who owned buffaloes, used to shift their *Bathan* to Govindapur during winter for abundant varieties of forage, suitable for buffaloes in its low lying areas. This PGR also had to face the pressure of encroachments and ultimately dereserved in the year 1963. (Chhetry, D B, 2009)

3.4.2.6 Laothowa PGR

Laothowa (Bhagnamari) PGR was present across the mighty Brahmaputra to the South of the present Mukalmuwa Bazaar in Nalbari district. This area also faced large-scale encroachment, ultimately leading to dereservation and consequent exit of Grazier. (Chhetry, D B, 2009)

3.4.2.7 Encroachment and De-reservation: the fate of grazing reserves

Encroachment of grazing lands in Assam is an old story dating back to much before 1947. It would perhaps be pertinent to note that in an unprecedented move of interference in the affairs of a neighbouring province 'the Bengal Legislative Council adopted a motion on 16th July 1943 calling upon the Government of India to take immediate steps to remove all restrictions by the Assam Government on the immigrant cultivators from Bengal. Exactly a year after its formation, the fourth Saadulla Ministry, therefore, adopted a new resolution on a land settlement under the slogan of "grow more food." The features of this resolution of 24 August 1943 clearly states that 'dereservation of select grazing reserves of Nowgong, Kamrup and Darrang for the purpose of distribution of lands in proportion to needs of different communities' and 'opening up of surplus reserves in all the submontane areas, and in Sibsagar and Lakhimpur, for settlement of landless'. Such policies chronologically opened the way for cultivators from the erstwhile East Bengal and began to cross over to Assam in large numbers since the early nineteen-twenties. They not only filled up the riverine area of Brahmaputra valley but also gradually filled PGRs in the

vicinity. The policy of coalition government by their Resolution of November 5, 1939, for evicting all encroachers from PGRs and VGRs was reverted by the Saadulla Ministry with the introduction by a resolution on June 21, 1940, what is known as 'Development Scheme' (Guha, 1977).

Thus, the conclusion can be drawn that both prior to and after the partition of the country, the absence of a well calibrated, coherent approach in regard to PGRs and VGRs is noticeable in the various policy decisions of the Governments. 'That perhaps explains why the Estimates Committee of the Assam Legislative Assembly, 1960-61, under the Chairmanship of Siddhinath Sarma, which went into the whole gamut of encroachment, reported that during 1960 alone, there were as many as 14,023 cases of encroachment in PGRs and VGRs (Sarma, 1960-61) and in the year 1981 suggested that 'Unless a strict supervision is kept over the PGRs and Village Grazing Grounds, in no time would these lands be encroached upon and no Professional Grazing Reserve and Village Grazing Grounds left.' (Sarma, 1960-61).

Twenty years after the Sarma report, the Land Reforms Commission has again observed, 'owing to lack of vigilance on the part of land records staff, the Professional Grazing Reserves and the Village Grazing Reserves have become a merry ground for encroachment which has resulted in the further curtailment of their areas. It is time that the Government to take firm measures to evict the encroachers from the Village Grazing Reserves and Professional Grazing Reserves.' (Govt.of Assam, 1981)But the problem of encroachment did not stop.

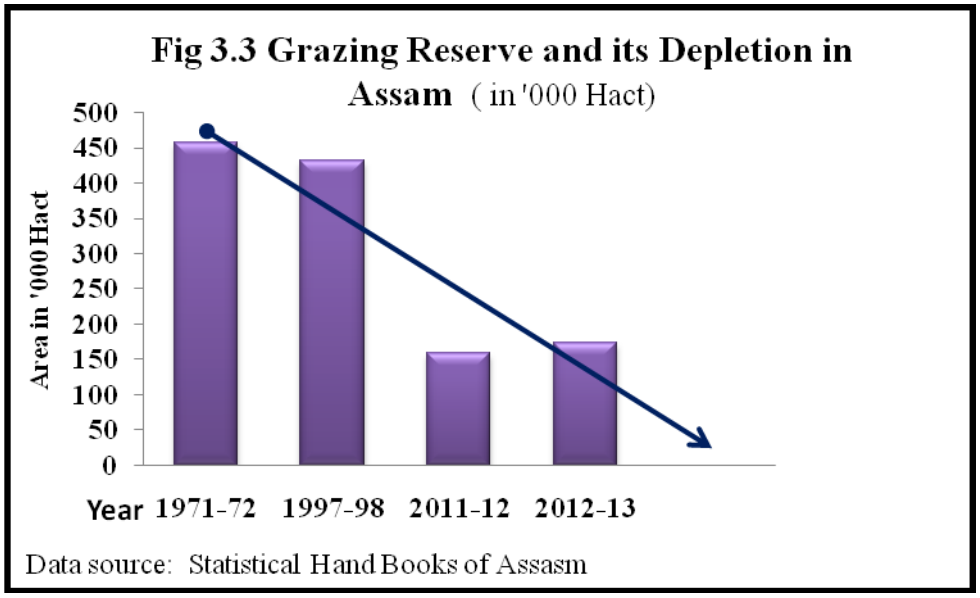
Table 3.3 Grazing Land in Assam

Year	Area in '000hectares
1971-72	456.900
1997-98	432.883
2011-12	159.668
2012-13	173.367

Source: Statistical Handbook of Assam, 2015

The grazing had decreased from 456.900 thousand hectares in 1971-72 to 173.367 hectare in 2012-13.

Figure 3.3 Grazing Reserve and its Depletion in Assam



The figure (3.3) clearly depicts that with the time the grazing land has been depleting in Assam. With the depletion of such land the natural facilities for cattle ranching, grazing or farming has been going down. Due to the non-availability of profitable farming facilities in official grazing reserves of Piedmont or submontane as well as wasteland or *Char* areas has pushed the dairy farmers towards the peri-urban areas; compelling them to keep up the farming as at present. The process of depletion in Grazing ground is almost continued till date.

3.4.3 Support Services for dairy farming- Government veterinary facilities and finance

In Assam, attention to enhancing the support services for dairy cattle farming had been paid since British rule. 'The Veterinary Department was created in 1905 for East Bengal and Assam. The Assam portion was looked after by a Veterinary Inspector located at Jorhat' (Bujarbaruah, 2011). In the same year, the first Veterinary Dispensary was established at Chenikuthi, Guwahati (Government of Assam,2017). However, the creation of the post of Deputy Director Agriculture (Live-stock) on 1st April 1934 in Assam by converting the former post of 'Live-stock, and Dairy Expert' could be termed as the first formal

initiation for the generation of modernised support services through departmental effort for dairying and milk production after the allotment of VGR and PGR by Assam Land Revenue Act 1886. During the 1930s 'a centre was started near Palasbari in the Kamrup District and a post of Agricultural Inspector (Live-stock) was sanctioned for the Surma Valley'. 'At the Khanapara and Sylhet Farms, herds of local cattle were graded up by the use of Sindhi bulls and herds of pure Sindhi cattle were maintained to provide acclimatized Sindhi bulls. In these farms, small herds of buffaloes were also graded up by Hurrah (Punjab) bulls'. 'At the Jorhat Farm, a herd of Grey Behari and Maurangia cattle was graded up by the use of selected bulls. The Khanapara and Sylhet Farms and the cattle section of the Jorhat Farm were carried on purely for breeding and experimental purposes, and the general breeding plan. 'The attempt to keep a herd of Sindhi at Upper Shillong was abandoned at the end of the year' 1935 and the breeding of Friesian cattle had been introduced, and excellent results were obtained, which is the first generation of Friesian cattle in the Northeast region. (Provincial Government, 1936). Thus, the support service for higher productivity was initiated during the British period. 'This department was divided into two zones. Jorhat was considered as upper Assam Circle and Guwahati as Lower Assam Circle. Till 1940, it was headed by the Veterinary Inspector[8]'. Even after independence, the department had run with the earlier set up having 'Veterinary Assistant Surgeons and Supervisory Field Assistants used to work in the dispensaries under the Veterinary Inspector'. The present setup of Animal Husbandry and Veterinary Department, Assam came into effect in the year 1950. 'To strengthen cattle breeding operations, the department had launched the Key Village Scheme in 1952-53 for cattle development and introduced for the first time artificial insemination in cattle' and 'the use of Frozen Semen Technology in cattle breeding was introduced in 1976'. (Bujarbaruah, 2011). Later several frozen semen centres and ten numbers of Intensive Cattle Development Project(ICDP) were established along with merging the Key Village Schemes into ICDP in different places of the state during the period of 1967-1980.

[8]Our History | Directorate Of Ah & Veterinary | Government ... (n.d.). Retrieved from https://veterinary.assam.gov.in/about-us/our-history-2

3.4.4 The present scenario of veterinary facilities in Assam

In Assam until February 1982, Animal Husbandry & Veterinary Department had the sole authority not only in animal husbandry but also dairy, poultry, and other all-round technicalities thereof. The responsibility of dairy development had been carried out by the Directorate of Animal Husbandry & Veterinary Department of Assam. Considering the importance of all the developmental activities of Dairy in the state, the decision for a separate Directorate of Dairy Development was taken in the year 1982. However, this had been executed in the year 1990 and subsequently; the Government notified it as a permanent department in 2004. On the other side, Assam Livestock Development Agency (ALDA) started functioning in the state from the year 2004, and Assam Livestock and Poultry Corporation (ALPCo) a Public Sector Undertaking of Government of Assam was incorporated as a Company registered under Companies Act, 1956 *vide* Registration No.2135 of 1983-84. As such, the Government of Assam is rendering support services dividing the department into four types of institutional categories as follows:

a. Directorate of Animal Husbandry & Veterinary
b. Directorate of Dairy Development
c. Assam Livestock Development Agency (ALDA)
d. Assam Livestock and Poultry Corporation Ltd (ALPCo)

3.4.4.1 Directorate of Animal Husbandry & Veterinary

The AH & Vety. Department has for the better functioning, adopted eight numbers of objectives as their vision. The following section is devoted to those objectives and vision.

3.4.4.2 Objectives and vision

The objectives of AH and Vety. Department, as stated on their website[9], are as follows:

1. To improve training of Veterinary doctors as well as Para-Vets
2. To improve veterinary research in the state

[9] What We Do | Directorate Of AH& Veterinary | Government ... (n.d.). Retrieved from https://veterinary.assam.gov.in/about-us/what-we-do-2

3. To reduce disease occurrence and mortality of livestock and birds through timely preventive and curative measures.
4. To increase crossbred livestock population through induction and upgradation programme
5. To establish and popularise the backyard farming of poultry and other birds
6. To popularise small ruminants and piggery farming
7. To educate farmers on various aspects of livestock management, including fodder cultivation
8. To render extension services in order to provide self-employment opportunities amongst unemployed youths and underprivileged of the state

For the realisation of the above mentioned objectives, the department has limited veterinary facilities for the farmers in Assam. Table 3.4 shows that there is a total of 1236 centers to look after the animal health of the state. In Hospitals, Dispensaries, Regional Artificial Insemination Centres (RAIC) one or two veterinary doctors are available. Sub-centres, first aid centres and other centres except for Rinderpest (R.P.) Check post, and Bovine Contagious Pleuropneumonia (BCCP) Check post, services have been rendered by Veterinary Field Assistants and non-salaried Gopal Mitras (GMs). However, the total livestock as per Livestock Census, 2012 is 19080304, *i.e.,* approximately 15500 populations are to be facilitated by each unit of the facility.

Table 3.4 Veterinary facilities in Assam

Facilities	Number
Hospitals	22
Dispensaries	337
Sub-Centre/ First Aid Centre/SMC	684
Block Veterinary Dispensaries	99
Key Village Centre	30
Regional Artificial Insemination Centre	31
R.P. Check post	20
BCPP Check post	13
Total	1236

Source: Statistical Handbook of Assam, 2015

3.4.4.3 Assam Livestock Development Agency (ALDA)

The Assam Livestock Development Agency takes care of the Artificial Insemination of animals in the state. ALDA collects and distributes frozen semen for the progeny development of cattle herd of the state. For the purpose at present, there are 24 semen producing bulls having Sire Dam's best lactation yield ranging from 3006 to 11407 kg per lactation at Barapeta farm. Among them, 7 nos. of bulls are of Holstein Friesian (HF) breed, and the rest comprises of Jersey and other Indian indigenous crossbreeds. The semen produced at Barapeta Frozen Semen Bull Station is transported to the Central Frozen Semen Bank at Khanapara, Guwahati and thereafter transported to the 15 Frozen Semen Banks (FSBs) situated at different locations in the state district wise. Table 3.5 shows the district wise distribution of frozen semen in Assam. Thus it is evident that in Assam the initiative for the dam development from the part of the Government is noteworthy, however, not sufficient at per cattle population.

Table 3.5Frozen Semen Bank (FSB) Area covered by Districts

Sl. No.	Frozen Semen Bank	Area Covered
1	Khanapara	Kamrup District(Rural & Metro)
2	Umrangso	Dima Hasao
3	Nagaon	Nagaon and Morigaon
4	Manja	Karbi Anglong
5	Tezpur	Sonitpur
6	Mongaldoi	Darrang and Udalguri
7	North Lakhimpur	Lakhimpur and Dhemaji
8	Howly	Barpeta and Nalbari
9	Abhayapuri	Bongaigaon and Dhubri
10	Balijana	Goalpara district and South Salmara
11	Kokrajhar	Kokrajhar,Chirang and Baksa
12	Jorhat	Jorhat and Golaghat
13	Demow	Sivasagar
14	Tinsukia	Tinsukia and Dibrugarh
15	Silchar	Karimganj and Hailakandi

Source: Department of Animal Husbandry and Veterinary, Assam

ALDA can develop the progeny to the level of farmer's satisfaction by enhancing productivity, one of the ways for bringing down the cost of production of milk.

3.4.4.4 Assam Livestock and Poultry Corporation Ltd

The Assam Livestock And Poultry Corporation (ALPCo) Ltd was incorporated on 06 February 1984 with the objectives[10]:

1. Processing and marketing of livestock and poultry products through different outlets.
2. Employment generation through the adoption of modern climate-resilient animal husbandry practices.

The impact of ALPCo found less active in dairy sector; possibly, it has limited scope to serve the sector. The corporation is active enough in poultry and piggery, with its feed product chicks marketing.

3.4.5 Role of financial institutions in milk production

Morigaon District has twenty nos. of bank fourteen numbers of public sector banks, four private and one each regional rural and cooperative banks. The United Bank of India is the lead bank of the district. Jagiroad Branch of State Bank of India is the most reputed bank branch in our study area.

Table 3.6 Banking facilities in Morigaon District

Category	Bank Nos.	Branches	CSP(Consumer Service Point)
Public sector	14	29	137
Private	4	7	1
Regional rural Bank	1	13	47
Cooperative bank	1	2	0
Total	20	51	185

Source: Primary data

Financial institutions, particularly the commercial banks run with the profit motive. They generally look at the rate of return in the business. The dairy

[10]Assam Livestock and Poultry Corporation (ALPCo) Animal ... (n.d.). Retrieved from https://animalhusbandry.assam.gov.in/about-us/detail/assam-livestock-and-poultry

business, is already observed form our sampling that the rate of return in the current business is around 14 percent only. On the other hand, the sampling data of our study area shows that till date no damage claim has been accepted by any of the insurance companies. As such without having under signature by the financially reliable institution or organisation or Government offices, no banks are found to be ready to extend financial support to the dairy farming. Banks are ready to provide a loan to the dairy farmer when their Estimated Monthly Installments are assured, or subsidy amount from the part of the government is assured. We have observed that 1200 farmers under SJDUSS have availed loan from numbers of bank branches at Jagiroad. Among the beneficiaries, 60 percent availed loan for cattle farming and others have availed loan for piggeries and other farming. During discussions with the bank officials, it was revealed that the CIBIL (Credit Information Bureau of India Limited) score of the farmers availing loan facilities hasn't been up to the mark, with the exception of SJDUSS farmers. This shows that farmers need a cooperative type of organisation for securing help from financial institutions. We have interacted with numbers of farmers associated with cooperative and found that they just had filled the application form for the required financial support and got their loan amount up to Rupees five lakhs transferred to their account without providing any collateral security. Cooperative also holds workshops for disseminating knowledge about dealing with banks. Thus, it is found that the farmer members of cooperatives have an easy excess of financial support.

3.5 The Milch animal scenario in Assam

According to the 19th Livestock Census out of the total 19.08 Million cattle, the total number of animals in milk in the state was 3135112 out of which 1136444 of goats were there producing milk. In the year2012-13, approximately 18.68 million litres of milk was produced in the state by goats, as per report provided by AH & Veterinary Department, Assam. The number of cross breed cows, buffalo and indigenous cows were 112148, 83368 and 1803152 respectively (Table 3.7).

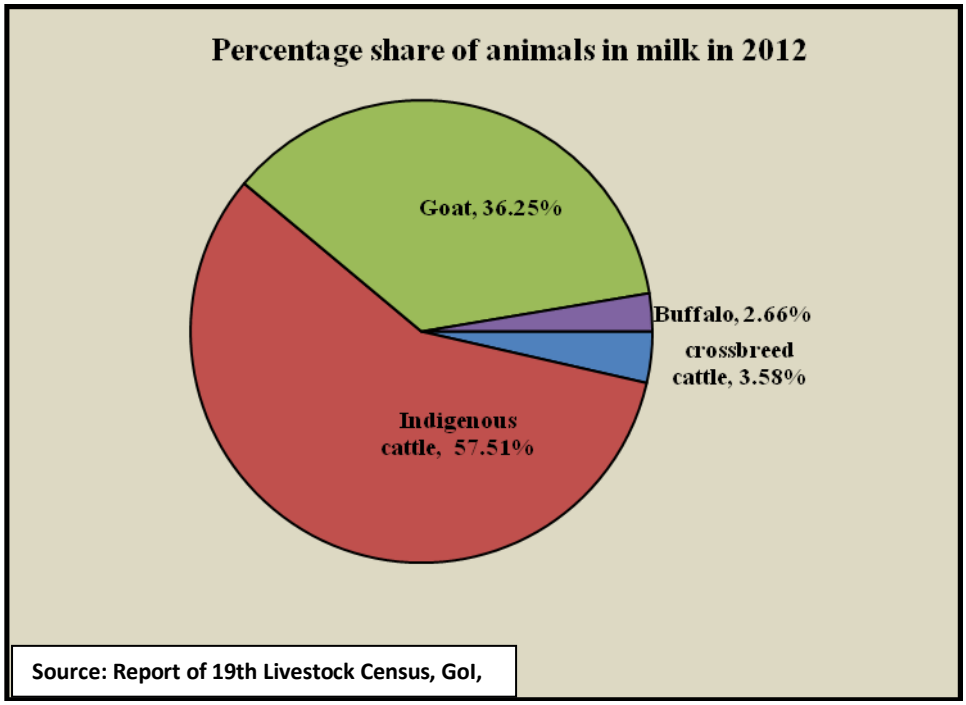
Table 3.7 In-milk animals in Assam, 19th Livestock Census, 2012

Animal Category	Numbers of in-milk animal	Share(% to total)
Crossbreed Cattle	112148	3.58
Indigenous Cattle	1803152	57.51
Buffalo	83368	2.66
Goat	1136444	36.25
Total	3135112	100.00

Source: Animal Husbandry Statistics Division, GOI

Table 3.7 & Figure 3.4 shows the percentage share of a number of animals in milk for three major species cattle, buffalo and goat. Indigenous cattle top the ratio with 57.51 percent, crossbreed cattle and buffalo share the milch animal population of 3.58 percent and 2.66 percent. The Census report shows the share of goat in milk animal was 36.25 percent.

Figure 3.4 percentage share of animals in milk in 2012



The trend of variation in the population of livestock with the possibility of milk shows that except goat the male population comes down in the state. Among the animals the male population of cross breed cattle had decreased by (-) 37.43

percent, followed by buffaloes (-) 22.17 percent and indigenous cattle (-) 10.96 percent. However, the male population of goat increased by 59.34 percent in between 18th (2007) and 19th (2012) Livestock Census. Except for a decrease in the female population of Buffalo, by (-) 5.65 percent female populations of all other species were registered positive growth. The numbers of females of crossbreed cattle had shown the growth rate of 10.8 percent, the female population of indigenous cattle and goat registered the growth by 16.34 percent and 32.77 percent respectively. Therefore, an increase in the total production of milk is registered. Table 3.8 and chart 3.5 clearly depicts all the facts.

Table 3.8 Livestock with milk possibility in Assam 2003 to 2012('000)

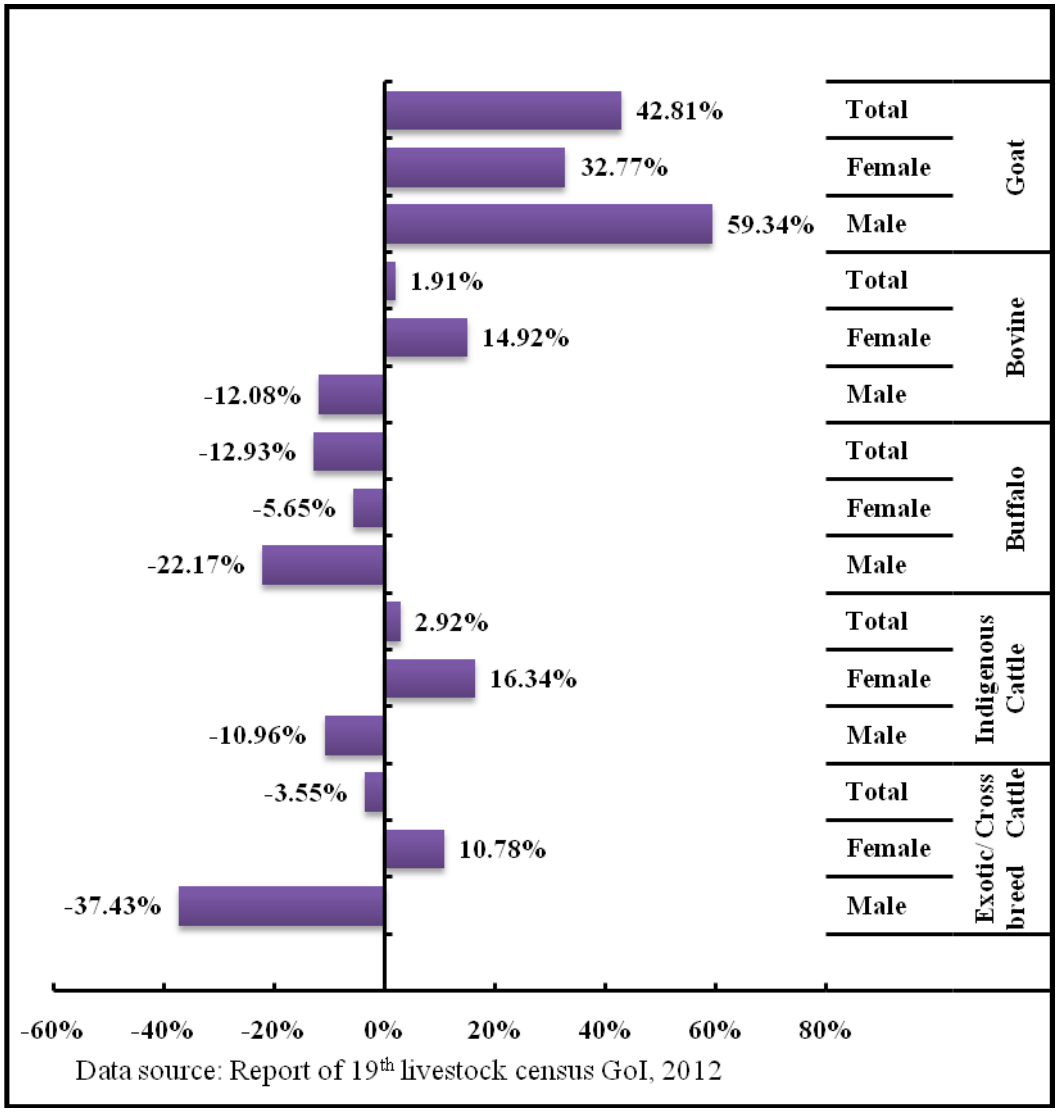
Category	Male/Female/Total	2003	2007	2012	%change from 2007 to 2012
Exotic/ Crossbreed Cattle	Male	122	122	76.33	-37.43
	Female	318	288.48	319.57	10.78
	Total	440	410.48	395.9	-3.55
Indigenous Cattle	Male	3878	4735.3	4216.41	-10.96
	Female	4122	4895.5	5695.39	16.34
	Total	8000	9630.8	9911.8	2.92
Buffalo	Male	307	220.26	171.42	-22.17
	Female	370	279.65	263.85	-5.65
	Total	677	499.91	435.27	-12.93
Bovine	Male	4307	5077.56	4464.16	-12.08
	Female	4810	5463.63	6278.81	14.92
	Total	9117	10541.19	10742.97	1.91
Total Goat	Male	1211	1632	2601	59.34
	Female	1776	2688	3568	32.77
	Total	2987	4320	6169	42.80

Source: Report of 19th Livestock Census

The efforts made for modernisation in the field of agriculture also have an impact on the male population of cattle in the state. The modernisation trend has reduced the use of cattle as draught power, leading a fall in market value. The farmers take insufficient care to the newborn male calf. This attributes to the higher mortality rate of the male calf and a rise in the number of female cattle in

general and in the case of cross breed cattle in particular. On the other hand, in search of employment opportunity, many young, educated unemployed at the fringe of urban and peri-urban areas have been taking up dairying as their opportunity. The entrance of educated segments of the population in dairying and different workshops, sensitising curricula by the department and different Non-Government Organisations (NGO) for farmers also had an impact on the total production in the state. Therefore, in spite of the total negative growth rate of crossbreed cattle by 3.55 percent the aggregate milk production has been increasing slowly.

Figure 3.5 Variation in the population of Cattle, Buffalo and total Bovine in Assam (From 2007 to 2012)



3.5.1 Milk Production in Assam

The milk production in Assam is growing very slowly. The production of milk was 750202013 litre in the year 2001-02, reached the level of 888146889 and 906315804litres in the year 2015-16 and 2016-17 respectively. In the last five years, the production is on an increasing trend. The compounded average growth rate of milk production in Assam is found to be around 1.18 percent in an average. The annual growth rate was highest at 3.07 percent in the year 2002-03 after that better growth rate was reckoned in 2016-17 by 2.05.

Table 3.9 Milk Production in Assam, since 2001-02

Year	Milk production (litres)	Annual Growth rate(%)
2001-02	750202013	--
2002-03	773201599	3.07
2003-04	795583946	2.89
2004-05	812082169	2.07
2005-06	821628173	1.17
2006-07	822722251	0.13
2007-08	824396346	0.20
2008-09	827011834	0.32
2009-10	829862664	0.34
2010-11	832720776	0.34
2011-12	838375290	0.68
2012-13	844895377	0.78
2013-14	857285203	1.47
2014-15	872992133	1.83
2015-16	888146889	1.74
2016-17	906315804	2.05
Compound Annual Growth Rate (CAGR)		1.18

Sources: Animal Husbandry &Veterinary Department, Assam; NDDB

3.5.2 Milk Production in Morigaon District

In the district of Morigaon, cattle rearing are cultural. Milk production was prevalent and had been practiced since long. Until 1936, the bridges over the river Killing, Kopili and other tributaries and *beels*[11] were not constructed and the link

[11]Words commonly used for marshy land

to Guwahati and Nagaon town was not developed. There were no such facilities for carrying milk for business purposes. After having the facilities for transportation, some cattle farmer begun settling their grazing with the basic facility of PGRs of the Khasi Jaintia hills and its piedmont stretched northward. On the 15th March 1835 formal possession of Jaintiapur was taken off by British, and in April the plains territory of the district of Gobha was similarly annexed to Nowgong[12] in Assam (anonymous, 1896). Subsequently, the area of Gobha, with concentrated cattle culture transferred to the present district of Morigaon in British regime from Jaintiapur.

Table 3.10 Milk Production in Morigaon District from 2001-02 to 2015-16

Year	Production (litres)	Annual growth rate(%)
2001-02	23243718	
2002-03	19071355	-17.95
2003-04	19384465	1.64
2004-05	18019528	-7.04
2005-06	20702183	14.89
2006-07	21846330	5.53
2007-08	22107284	1.19
2008-09	24905736	12.66
2009-10	25044937	0.56
2010-11	26893200	7.37
2011-12	24196900	-10.03
2012-13	28954637	19.66
2013-14	26256624	-9.32
2014-15	29100227	10.83
2015-16	27679583	-4.88
Compounded Annual Growth rate (CAGR)		1.17

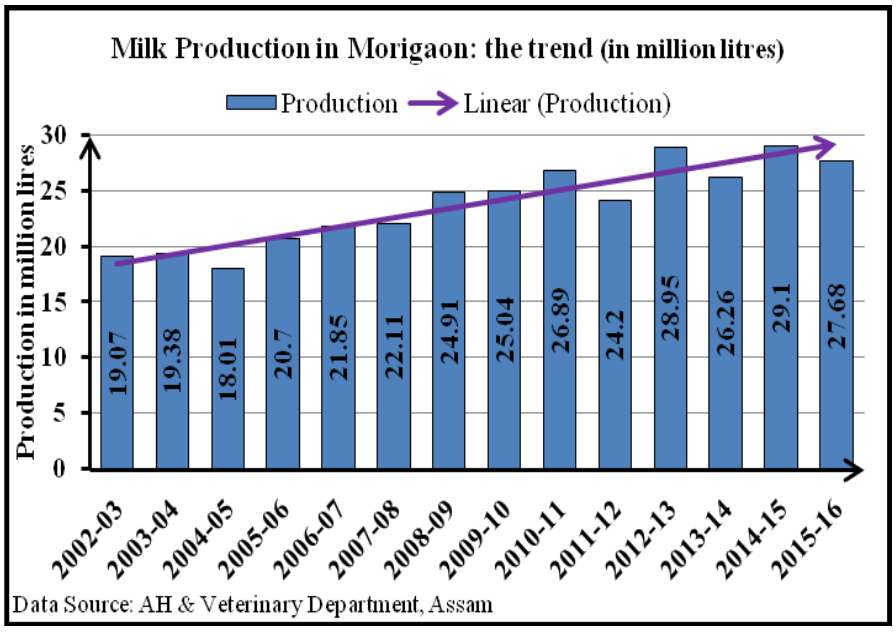
Source: Animal Husbandry & Veterinary Department, Assam

Cattle culture practically begun in hilly terrain with the initiation of Grazing permit system had slowly transited and flourished in the area since 1936 with the beginning of road link to Guwahati and Nagaon. Of course, earlier around the bank of Brahmaputra, the Bhuragaon area had been dominating the

[12]Present Nagaon District was spelt as Nowgong earlier.

production and doing the business of Ghee and *Mawa* only, through the water route to Guwahati and other places. At present, it is not possible to gather the evidence of such activities as the villages with significant cattle production was completely washed away by the great flood, the aftermath of the great quake of 1950 in Assam. After the 1950s, the supremacy of milk production activity in Morigaon district had been shifted to the piedmont areas of Mayong block comprising the areas of Amlighat, Nellie, Jagi Bhakatgaon *etc.* The milk production in Morigaon District was 232243718 litres had reached its lowest to the level of 18019528 litres in the year 2004-05, and after it, the production picked up slowly and reached 29100227litres in the year 2014-15. The production in the year2015-16 reckoned 27679583 litres with a negative growth rate of 4.88 percent. The Compounded annual growth rate (CAGR) found to be 1.17 percent during the period of 2001-02 to 2015-16.

Figure 3.6 Milk Production in Morigaon: the trend



3.6 Milk production in the study area: Income, Employment and Living standard of dairy farmers of the study area.

3.6.1 The income from dairy farming

The income from dairy cattle farming is dependent firstly on milk production and secondly on the business of milk and cattle. The use of milk and cattle is dependent upon the conventionalities and socio-cultural behaviour of society. Further, the level of living standard and employment depends upon income. So long as the level of income from any business inclusive of its nominal and real income remains sufficient to maintain livelihood and living standard the employment remains secured. The income level is always dependent upon the number of cattle, their productivity and production.

The survey data of 171 sampled household show that a total number of cattle were 2456 out of that 2003 were female cattle and only 1042 are found milch cattle. The percentages of milch cattle to total cattle and to total female cattle were 81.56 percent and 42.43 percent respectively. However, the ratio of milch cattle to total female cattle was 0.52. (Table 3.11)

Table 3.11Productivity of cattle of sample households

Category	Unit
Number of total cattle	2456
Number of female cattle	2003 (81.56)
Number of milch cattle	1042 (42.43)
Ratio of milch cattle to female cattle	0.52
Total milk production (LPD)	7727.5
Productivity per milch cattle (LPD)	7.42

Source: Survey Data, LPD- Litres Per Day. (Figures in parenthesis show percent to total)

In the income generation from cattle farming, milk production and productivity of cattle play an important role. The total milk production of sample

households was 7727.5 litres per day (LPD); the annual production was 2820537.5 litres. The average productivity was 7.42 LPD per cattle (Table 3.11). However, the cost of production affects the benefit from production and productivity.

In Mayong Block and in Morigaon, the cost condition faced by the farmers of the cooperative under our study, other cooperatives or any individual farmers were identical. It is because all have to purchase the input material from the same market and at the same price and have to pay the same level of wage. Therefore, the production condition faced by the farmers associated and not associated with cooperatives were the same. Further, the abundance of resources for farming and the environment has an impact on its cost of production. In our study area, the cost fully depends on the cost of feed, green fodder, dry fodder, labour and cost of contingencies and others. Where, contingencies and others comprise the cost of veterinary care, required utensils and cost of capital *etc.*

From the sample data, it is evident that feed and fodder cost comprises a major share of total cost. The composite of feed and fodder cost amounted to 74.53 percent, in the total cost of ₹ 102,132,671, where the share of feed was 53.43 percent, green fodder 8.45 percent and dry fodder comprised 12.65 percent of total cost. The share of labour and contingencies accounted for 17.83 percent and 7.64 percent respectively. In the study area with the annual cost of ₹102,132,671, milk produced annually is 2820537.5 litres. The average cost of milk production, determined by the cost and output is ₹36.21 (Table 3.12). The noteworthy of the feeding practice was that the farmers keep cattle in the stall-feed system and grass was given without chopping. The system of providing feed concentrate was different from other parts of India and world. The concentrates were used to mix with a substantial volume of water and make them drink it. As such, animals might not get the optimum level of water that required for maintaining their body and productivity. Further, a number of farmers were also habituated of providing cooked feed to their cattle. This, in fact, reduces the metabolic capability of animals. On the other part, in the conventional grazing system of cattle providing fodder and feed concentrate in the shelter were almost

absent. This system has an effect on the health of the cattle, as well as the quantity and quality of milk produced.

Table 3.12Production cost of milk in the sample area

Category	Cost in ₹	Percentage of cost to total cost	Milk production (litres)
Feed	54571500	53.43	
Green Fodder	8624621	8.45	
Dry fodder	12924350	12.65	
Labour	18214400	17.83	
Contingences	7797800	7.64	
Total	102132671	100.00	2820537.50
Average cost of production (per litre)	36.21		

Source: Survey Data

During the period of data collection, it is observed that the farm using more green fodder uses less dry fodder. Further, some farms use more labour because the labourers employed at farm household are used to perform a variety of jobs inclusive of collecting green fodder and haying *etc.* The table shows that only 8.45% of the total cost has been attributed to green fodder. Observation also shows that farmers are expending 53.43% of total cost on feed. When this was discussed with Dr. Madhu Mohini Dutta during her visit to Sitajakhala, informed that the feed cost of the area was more than in any part of north India. Again, some farmers also said that they like to rely more on fodder than feed; whereas the situation compels them to expend more on feed. Depleting grazing lands where the early stage of professional dairying was dependent had never been allocated for animal agriculture and a maximum of feed items not only for study area but also for the state itself has been remained items to be imported. The prices of feeds are not even under the control of the Government of Assam. Therefore, the cost of production of milk is higher in the state.

The dairy farmers of our study area have the sole aim of producing milk and earn a livelihood from milk production. In the area, no farm has been able to economically utilise the dung produced except utilizing for household biogas. On

the other hand, neither of them has been observed rearing cattle for dung and animal production. They are devoted to producing milk and to some extent milch animal for the purpose of replacement of herd and capital earnings.

The income from dairy farming basically can be summarized in two typological categories:

a) Income from milk production and

b) Income from dung and animal production.

3.6.2 Income from milk production

In the Indian system of cattle farming, milk production forms a substantial part of the income. Further, it is observed that the income of dairy cattle farmer can be calculated in three parts. First, the regular income from milk production, second the income from dairying total comprising the income from animal production and other by-products like dung *etc.*, thirdly the total income of the farmer, comprising income from dairying total plus income from other sources. In this study too alike other regions in India, it was observed that the major share of incomes come from the production of milk. The survey data covering 171 households' and a total population of 958, with average family size 5.6 (Appendix 3-III) that Gross Value Added of dairy was ₹28607664.00 and per capita Gross Value Added was ₹29861.86. That is, monthly per capita income from dairying total accounted to the tune of ₹ 2488.49. Average family income from dairying was ₹ 13941.36 (Table 3.14). It is to be noted that 'contributory income share of livestock to 'agriculture and allied activities is less than 20 percent in Assam' (GOI, 2012, p. 21)'. In India, 'Milk is the main output of livestock sector accounting for 66.7 percent of the total value of the output of livestock' (GOI, 2012, p. 21). However, it is observed from the primary data that in the value of total net income, the share of income from milk was 41.68 percent and share of income from dairy farming in aggregate was 73.01 percent among the sample households. The contributions of other sources, comprising income from cultivation, other business along with wage and salary earnings were 26.99 percent.

Table 3.13 Income of survey households from different sources

(Production and Income in ₹)

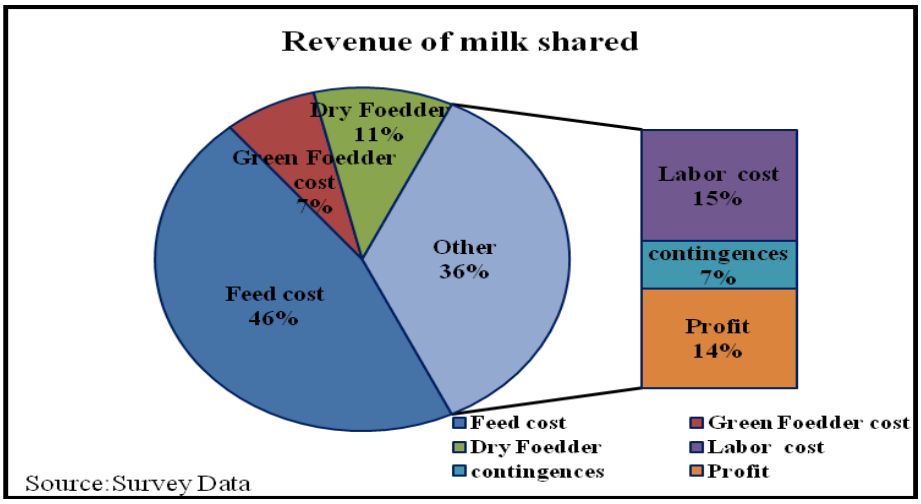
Category of Income	Milk Production	Animal Production	Dairy Farming	Other Sources	Total
1	2	3	4 (2+3)	5	6 (4+5)
Income	16329904	12277760	28607664	10575600	39183264
Per capita income	17045.83	12816.03	29861.86	11039.25	40901.11
Monthly Per capita income	1420.49	1068.00	2488.49	919.94	3408.43
Annual average family income	95496.51	71799.77	167296.28	61845.61	229141.89
Monthly average family income	7958.04	5983.31	13941.36	5153.8	19095.16
Share (percent to Total)	41.68	31.33	73.01	26.99	100

Source: Survey Data

3.6.3 The milk revenue and its share in the study area

The maximum of the milk revenue is shared by the cost of feed and fodder. The feed and fodder cost combined shares 64 percent of the total milk production. 15 percent is the labour cost, and a part of this goes as farmer's income where the farmer rears his cattle without outsourcing of labour. The profit has been found to the tune of 14 percent of the total milk production. The cost of feed and fodder of dairy cattle farming forms the additional income of rural cultivators of the state as well as in our study area. The most prominent of the importance of dairy cattle farming for rural area is that it generates cash and cash transactions twice a day. This keeps farmers out of the depressive psychological situation.

Figure 3.7 Revenue of milk shared by factors



The gross income from milk proper was the highest proportion of income earned by the dairy cattle farmers of the study area. Entrepreneurs, as factors of productions, acquire the residual or profit. The revenue of milk shared among the factors of productions. The total revenue income from milk production proper was ₹118462575. The distributive share among feed cost, green fodder cost, dry fodder cost, labour cost, contingencies and profit of the entrepreneur were ₹ 54571500, ₹8624621, ₹12924350, ₹18214400, ₹7797800 and ₹16329904 respectively (Table 3.14). The chart (Figure 3.7) depicts the approximate percentage share of feed cost, green fodder cost, dry fodder cost, labour cost, contingencies and profit was 46 percent, 7 percent, 11 percent, 15 percent, 7 percent and 14 percent, respectively in the total revenue from milk proper.

Table 3.14 Revenue of milk shared among sample households

Particulars	Cost/Profit in ₹	Percent share of total revenue
Feed cost	54571500	46.06
Green Fodder cost	8624621	7.28
Dry Fodder cost	12924350	10.91
Labour cost	18214400	15.37
Contingences	7797800	6.58
Profit	16329904	13.78
Total Revenue	118462575	100.00

Source: Survey Data

The total revenue earned by the farmers at an average is higher in the long run when the income from animal production and other sources is combined. In the short run, a dairy farmer may result in a loss during the off lactation period of his farm herd. During our study, the farmers have revealed that a farm generally has to bear losses around three to four months a year. Therefore if data collection is done at a certain point in time, there is a possibility of having negative profit data from one-third of the farm being randomly selected. However, in the long run, if a farmer can sustain his farm and family even with a minimal of profit from milk production can make saving or raise living standard with the earning from the animal production and other.

3.6.4 Total revenue of Dairying total and its share

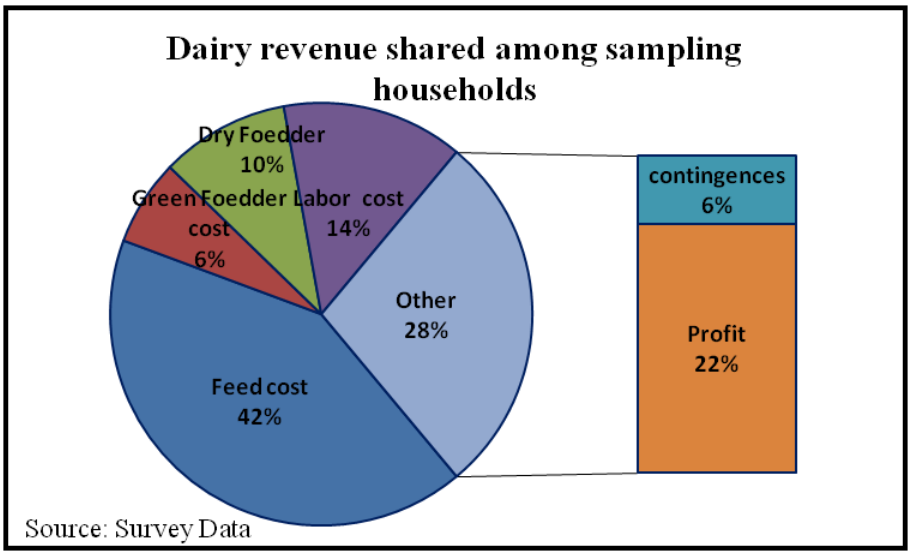
The sale proceeds of cows or calves by dairy farmers form animal production. The revenue of dairying total was the sum of the value of animal production and revenue earnings from milk productions. It is not a regular type of income Dairy farmers get that once or twice in a year. In this study, the income accrued from this source was accounted to be ₹ 12277760. The income summed up with the income from milk, ₹ 16329904 amounted to income of dairying total, ₹ 28607664 (Table 3.13). The income from dairying in total was accounted to be 42.92 percent. After the inclusion of revenue of animal production, the total revenue rises to the tune of ₹ 130740335. (Appendix-3-III). The contribution of animal production raises the entrepreneur share or profit. Moreover, the share of other factors scales down nominally.

Table 3.15 Total Revenue of dairy farming shared

Particulars	Amount	Share (%)	Rounded (%)
Feed Cost	54571500	41.7403	42
Green Fodder	8624621	6.5967	7
Dry fodder	12924350	9.8855	10
Labour Cost	18214400	13.9317	14
Contingencies and Others	7797800	5.9643	6
Profit	28607664	21.8812	22
Total revenue	130740335	100.0000	100

Source: Survey data

Figure 3.8 Dairy revenue shared among sampling households



After the inclusion of animal production on the total revenue it was seen that the total profit amounts to the tune of about 22 percent of total production and feed cost share coming down by 4 percent, from 46 percent to 42 percent and all another cost by 1 percent each. Moreover, the cost of green fodder, dry fodder, and parts of feed cost and contingences provides the prospects of employment avenues through backward linkages

3.6.4.1 Income from dung and animal production

In our study, it is found that the average profit level of milk production is 14 percent of the total cost. The cost incurred on feed and fodder accounts for over 64 percent of the total revenue earned from milk production and 59 percent total revenue earned from dairy farming. The labour cost shares 15 percent of the total milk production. The costs incurred by the farmers are for the purpose of milk production only. The monetised output of other then milk and dung production they receive is animal production. The ratio of animal production accounts for 9.39 percent of the total production. However, this part of monetary earning is very important for generating sustainability of the farmers and is a net gain as psychologically farmers incur expenditure for milk production, not for animal production.

In other parts of India, the dung produced form an important part of income. Unlike other parts of our country in our study area, no households have been

observed using dung cake as fuel. At present, the biogas is getting popularity. Among dairy households, 54.39 percent has the habit of using biogas. It is also observed that the households keeping other facilities of fuel as a precautionary measure for an emergency, since biogas is available as per the capacity of the installed anaerobic digester, and is free of recurring expenditure. As such, expenditure saved is income earned already as stated in the earlier part of this discussion.

However, it is not customary in Assam to rear cattle for animal or meat production. In the study area, we found no farmer has cash earning from selling the hide, skin, and carcasses or even the dung of cattle. 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.

3.6.4.2 Farmer's dissatisfaction over their income level

In the last few years, many farmers have been expressing displeasure over the rate of margin they have.

Therefore, the study has been initiated with the *Hypothesis:*

"High cost and low return from the production of milk creates disincentives in the occupation of dairy cattle farming"

The sample data has been divided into two groups on the basis of the answer:

Group 1 (Y): This group feels that high cost and low return are disincentives to dairy farming.

Group 2 (N): This group feels that high cost and low return are NOT disincentives to dairy farming.

At the time of tabulation, it was found that out of 171 respondent farmer 145 (84.79 %) had expressed that in comparison to the cost of production the price of milk does not return them to the satisfactory level of income. However, 19 (11.11 %) respondents replied that return from the business was satisfactory. On the other hand, 0.04 percent (Table 3.16) farmers had shown ignorance replying 'Don't Know'. This necessitates us to look into the average annual income of the

dairy cattle farmer; as a central theme of this study. We assumed that the farmers showing displeasure over the price and income have a low average income.

Table 3.16 Response on 'whether high-cost low return create disincentive'

YES	NO	DN
145 (84.79)	19 (11.11)	7 (0.04)

Source: Survey data. (Figures in parenthesis show percentage)

The Hypothesis:

$$H_1: \mu_1 < \mu_2$$

There is a significant difference in the average income level between farmers expressing low average income level causes disincentive in dairy cattle farming and expressing a low average income level does not cause disincentive in dairy cattle farming.

Where:

μ_1 = average income of the group 1 farmer and

μ_2 =average income of the group 2 farmer

And the null hypothesis:

$$H_0: \mu_1 \geq \mu_2$$

There is no significant difference in average income level between farmers having the viewpoint, that low-income level causes disincentive, and those having the viewpoint, that low-income level does not cause disincentive.

For comparing the average income level of the farmer groups (group 1 & group 2), with the data of expressed views of the farmers and their respective income level have been analyzed for comparison of means. For the purpose, Independent t-tests have been used because the sample containing cooperative members, and the sample containing non-cooperative members, are composed of different households, the observations are also different, the two samples are independent of each other, and cannot be viewed as paired data.

First, we have observed the following table of Group Statistics that the mean value of the income level of group 1 and group 2 farmers found to be ₹ 176037.68 and ₹ 124934.74 respectively (Table 3.17). The mean value of the income level of group 1 farmers found to be greater than that of the group 2 farmers.

Table 3.17 Independent Samples Test, Group Statistics

High cost and low return from the production of milk creates disincentives in the occupation of dairy cattle farming		N	Mean	Std. Deviation	Std. Error Mean
Total Net Income Sampled	low-income level causes disincentive	145	176037.68	209356.89	17386.14
	low-income level does not cause disincentive	19	124934.74	205840.89	47223.14

Source: Survey data analysed with SPSS

The Levene's Test for Equality of Variances shows that p>0.05 and p =0.425; *i.e.* the variances are not significantly different.

The t-test for Equality of Means for assessing if the t-test is significant (for α = 0.05) shows that p =0.318 and is >0.05; clearly indicating the mean income level does not differ between group 1 and group 2 farmers (Table3.18).

Table 3.18 Independent Samples Test

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig.(2-tailed)	Mean Difference	Std. Error Difference	95 percent Confidence Interval of the Difference	
									Lower	Upper
Income level	Equal variances assumed	0.639	0.425	1.002	162	0.318	51102.95	50985.10	-49578.13	151784.02
	Equal variances not assumed			1.016	23.16	0.320	51102.95	50321.99	-52956.90	155162.81

That is, There was not a significant difference in the average or mean income level of group 1 and Group 2 farmers in dairy cattle farming, t(*df* 162)= 1.00, p = 0.318. Thus, 'High cost and low return from the production of milk creates disincentives in the occupation of dairy cattle farming do not bear truth from an economic point of view. That is the hypothesis has been rejected. It has been observed that the displeasure among the dairy farmers have been arisen out of the comparison they made with the cultivators, service holders and other professionals. Cultivators get seasonal leisure; service holders get schedule leisure and different professional can avail leisure on their own will, but a dairy farmer has to work absolutely regular without any holiday. Comparison of net income level with the net earnings of equally educated counterparts in government services found to be the source of their displeasure.

Therefore, beyond the nominal income, to have a clear look over their welfare status through dairy cattle farming, indicators of standard of living have been studied.

3.7 The standard of living of survey households

Income generation always is the prime objective of any kind of productive activity. Generation of income only cannot be the indicator of the state of development of a nation. Similarly only the earning of gross money income by households of a society cannot be the indicator of their standard of living. Therefore, in the study area, the pattern of a dwelling house, use of consumer durables, sanitation standard, an excess of electricity, cooking fuel, availability of drinking water *etc.* were observed. This shows that generated income from dairying whether directly or indirectly has been sufficient to run a household by maintaining a minimum level of living standard. It was seen that the real disposable income was just over 22 percent. However, beginning from the food intake to sanitary standard and use of consumer durables and luxuries shows the real income was able to cover the necessary expenditure. The households with dairying have to work hard and scarcely have time for leisure, but enjoy higher real income situation although nominally their income seems less. It is because a household with dairying regularly gets some facilities like i) cooking fuel ii) milk

and iii) manure for their kitchen garden and other. With the biogas plant itself saves fuel cost approximately ₹1000/- per household if we add up the transportation cost *etc.* for the management of LPG or purchase of firewood for a month. Secondly, the availability of milk and milk product thereof provides food security and practically helps them in maintaining the dietary balance of a part of food intake free of cost. The availability of bio-manure keeps the kitchen gardens green throughout the year reducing the cost of vegetable. These are the extraordinary and exceptional benefits of dairy cattle farming. All these help farmers for keeping the living standard high even with the low nominal profit from milk business making saving easier. With the saving, they are able to go for other consumer durables and luxuries. During the study, maximum households explicitly expressed high cost and low return generating disincentive to dairy cattle farming. Yet, they are not ready to go for another option without having the certainty of better than the present one. This implicitly indicates that gross happiness index seems low, but the total economic welfare has been at a satisfactory level. During our interaction with educated dairy farmers to reveal their make parity expectation on wage, demanded their wage level be assigned equally to the daily salary level of equally qualified counterparts in Government service or other company jobs for the calculation of the cost of production. Therefore, a few indicators of the living standard have been chosen for observation during our study. They are discussed as follows:

3.7.1 Housing pattern

The living standard is also reflected in the housing pattern of sample households. In our study area it is observed that among the households of the farmers associated with cooperative, only 0.63 percent of families have been able to construct RCC house, 79.38 percent has Assam Type house whereas 11.88 percent and 8.31 percent of families have Thatched and Government *Awas Yojana* houses, popularly known as *Indira Awas Yojana* (IAY). On the other hand, 18.18 percent, 36.36 percent and 45.45 percent of the farmers not associated with cooperative respectively have RCC, Assam Type and Thatched Houses respectively. Among the household of cooperative farmers, 15 percent have

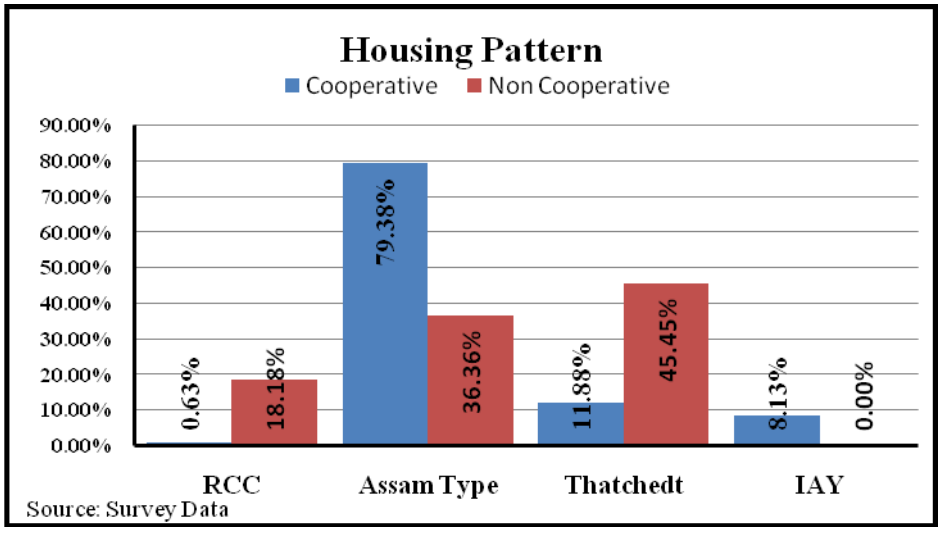
running water facilities (Table 3.19; figure 3.9). This reflects the attraction of the dairy farmers towards modern facilities.

Table 3.19 Dwelling houses of the sample area

Category	Cooperative members	Cooperative Nonmembers
RCC	1(0.63)	2(18.18)
Assam Type	127(79.38)	4(36.36)
Thatched/bamboo wall with roof sheet	19(11.88)	5(45.45)
IAY*	13(8.13)	0(0.00)
Total	160(100)	11(100)

Source: Survey data
(Figures in parenthesis shows percent to total)
*IAY refers to Government's Awas Yojana; constructed under Government scheme of Rural Housing.

Figure 3.9 Housing among Sample Households



3.7.2 Fuel and pattern of use

Fuel used for cooking in a household is not only the concern of the ecosystem but also reflects the living standard of a household. Higher the use of renewable energy is better for the environment. In our study area, 58.12 percent of dairy farmers associated with cooperative and 48.45 percent of the dairy farmer not associated with any cooperative informed us that they are mostly dependent on biogas. During the interaction, they revealed that they are used to keep hearth

as a cultural piece and Liquid Petroleum Gas (LPG) precautionary measure. LPG or firewood hearth/ are used when biogas exhaust. The households also informed that they require only one or two cylinders of LPG to manage festive occasions during a year. As such, we observed that a farmer family with around 5 to 6 cattle gets sufficient dung for biogas. The chart (figure 3.10) and Table (3.20) depicts clearly the availability of cooking fuel in sample households in our study area.

Figure 3.10 Cooking fuel in sample households

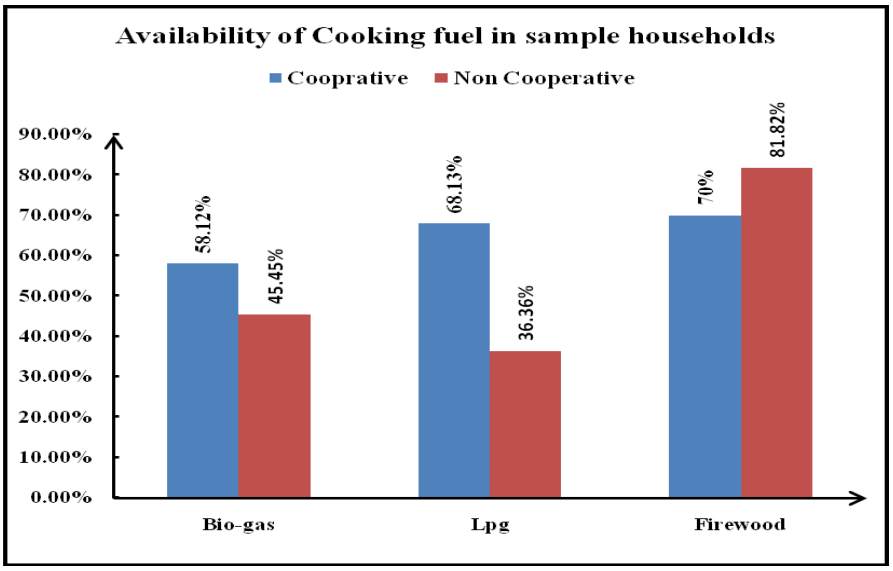


Table 3.20 Availability of cooking fuel among sample households

Category	Bio-gas	LPG	Firewood
Cooperative	93 (58.13)	109 (68.13)	112 (70)
Non cooperative	5 (45.45)	4 (36.36)	9 (81.82)
Total	98 (57.31)	113 (66.08)	121 (70.76)

Source: Primary survey

(The figures in parentheses show percent to total)

3.7.3 Sanitation

The sanitation standard attained by the sample household is one of the important indicators of living standard. Only 1 percent of the sample households

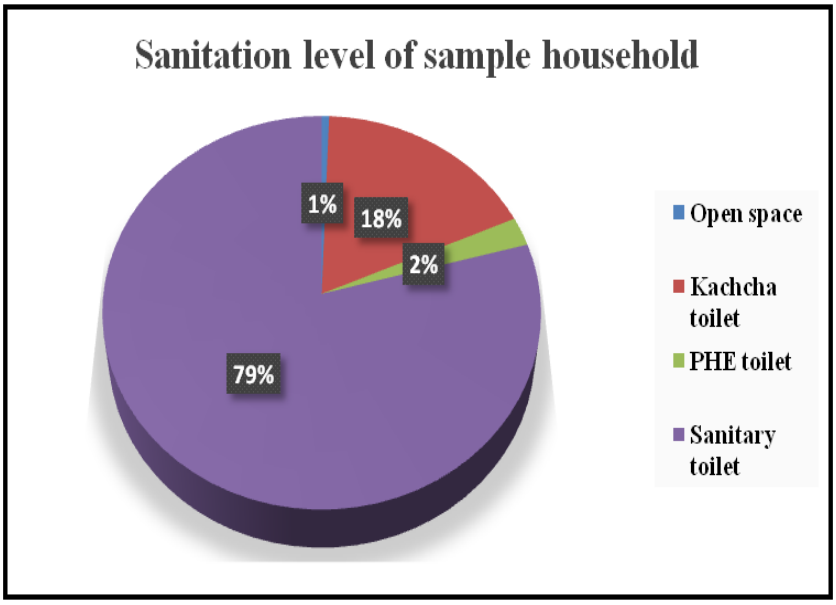
are yet unable to have a proper sanitary standard. 18 percent of households have *Kachcha* toilet, 2 percent has been availing the toilet constructed by government grant through the Public Health Engineering (PHE) department. Table 3.21 and Figure 3.11 depict the scenario clearly.

Table 3.21 Sanitary system among sample households

	Open Space	*Kachcha* Toilet	PHE Toilet	Sanitary Toilet	Total
Cooperative	2 (1.25)	24 (15.00)	3 (1.88)	131 (81.87)	160 (100)
Non Cooperative	0 (0.00)	6 (54.54)	1 (9.10)	4 (36.36)	11 (100)
Grand Total	2 (1.00)	30 (18.00)	4 (2.00)	135 (79.00)	171 (100)

Source: Survey Data
Figures in parenthesis show percent of the total

Figure 3.11 Sanitation among sample households



3.7.4 Use of consumer durables

In our study area for the purpose of investigating the living standard of the dairy farmers data regarding the use of some selective consumer durables such as TV sets, telephone/ mobile phone, two-wheelers, other vehicle, refrigerators and computers had been taken and found that all those articles have been used respectively by 91.88 percent, 97.50 percent, 16.25 percent, 47.50 percent and

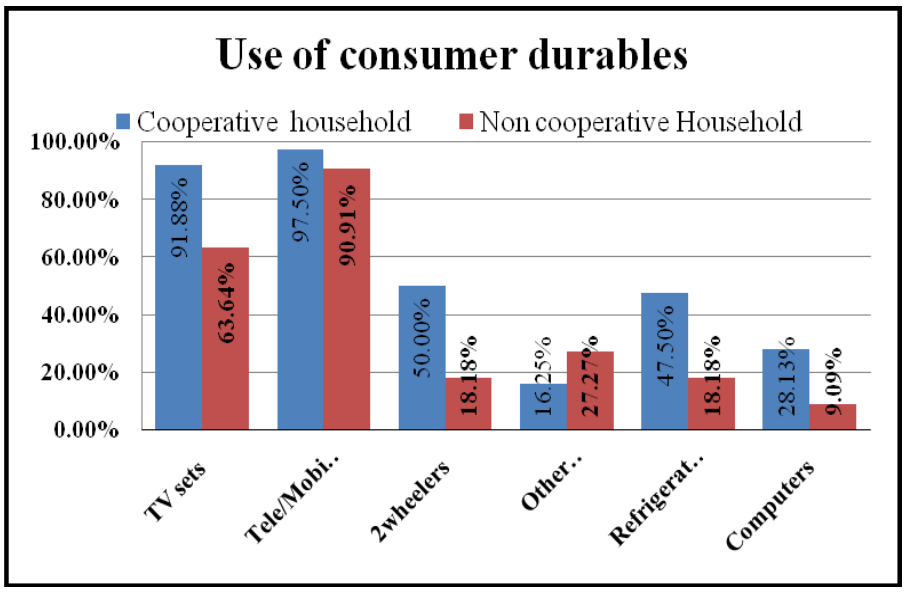
28.13 percent of sample households associated with Cooperative (Table 3.22 & Figure 3.12).

Table 3.22 Use of consumer durables among sampled households

Particulars	Cooperative	Percent of total cooperative Household	Non Cooperative	%of total Non-cooperative Household
TV sets	147	91.88	7	63.64
Telephone/Mobile	156	97.5	10	90.91
2-wheelers	80	50.00	2	18.18
Other Vehicles	26	16.25	3	27.27
Refrigerators	76	47.5	2	18.18
Computers	45	28.13	1	9.09

Source: Primary data

Figure 3.12 Use of consumer durables



3.8 Dairy farming as a tool of employment generation

Dairy farming can be one of the reliable tools for the employment generation in developing countries. In the country like India, the labour supply has been large and will remain larger possibly for a long time to come. It is the employment opportunity that has control over not only on the level of income and living standard but also the nutritional level of the rural masses with a cluster of

an agrarian economy. In areas where chances of success of industrialisation were far away, promoting small entrepreneurship such as dairy farming, horticulture, floriculture *etc.* can play a pivotal role in generating employment and sustainably in regards to income and environment both.

Employment through Dairy cattle farming is generated "on the farm" and "off-farm." Off-farm employment is the outcome of forward and backward linkage of the business.

3.8.1 On-farm and off-farm employment generation through dairy cattle farming: in the study area, Morigaon district and in Assam

The farming activity requires manpower with a certain type and level of knowledge and skill. A conventional farmer learns those skills automatically within their working environment. Other new farmers have to acquire that knowledge through training. Training may be of two kinds, one formal workshop, and other in-service training. In the case of in-service training, the person concerned becomes fully employed and after the training when he takes up a venture of entrepreneurship, can employ others. In the study area, according to our sampling data, number Farm level Employment in the milk production were 656 comprising 171 entrepreneur and 485 labours inclusive of family labour and others. Among the farm worker of 485 the numbers of female labour were 43.92 percent, and among the171 entrepreneurs, 20.47 percent were female (Table 3.23). Entrepreneurs were the claimant of profit from the business. They are fully absorbed in the activities of their respective farms and are fully employed therein. Comprising both entrepreneur and labour, the female share in total employment was 37.80 percent among the surveyed households.

Table 3.23 Farm level Employment in the milk production

Category	Male	Female	Total
Labour	272(56.08)	213(43.92)	485
Entrepreneur	136(79.53)	35(20.47)	171
Total	408(62.20)	248(37.80)	656

Source: Survey data. (Figures in parentheses show percentage to total)

Beyond the surveyed data of this study, no secondary data on employment have been available. This study has no other option then to extrapolating these figures to the district and state level, 'which requires the large assumption that similar employment levels are found per unit of milk across the state, allows some understanding of the level of employment generated' through the similar kind of milk production and marketing in the state (Staal, Pratt, & Jabbar, 2008). The survey data shows that in the study area, per litre of milk production has been generating 656/2820538 numbers of employment (Table 3.24).

Employment generated in the forward marketing and processing of output is off-farm employment. The average of per day milk handled by SJDUSS during January/February is 2018 found to be 15000 LPD. The marketing activity of SJDUSS provides engagements to a total of 144 persons comprising its employees, vendors and others.

Table 3.24 Employment generation through production and marketing

Production		Marketing*	
Total employment on farm Nos.	656	Total employment in milk Marketing Nos.	144
Milk produced annually	2820538	Milk handled annually	5475000
Employment generated per litre	656/2820538	Employment generated per litre	144/5475000

Source: Survey Data

*Average milk handled per annum is inflated from the daily average

SJDUSS after procurement adopts various means to market the total milk. It supplies milk to number of vendors, sells directly to consumer through its numbers of selling points locally in the Morigaon district and selling points in Guwahati city, provides milk to private trader and while some of it is processed as packaged milk, another part is converted into different kind of sweets, cream, *paneer,* curd, *etc.* and sells them through its own parlors. It also transports a proportion of milk, for supplying it to processing unit of WAMUL and other at Guwahati. Thus, the cooperative performs all kind of milk marketing activities.

Therefore, to study the employment generated through processing and marketing of milk, the activities of SJDUSS have been considered reliable.

The estimated direct farm level employment in milk production was 5406 in the year 2001-02. This had increased to the level of 6437 in the year 2015-16. As per the data of Animal Husbandry & Veterinary Department, Assam, the milk retained for home consumption was in decreasing trend, thereby increasing the marketable proportion of increased output. Therefore, the growth of employment through milk marketing had been increasing slowly but steadily. The employment generated through milk marketing in the district was 333 nos. in the year 2001-02. It had risen to 495 in the year 2015-16. The Compound Annual Growth Rate of employment in Morigaon District through milk marketing, production and their total has been found to be 2.68 percent, 1.17 percent and 1.27 percent during the period of 2001-02 to 2015-16 (Table 3.25).

Table 3.25 Milk production and level of estimated employment in Morigaon since 2001-02

Year	Milk marketed percent of Total production in Assam	Milk production in litres	Approximate Milk Handle in the market in litres	Employment through Milk Marketing	Number of employment on farm/production activity	Total Employment Generated	Annual rate of growth percent
2001-02	54.40	23243718	12644583	333	5406	5739	
2002-03	52.51	19071355	10014369	264	4436	4700	-22.12
2003-04	53.70	19384465	10409458	274	4508	4782	1.74
2004-05	54.20	18019528	9766584	257	4191	4448	-7.52
2005-06	54.80	20702183	11344796	298	4815	5113	13.01
2006-07	53.70	21846330	11731479	309	5081	5390	5.13
2007-08	54.60	22107284	12070577	317	5142	5459	1.28
2008-09	55.00	24905736	13698155	360	5793	6153	11.27
2009-10	52.00	25044937	13023367	343	5825	6168	0.24

Year	Milk marketed percent of Total production in Assam	Milk production in litres	Approximate Milk Handle in the market in litres	Employment through Milk Marketing	Number of employment on farm/production activity	Total Employment Generated	Annual rate of growth percent
2010-11	62.00	26893200	16673784	439	6255	6694	7.86
2011-12	64.00	22987055	14711715	387	5346	5733	16.75
2012-13	70.00	27506905	19254834	506	6398	6904	16.96
2013-14	65.00	24943793	16213465	426	5801	6227	-10.86
2014-15	68.00	29100227	19788154	520	6768	7288	14.55
2015-16	68.00	27679583	18822116	495	6437	6932	-5.13
Compound Annual Growth Rate				2.68%	1.17%	1.27%	

source: AH & Veterinary, Assam and Survey data

Employment through milk production and marketing has not been rising much satisfactorily. The employment in Assam through dairy cattle in total was found to be 185216 nos. out of the total 10734 nos. are engaged in milk marketing and 174482nos. found the employment on farm activities in the year 2001-02. The employment through milk marketing, on farm activities and the total, has risen to the level of 15840, 205980 and 221820 nos. respectively in the year 2015-16. The Compound Annual Growth Rate found to be of 1.21 percent in total of which milk marketing registered the growth rate 2.63 percent employment growth rate on farm production activities was 1.11 percent (Table 3.26).

Table 3.26 Milk production and level of estimated employment in Assam since 2002-03

Year	Milk marketed percent of Total production in Assam	Milk Production in litres	Milk Handled in market in litres	Approximate Employment through Milk Marketing	number of approximate Employment on production activity, Assam	Total Employment	Annual rate of growth percent
2001-02	54.40	750202013	408109895	10734	174482	185216	
2002-03	52.51	773196544	406005505	10679	179830	190509	2.78
2003-04	53.70	795583946	427228579	11237	185037	196274	2.94
2004-05	54.20	812082119	440148508	11577	188874	200451	2.08
2005-06	54.80	821628173	450252238	11842	191094	202936	1.22
2006-07	53.70	822722246	441801846	11620	191349	202969	0.02
2007-08	54.60	824395846	450120132	11839	191738	203577	0.30
2008-09	55.00	827011834	454856509	11963	192346	204309	0.36
2009-10	52.00	829862664	431528585	11350	193009	204359	0.02
2010-11	62.00	791084740	490472539	12900	183990	196890	-3.79
2011-12	64.00	796456504	509732163	13407	185240	198647	0.88
2012-13	70.00	802650612	561855428	14778	186680	201458	1.40
2013-14	65.00	814515941	529435362	13925	189440	203365	0.94
2014-15	68.00	882972133	600421050	15792	205361	221153	8.04
2015-16*	68.00	885633000	602230440	15840	205980	221820	0.30
Compound Annual Growth Rate				2.63%	1.11%	1.21%	

Source: AH & Veterinary, Assam and Survey data
* Government of India figure approximated to litre from tonnes

On-farm employment is the employment generated due to production activities of dairy cattle farming. However, off-farm employment generation can be of two types a) generation of employment in the forward linkage of marketing

for performing the transportation, processing, and marketing and b) generation of employment through backward linkages for purchasing of input factors.

3.8.2 Forward and Backward linkage

After milk collection, carry forward it to the sellout point of milk or milk product comprises the activity of forward linkage of marketing. Here employment is generated on points like milk collection booths, on transportation to the processing centre, at the processing centre, transportation to the selling points and at the selling point.

The forward linkage of dairying has been associated with the marketing of milk in peri-urban and urban areas. In this process, employment is generated. In the direct marketing under the cooperative system, the number of employment generated is more than the employment that generated when produced or procured milk is supplied to a trader or other processors by the producer or the producers' cooperative.

Employment through backward linkage is generated on the basis of requirement of feed and fodder for milk producing farms. As it has been obvious that in our state dairy farming or business of milk production has been 'generally owned' and hold entrepreneurship by small and 'marginal farmers and landless agricultural labourers' (Government of Assam, 2017) and is thus highly livelihood oriented. The livestock sector is a basic component of production systems and contributes to the sustainable rural agrarian economy. 'It's fast growth is essential not only to achieve higher productivity levels in livestock products but also for income generation of rural households of the State' (Government of Assam, 2017).

However, in most of the interior rural areas of Assam due to the lack of infrastructural facilities particularly the facility of transportation and the absence of optimal localisation of dairy cattle farming in some areas for producing congenial volume for marketing; farmers are still getting milk price less than the average cost of production. In the areas with transportation and marketing facilities, farmers have to face the problems of lack of natural resources like land, forest or grazing areas, and others. In the areas where natural resources are

available, there arises the problem of milk marketing infrastructure. Only the farmers of rurban areas with natural resources though limited in nature have been surviving with limited expansion. These are the reasons attributive towards the slow growth of milk production in the state.

The observation of sample data of milk income shared in the study area shows that substantial part of the income from milk production has been shared by two important inputs feed and fodder, *i.e.,* 64.26 percent of the milk income. Here it is to be observed that feed and fodder both come from agriculture. Higher demand for feed and fodder provides the impetus for a higher level of output in the agricultural sector. Not only in our study area but also throughout the states of Northeast region as well as in the state of Assam the stub of the crops like paddy, mustard, wheat *etc.* use to be burnt to cleanse the agricultural field. However, with the development of animal husbandry, particularly of dairy farming has the credit of changing that wastage of cultivator to be burnt, to a resource of valuable cash earning. In different parts of the state even till date after harvesting, the stub of different crops has been burnt. On the other hand, the values of crops are hardly able to attract the youths to the field. This is the reason why youth from the villages of Assam has been attracted to the states like Kerala, Karnataka, Tamil Nadu, Gujarat, Punjab *etc.* making own state deficient of even the foodstuff required. As such developing of dairying not only provides employment in the sector but also increases the total return from agriculture turning some agricultural wastage into the marketable output on the one hand and on the other hand, it can increase the productivity by supplying eco- friendly manure.

3.9 Conclusion

The living standard as seen in the above analysis depicts that the farmers have been getting ₹ 42.50 and more in the fringe areas of town or city as well in the areas under farmer's cooperative. This is more than the cost of production estimated from survey data. This indicates that the dairying as a means of livelihood is a successful one at least in the urban areas and in the areas where the farmers' cooperatives have control over the business. Whatever the dissatisfaction at the preliminary stage of our study has been observed, which provided the

stimulus for us to go into the deep study, was basically due to the comparison made by some educationally qualified farmer with the equally qualified counterparts in the different services under Central and State Government. Here the expectation level of educated and semi-educated farmers found not satisfied. Dissatisfaction regarding labour in dairy farming was observed even in 1911 by Clarence Eckles (Eckles, 1911), 'The special objections raised to the labour on the dairy farm are the long hours, the steady, regular work, and the nature of the work'.

In Assam, the prospect of dairy cattle farming was well envisaged during British rule itself. The scenario of British rule with the initial step of keeping Grazing Reserves was very much encouraging for dairy cattle farming. However, in Assam, following the implementation of the exploitative policy of Grazing tax and post 1930s Land policies, particularly on VGR & PGR were not favourable for farmers. After independence, 1960's onward government efforts to develop dairy scenario by installing processing plants had been praiseworthy, but the allocation, placement, and management of the milk processing facilities with the keep safe policy under the bureaucratic control, rather than providing them according to the requirement have been hardly serving the purpose envisaged for. As a result, almost all of the processing plants installed by the government of Assam have been lying defunct at present, and the state is in a shortage of milk by around 180 percent in an average of its own output.

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Appendix 3-I State wise milk production in India and growth in percentage during 2012-13 to 2016-17

Sl. No.	States/UTs	Production of milk ('000 tonnes)				Annual Growth rate (%)		
		2013-14	2014-15	2015-16	2016-17	2014-15	2015-16	2016-17
1	Andhra Pradesh	13007.10	9656.15	10816.99	12177.94	-34.70	10.73	11.18
2	Arunachal Pradesh	43.35	46.07	50.13	52.53	5.90	8.10	4.57
3	Assam	814.52	829.47	843.46	861.27	1.80	1.66	2.06
4	Bihar	7197.06	7774.89	8288.42	8711.07	7.43	6.20	4.85
5	Chhattisgarh	1208.61	1231.57	1277.32	1373.55	1.86	3.58	7.01
6	Goa	67.81	66.60	54.34	51.36	-1.82	-22.56	-5.80
7	Gujarat	11112.20	11690.57	12262.35	12784.12	4.95	4.66	4.08
8	Haryana	7441.67	7901.35	8381.33	8974.75	5.82	5.73	6.61
9	Himachal Pradesh	1150.81	1172.16	1282.86	1329.11	1.82	8.63	3.48

Sl. No.	States/UTs	Production of milk ('000 tonnes)				Annual Growth rate (%)		
		2013-14	2014-15	2015-16	2016-17	2014-15	2015-16	2016-17
10	Jammu & Kashmir	1614.67	1950.93	2273.35	2376.09	17.24	14.18	4.32
11	Jharkhand	1699.83	1733.72	1812.38	1893.80	1.95	4.34	4.30
12	Karnataka	5997.03	6120.93	6344.01	6562.15	2.02	3.52	3.32
13	Kerala	2654.7	2711.13	2649.82	2520.34	2.08	-2.31	-5.14
14	Madhya Pradesh	9599.20	10779.07	12148.37	13445.32	10.95	11.27	9.65
15	Maharashtra	9089.03	9542.29	10152.61	10402.15	4.75	6.01	2.40
16	Manipur	81.70	82.17	78.97	78.82	0.57	-4.05	-0.19
17	Meghalaya	82.16	82.96	83.95	83.96	0.96	1.18	0.01
18	Mizoram	15.30	20.49	22.00	24.16	25.33	6.86	8.94
19	Nagaland	80.61	75.69	77.00	79.37	-6.50	1.70	2.98
20	Odisha	1861.19	1903.14	1930.47	2003.42	2.20	1.42	3.64
21	Punjab	10011.10	10351.41	10774.20	11282.06	3.29	3.92	4.50
22	Rajasthan*	14573.10	16934.31	18500.08	20849.59	13.94	8.46	11.27
23	Sikkim	45.99	49.99	66.74	54.35	8.00	25.10	22.80
24	Tamil Nadu	7049.19	7132.47	7243.53	7556.35	1.17	1.53	4.14
25	Telangana	-	4207.26	4442.45	4681.09	NA	5.29	5.10
26	Tripura	129.70	141.23	152.23	159.59	8.16	7.23	4.61
27	Uttar Pradesh	24193.90	25198.36	26386.81	27769.74	3.99	4.50	4.98
28	Uttarakhand	1550.15	1565.35	1655.81	1692.42	0.97	5.46	2.16
29	West Bengal	4906.21	4961.00	5038.47	5182.60	1.10	1.54	2.78
30	A&N Islands	14.21	15.56	15.43	16.14	8.68	-0.84	4.40
31	Chandigarh	44.43	44.00	43.18	36.39	-0.98	-1.90	-18.66

Sl. No.	States/UTs	Production of milk ('000 tonnes)				Annual Growth rate (%)		
		2013-14	2014-15	2015-16	2016-17	2014-15	2015-16	2016-17
32	D.& N. Haveli*	11.00	8.52	8.52	7.50	-29.11	0.00	-13.46
33	Daman & Diu	0.82	0.82	0.80	0.62	0.00	-2.50	-29.03
34	Delhi*	284.31	280.06	280.83	279.11	-1.52	0.27	-0.62
35	Lakshadweep	6.07	4.19	3.25	3.24	-44.87	-28.92	-0.31
36	Puducherry	47.25	47.64	48.04	48.31	0.82	0.83	0.56
	All India	137686	146313	155490	165404	5.90	5.90	5.99

Source: Basic Animal Husbandry & Fisheries Statistics 2017, GOI

Appendix 3-II State wise milk production in India and growth in percentage during 2011-12 to2013-14

Sl. No.	States/UTs	Production of milk ('000 tonnes)			Growth rate (%)		
		2011-12	2012-13	2013-14	2011-12	2012-13	2013-14
1	Andhra Pradesh*	12088.00	12761.65	13007.07	7.89	5.57	1.92
2	Arunachal Pradesh	21.93	22.72	43.35	-22.62	3.60	90.80
3	Assam	796.00	799.67	814.52	0.76	0.46	1.86
4	Bihar	6643.00	6844.84	7197.06	1.93	3.04	5.15
5	Chhattisgarh	1119.00	1164.05	1208.61	8.73	4.03	3.83
6	Goa	59.85	61.24	67.81	0.72	2.32	10.72
7	Gujarat	9817.00	10314.63	11112.18	5.32	5.07	7.73

Sl. No.	States/UTs	Production of milk ('000 tonnes)			Growth rate (%)		
		2011-12	2012-13	2013-14	2011-12	2012-13	2013-14
8	Haryana	6661.00	7040.24	7441.67	6.28	5.69	5.70
9	Himachal Pradesh	1120.00	1138.60	1150.81	1.57	1.66	1.07
10	Jammu & Kashmir	1614.43	1630.56	1614.67	0.32	1.00	-0.97
11	Jharkhand	1745.00	1679.00	1699.83	12.22	-3.78	1.24
12	Karnataka	5447.00	5718.22	5997.03	6.52	4.98	4.88
13	Kerala	2716.00	2790.58	2654.70	2.71	2.75	-4.87
14	Madhya Pradesh	8149.00	8837.79	9599.20	8.45	8.45	8.62
15	Maharashtra	8469.00	8733.69	9089.03	5.28	3.13	4.07
16	Manipur	78.61	80.03	81.70	0.78	1.81	2.08
17	Meghalaya	79.69	80.52	82.16	-0.18	1.04	2.04
18	Mizoram	13.91	13.63	15.30	21.70	-2.01	12.29
19	Nagaland	78.00	78.66	80.61	2.59	0.85	2.48
20	Odisha	1721.00	1724.40	1861.19	3.14	0.20	7.93
21	Punjab	9551.00	9724.34	10011.10	1.35	1.81	2.95
22	Rajasthan	13512.00	13945.92	14573.05	2.10	3.21	4.50
23	Sikkim	45.00	42.24	45.99	4.65	-6.13	8.87
24	Tamil Nadu	6968.00	7004.73	7049.19	2.00	0.53	0.63
25	Tripura	111.00	118.04	129.70	5.86	6.34	9.88
26	Uttar Pradesh	22556.00	23329.55	24193.90	7.25	3.43	3.70
27	Uttarakhand	1417.00	1478.38	1550.15	2.42	4.33	4.85
28	West Bengal	4672.00	4859.23	4906.21	4.48	4.01	0.97
29	A&N Islands	26.00	21.45	14.21	2.80	17.50	-33.74

Sl. No.	States/UTs	Production of milk ('000 tonnes)			Growth rate (%)		
		2011-12	2012-13	2013-14	2011-12	2012-13	2013-14
30	Chandigarh	45.09	44.03	44.43	0.38	-2.35	0.91
31	D.& N. Haveli	11.00	11.00	11.00	4.73	0.00	-0.03
32	Daman & Diu	1.00	1.00	0.82	-28.06	0.00	-17.64
33	Delhi	502.00	286.58	284.31	4.66	-42.91	-0.79
34	Lakshadweep	2.38	2.21	6.07	20.20	-7.14	174.64
35	Puducherry	45.09	47.17	47.25	-3.72	4.61	0.18
All India (rounded off)		127904	132430	137685	4.97	3.54	3.97

*includes Telangana State
Source: AHS Unit OM No.26-1-4/2013/ParlM/AHS dated 04.03.2015

Appendix 3-III Summary of survey data

sl. no	Summary of survey data	
1	Number of villages covered	6
2	Total nos. of Household Covered	171
3	Total Population	958
4	Total female population	474
5	female ,Male ratio	0.98
6	SC	18.71%
7	ST	14.62%
8	OBC	14.62%
9	GEN	52.05%
10	Ratio of farmer associated with Cooperative	93.60%
11	Total Cattle nos.	2456
12	Total Female Cattle nos.	2003

sl. no	Summary of survey data	
13	Total Milch Cattle nos.	1042
14	Ratio of milch cattle on Total cattle	42.43%
15	Ratio of milch cattle on Total female cattle	52.02%
16	Marketed Milk Production Daily in litre	7353
17	Household Consumption of milk in litre	376
18	Total milk Production daily in litre	7729
19	Total Annual Milk Production in litre	2820537.5
20	Total Revenue earnings from Milk INR	118462575
21	Total Revenue earnings (Milk+ Animal Production)	130740335
22	Ratio of animal production	9.39%
23	Total Cost INR	102132671
24	Profit from milk INR	16329904
25	Profit percentage of milk production only	14%
26	Total profit (Milk+ Animal Production)	28607664
27	Total profit (Milk+ Animal Production)	22%
28	Daily Average household marketable Production	45.19 litres
29	Daily Average household consumption of milk	2.21
30	Average annual household output INR	764563.36
31	Productivity/Cattle	7.42 Ltres
32	Per capita Consumption of milk	392ml
33	percentage of animal production to total Revenue after replacement cost	9.40%
34	Cost of production of milk per litre	₹ 36.21
35	Direct farm level employment of labour	485
36	Employment as entrepreneur	171
37	total employment	656
38	Average annual output of milk for one unit of labour in litres	4299.6

sl. no	Summary of survey data	
39	Coefficient of farm level direct employment when production level is available annually	0.00023258
40	Average output of milk for one unit of labour in litres	11.78
41	Average producers price of milk with farmer's cooperative	₹ 42.5
42	Average producers price of milk without farmer's cooperative	₹ 35.5
43	Coefficient of farm level direct employment when production level is available on per day	0.0848896

Source: Survey Data

CHAPTER – IV
MILK MARKETING

4.1 Introduction

Philip Kotler has defined Marketing as a 'Social and managerial process by which individuals and groups obtain what they need and want through creating and exchanging products and value with others' (Kotler *et al.* 2005). According to the FAO manual, marketing is 'the performance of all business activities involved in the flow of goods and services from the producer to the consumer.' The process of flow of goods takes place with a number of market activities and intermediaries functioning in it as their business for the highest possible profit. The number of players in between producers and consumers has an effect on consumer price as well as farm gate price.

Generally, buying and selling of agriculture and animal husbandry or animal agriculture output is known as agricultural marketing. In India, irrespective of geographical area and production systems, agricultural marketing mechanism is understood to be the means to reach out to the consumers at the lowest level.

In the milk production business, facilities of proper marketing chain are the most important infrastructure. The Indian dairy history reveals that before the formation of Kaira District Cooperative Milk Producers Union Limited (KDCMPUL), India had to import milk. The formation and success of KDCMPUL and such other cooperatives and cooperative unions infrastructurally developed the Indian dairy sector to such an extent that, today; India is the highest milk producing and exporting nation. The basic behind the development of this sector had been the remunerative price to the producer farmers.

In the case of milk marketing, the additional problems encountered are its high perishable nature compounded with fluctuation in demand. On the other hand, in the unorganised marketing chain, the maintenance of quality to the expectation level is very hard. The milk marketing structure in India varies according to the availability of resources for marketing as per the spatial location

in different states, the model of farming, facilities from government, ethos and enthusiasm of farmers and traders in regards to maintenance of quality *etc.*

The cooperatives and cooperative unions are organisational infrastructures and the facilities for processing, preserving and maintenance of cold chain *etc.* are a physical infrastructure of milk marketing. In Assam, the dairy infrastructure for processing *etc.* had been developed and run by the Department of Dairy Development, Assam. The discussion of milk marketing in this chapter starts with the genesis of cooperatives, and continues with the enactment of cooperative law in India, beginning of *Amul*, necessity of cooperatives for dairy marketing, Government effort for dairy cooperatives in Assam, beginning of SJDUSS, beginning of dairy development department and its support service facilities for milk marketing, milk marketing in Assam informal and formal milk marketing and how the formal market players share the market price with producer farmer, relations and differences between West Assam Milk Union Limited and SJDUSS in regards to milk prices and reaches conclusion after comparing the basic ethos of study area milk cooperative, SJDUSS with largest milk marketing cooperative Anand Milk Union Limited(AMUL).

4.2 Genesis of cooperatives

4.2.1 The Rochdale pioneers

Shivajirao G. Patil, Chairman of 'High Power Committee on Cooperatives' opines 'The Rochdale Pioneers demonstrated the cooperative ability not only to help the survival of the people but also of indirectly forcing the market to behave'.'The cooperative route is a dignified way of growth for all; it is particularly so for the marginalised segments of the country, offering the small man as it does the chance to enter a "world of bigness"(GOI, Report of the High Powered Committee on Cooperatives, 2009). This has been tested successfully way back in the nineteenth century when 'Rochdale Pioneers' not only successfully revitalised their members but also generated the principles of cooperatives, with which the modern day cooperatives are running. The Rochdale, with the total of twenty-eight members comprising among them almost impoverished weavers who started a shop in Toad Lane in 1844; a shop that

became the first successful co-operative in the world; a co-operative that defined the principles for all later co-operatives to follow (Brett, 1994). George Jacob Holyoake discussing the 'Rochdale Pioneers' stated, 'A co-operative society commences in persuasion, proceeds by consent, seeks success by common efforts, incurs risks, and shares losses, intending that all its members shall proportionately share whatever benefits are secured. The equality sought is not mad equality of "Equal division of unequal earnings,"[13] but an equitable award of gains proportionate to work done. (Holyoake, 1906)' He assessed that the Rochdale was persuaded by the thought of 'Owenism'[14], first pioneered by those 28 members who had provided their common consent out of their necessity; so, they were ready to share losses, put the healthiest effort in it for sharing benefit equally. This accrued the benefits not only to Rochdale but also set the principle of cooperatives for centuries.

Before and after the Rochdale Pioneer there were numbers of instances of cooperative effort. However, the importance of Rochdale lies in the context of our nation as well as its philosophic role in the formation and operation of the International Cooperative Alliance (ICA). Rochdale through its journey selflessly acted on the evolution of evaluated philosophy displayed at the Rochdale Pioneers Museum in England. The words displayed reads as,

> 'The co-operative ideal is as old as human society. It is the idea of conflict and competition as a principle of economic progress that is new. The development of the idea of co-operation in the 19th century can best be understood as an attempt to make explicit a principle that is inherent in the constitution of society, but which has been forgotten in the turmoil and disintegration of rapid economic progress.'

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[13] Ebenezer Elliott wrote the best description of what communism is not; Elliott repeated it amid the charming hedgerows, where he wrote his song of "The Wonders of the Lane":
"What is a Communist? One who hath yearnings
For equal division of unequal earnings,
Idler or bungler, or both, he is willing
To fork out his penny and pocket your shilling."

[14] Owenism is the utopian socialist philosophy of 19th-century social reformer Robert Owen and his followers and successors, who are known as Owenites. Owenism aimed for radical reform of society and is considered a forerunner of the cooperative movement (Garrett, 1972)

The Rochdale had begun in necessity, provides the philosophic lead in forming the International Co-operative Alliance (ICA). The ICA is a 'non-profit international association established in 1895 to advance the co-operative social enterprise model' is the apex organisation for co-operatives worldwide and as on January 2015 'representing 284 cooperative federations and organisations across 95 countries' of the world (International Co-operative Alliance, 2015) is the custodian of the Co-operative Values and Principles at international level.

4.2.2 Enactment of cooperative law in India (1904)

Even before formal cooperative structures came into being through the passing of a law, the practice of the concept of cooperation and cooperative activities were prevalent in several parts of India. Village communities collectively creating permanent assets like village tanks or village forests called *Devarai* or *Vanara*i or collecting small contributions in cash at regular intervals to lend to members of the group *viz.*, *Dhikuti*, working together alternately during the season of cultivation known as *Pal Mela* (in Assam) *etc.* and similar others are a few examples of cooperation. 'Taking cognizance of these developments and to provide a legal basis for cooperative societies, the Edward Law Committee with Mr. Nicholson as one of the members was appointed by the Government to examine and recommend a course of action. The Cooperative Societies Bill, based on the recommendations of this Committee, was enacted on 25th March 1904'.(GOI, Report of the High Powered Committee on Cooperatives, 2009)

4.2.3 The beginning of *Amul*

The beginning of *Amul* was a revolution against corruption initiated by the middleman. In 1929, the Polsons dairy was established by a private concern at Anand and bestowed with monopoly power for milk collection from Anand, by the then provincial Bombay Government. The Polsons, used to pay the price as low as possible, reaping the highest possible benefit out of farmers toil. Verghese Kurien stated the reason behind the formation of the first dairy cooperative in Gujrat in the words 'In the mid-1940s when the milk producers in Kaira, asked for a share of the profits, they were denied even a modest increase. The milk producers went on strike, refusing to supply milk to Polsons. The Kaira milk

cooperatives began as a response to put an end to this exploitation.' (Kurien, Verghese, 2004)

'The first dairy cooperative in Gujarat was the result of a farmers' meeting in Samarkha village (Kaira district, Gujarat) on 4th January 1946, called by Morarji Desai on the advice of Sardar Vallabhbhai Patel, to fight rapacious milk contractors. It was Sardar's vision to organize farmers, to have them gain control over production, procurement and marketing by entrusting the task of managing these to qualified professionals, thereby eliminating the middlemen. In the pursuance of Sardar Vallabhbhai Patel, Tribhuvandas Patel was selected Chairman of the committee. Later in 1949-50 'Young Kurien, volunteered to help Shri Tribhuvandas Patel, the Chairman of Kaira District Cooperative Milk Producers Union Limited (KDCMPUL), to set up a processing plant. At that time, only two village milk cooperatives were involved, representing only a handful of farmers.' (Kurien, Verghese, 2004). Later H M Dalaya, who studied dairy engineering at Michigan State University with Kurien, is the one who provided *Amul* with the technical backbone.

4.2.4 The necessity of dairy cooperatives

In India, landholdings are already so fragmented that farming in the industrial pattern still seems like a far-flung idea. The few persons owning land in the required shape are not willing to enter into animal agriculture for producing milk. In such a situation, milk production is the business of marginal and landless farmers. In Assam too in dairy cattle farming the similar situation exist. The average operational land holding in India has been observed and the average size of land holdings was 1.15 hectare in 2010-11. In the same year, marginal and small holder's average land holding sizes were 0.39 hectare and 1.42 hectare only. (Table 4.1).

Table 4.1 Number and Area of Operational Land Holdings by Size - all Groups in India 2010-11

Size Class (in hectare)	Total No. of Operational Holding (ha)	Total Area Operated (ha)	Average size (ha)
Marginal (Less than 1 hectare)	92826	35908	0.39
Small (1.0 to 2 hectare)	24779	35244	1.42
Semi-Medium (2.0 to 4 hectare)	13896	37705	2.71
Medium (4.0 to 10 hectare)	5875	33828	5.76
Large (10.0 hectare and above)	973	16907	17.38
All Holdings	138348	159592	1.15

The table (Table 4.2) shows that in Assam, the average land holding size was below 1 hectare and marginal land holding size was only 0.27274 hectare.

Table 4.2Number and Area of Operational Land Holdings by Size - all Groups in Assam and Morigaon 2010-11

Size Class (in hect.)	Total No. of Operational Holding	Total Area Operated (ha)	Average size (ha)	Total No. of Operational Holding	Total Area Operated (ha)	Average size (ha)
	Assam			Morigaon		
1	2	3	4	5	6	7
Below 0.5	1279535	385255.42	0.30109018	55239	15066	0.27274
(0.5-1.0)	551580	389541.03	0.70622762	13472	10418	0.77331
Marginal	1831115	774796.45	0.42312823	68711	25484	0.37089
(1.0-2.0)	496574	687156.19	1.38379414	19086	27416	1.43645
Small	496574	687156.19	1.38379414	19086	27416	1.43645
(2.0-3.0)	203596	480948.66	2.36226969	6979	16320	2.33844
(3.0-4.0)	99932	337033.83	3.37263169	2946	9794	3.32451
Semi	303528	817982.49	2.69491609	9925	26114	2.63113
(4.0-5.0)	48949	214768.17	4.38759055	1422	6183	4.3481

Size Class (in hect.)	Total No. of Operational Holding	Total Area Operated (ha)	Average size (ha)	Total No. of Operational Holding	Total Area Operated (ha)	Average size (ha)
	Assam			**Morigaon**		
(5.0-7.5)	31280	184189.82	5.88842136	837	4739	5.66189
(7.5-10.0)	4640	38414.24	8.27893103	124	1016	8.19355
Medium	84869	437372.23	5.1534981	2383	11938	5.00965
(10.0-20.0)	1861	24567.5	13.2012359	28	337	12.0357
(20.0 & Above)	2276	257195.09	113.003115	10	628	62.8
Large	4137	281762.59	68.1079502	38	965	25.3947
All Classes	2720223	2999069.9	1.10250886	100143	91917	0.91786

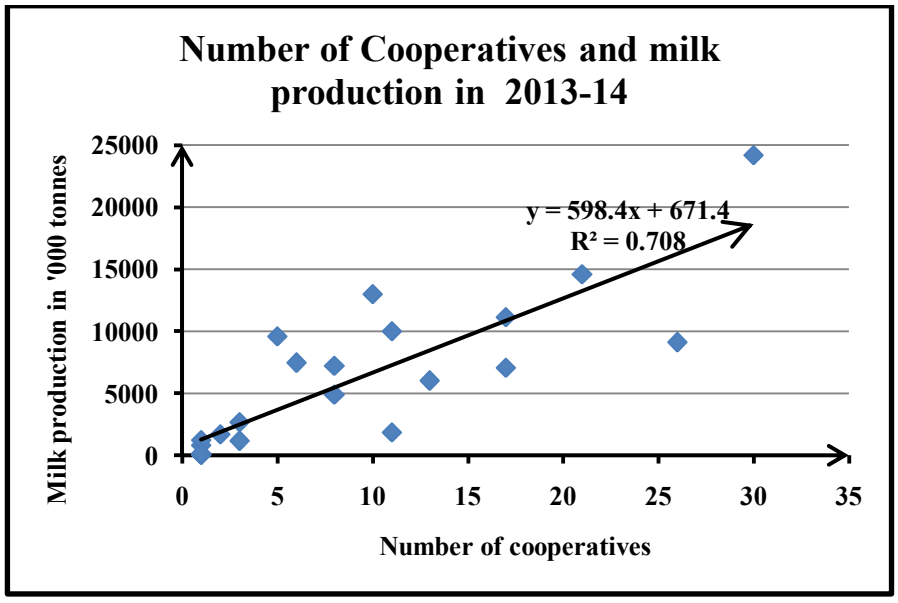
Source: Department of Agriculture, Cooperation & Farmers Welfare [Agriculture Census 2010-11 (Phase-1)].

In the Survey area, operational land holding found to be less than 0.5 hectares. The average size of land holding is coming down continuously. For keeping milk cattle at least in fencing system, needs not less than half a hectare of open land and another half a hectare for fodder cultivation. Earlier the cattle were kept in ranching system in which the rancher popularly known as a grazier in Northeast India had normally been making use of forest land and grazing reserves. But after the high growth of population in the post, independent era land becoming more and scarcer along with the legitimacy of environmental consciousness compelled them to settle down in one place. As such, the conventionally perpetuated cattle farmers hardly have sufficient land to take up the industrial type of cattle farming. Therefore, the convention of *stall feed system* of cattle farming came up in this part of our country. This calls for continuous look after the farms leading no spare time for other innovations like searching, bargaining and transacting in the market twice a day since milking is also to be done twice a day. However, until the period of Grow More food Campaign of pre-independent Assam, Stall Feed system of cattle rearing had not begun. After the Grow More Food Campaign, the Village Grazing Reserves (VGR) and Professional Grazing Reserves (PGR) continuously went on shrinking. This led Grazier to rethink for their survival, and slowly the Stall Fed system crept in

Northeast India. Once the Stall Feed system had begun, the necessity of a cooperative organisation to help farmers, particularly in the marketing of milk and its products become inevitable.

Active cooperatives in the field of milk marketing always ensure remunerative price for the farmers. This increases enthusiasm among the farmers to produce more. It has been observed that the states with strong dairy cooperative structures are producing more milk than that of the state with weak cooperative structure. There are highest 30 nos. of cooperatives in Uttar Pradesh procuring, processing and marketing milk and the state have also produced highest volume amounting to 24193.9 thousand tonnes of milk in the year 2014(Table 4.5). Similarly, Gujrat, Maharastra, Rajasthan, Tamil Nadu and Karnataka have more numbers of cooperatives and producing more milk. The milk productions of different states and the number of active cooperatives are shown in table 4.5. The volumes of milk produced when regressed with the number of cooperatives generate a trend line (figure 4.1) showing the general trend that the volumes of production increase as the number of dairy cooperatives increase. Moreover, it is obvious that not only for the better marketing of farmer's milk production but also to produce more milk dairy cooperatives are essential institutions.

Figure 4.1 Number of Cooperatives and milk production in India, 2013-14



4.3 A push forward by the government of Assam and formation of milk cooperatives

The Government of Assam introduced the dairy development scheme in the State during the last part of the Second Five Year Plan in 1961. Under the scheme, a survey was conducted on various milk pockets and milk shed areas in the state. The target was to procure pure and fresh milk for distributing among the intending consumers of Guwahati town and later to all the important towns in the State. Under the scheme, many Cooperative Societies of milk producers were formed. The Dairy Development Scheme in the State started functioning in 1963 (Amlan Baruah, 1999). 'During Chinese aggression in 1962 the "National Emergency Production Scheme" was launched for coordinating and developing the activities of milk production. Immediately after, in 1963 the first milk supply scheme, *i.e.* "Guwahati Town Milk Supply Scheme" came into operation. At first, the Milk procured was supplied to army personnel, but within a period of one year when the procurement raised supplying milk to the consumers of Guwahati was started from the last quarter in 1964. 'The scheme was supported by the producers of Bhoi area (now under Meghalaya) followed by the producers of Sitajakhala (Jagiroad) and Mikir Hills (Karbi Anglong)' (Shodhganga, 2009). The primary objective was to supply milk to the consumers on 'no profit no loss' basis and to provide an incentive to breeders for increasing production by advancing loans to purchase milch cattle, feed, and equipment and to encourage them for better breeding, feeding and management of cattle. In this process, numbers of primary milk producers' cooperative societies were formed in the then United Khasi Jaintia Hills district. The formations of those societies were mostly encouraged by great expertise viz Dr. J.M. Bujarbaruah, Pulin Baruah, Nandalal Upadhaya along with local people like Bhimlal Lamsal, Jagannath Bawri (Shillong), Kantu Prasad Rijal alias Dumre Mahajan (Umsaw), Bhanu Bhakta Subedi (Nayabanglow), Homlal Lamsal (Mawhati), Kalkatte alias Bal Bahadur Chhetry (Ralla), Madhusudan Bhandari (Kyrdem), Dhaneswer Tiwari (Umrun), U Klemshon Mylliemngap (Ralla) *etc.* Their efforts fruition in the 1970s and formed twelve nos of milk cooperatives. These cooperatives 'had united to form the *BhoiArea*

Milk Producers' Cooperative Union Ltd. with Bhimlal Lamsal (Jaissi) as President and Captain Dhan Bahadur Thapa as Secretary. Here it is worth mentioning that in the History of Dairy Development in the NER the *Bhoi Area Milk Producers' Cooperative Union Ltd.*was the first union to be formed democratically having a characteristic resemblance to ANAND [15] (Upadhaya, Bishnu Prasad, 2017). With the division of the state of Assam, the Dairy Development Department of the state itself deprived of heretofore benefit of that organisational exercise. However, the momentum had been kept going on. 'In 1970-71, the Scheme of Creamery Centre at Guwahati, in North Cachar Hills, and milk supply schemes for towns of Dibrugarh and Tezpur were taken up' (Amlan Baruah, 1999). Initially 'collection of milk under the Gauhati Town Milk Supply Scheme was done from Nayabunglow (presently known as Umsning), Barapani, Lalcherai (present Mowlen) areas (all now under Meghalaya) and Jagiroad, Amlighat, Mayang, Manaha, Kacharigaon, Nelly, Bhakatgaon areas of Nagaon (all now in Morigaon) district and Sipajhar and Garukhuti of Darrang district. The Government of Assam for the first time had taken the initiative for dairy development in 1961. The Scheme of Dairy Development started functioning in the State in the year 1963; under it 'The following chilling plants had been installed at different parts of the State before 1980' (Government of Assam, 1999).

[15]Researcher is grateful to C M Adhikari (Nayabanglow), Krishna Prasad Rijal (Dumre) Son of Late Kantu Prasa Dumre (Umsning), Keshab Koirala (Habang), Late Dilu Subedi (Umroi), Ganesh Gewali (Jagiroad), Chudamani Sharma (Dudhnai), Nandalal Upadhaya (Jagiroad) and Indra Prasad Upadhaya(Amlighat) who during discussion helped with practical Knowledge and information they have.

Table 4.3 Milk chilling plants in Assam before 1980

Name of Chilling Plant	Capacity (LPD)	Distribution
Nayabunglow	10000	Guwahati TMSS
Jagiroad	6000	Guwahati TMSS
Sipajhar	2000	Guwahati TMSS
Boko	1000	Guwahati TMSS
Bokakhat	2000	Jorhat TMSS
Joysagar	2000	Jorhat TMSS
Biswanath Chariali	2500	Tezpur TMSS
Lakhowal	2500	Dibrugarh TMSS

Source: Assam State Gazetteer 1999.

The impact of those facilities still found in the areas of Jagiroad in Morigaon District and Biswanath Chariali in Biswanath District.

The infrastructures are shown in table 4.3, and the milk processing plant at Khanapara is the outcome of the milk revolution started during China aggression. Later the Nayabunglow Chilling Plant had gone from the state as this became the part of Meghalaya. But the cattle culture of Nayabunglow and surrounding areas have been gradually transferred to the peri-urban areas of Guwahati city. In this regard, Jugal Saikia found in his study 'Economics of Informal Milk Producing Units in Guwahati city' that 92.3 percent of entrepreneurs are migrants from Meghalaya state' (Saikia, 2009).

4.3.1 Directorate of Dairy Development

At present, the dairy development is running under the Directorate of Dairy Development. This directorate runs with the spatial arrangement of its organs in three broad parts *viz.* zonal office, Dairy development office and Town Milk Supply Scheme (TMSS).

4.3.1.1 Zonal Office

The Dairy Development Department has four zones to look after the dairy scenario in the state they are a) Nalbari zone, b) Tezpur zone, c) Jorhat zone, and Silchar zone, each zone under the Zonal Deputy Director.

4.3.1.2 Dairy Development office

There are three dairy development offices one each at Goalpara and Nagaon under the control of the Dairy Development Officer. On the other hand, one Dairy Development office at Diphu is at present controlled by Assistant Director, Dairy Extension Services.

4.3.1.3 Town Milk Supply Scheme

There are nine Town Milk Supply Schemes in Assam. The TMSS Khanapara, Guwahati and TMSS Kokrajhar are under the control of Superintendent, Town Milk Supply Scheme and Council Head of Department of Dairy Development, BTAD. All the remaining TMSS at Jorhat, Dibrugarh, North Lakhimpur, Tezpur, Silchar, Umrangshoo and Manja each are headed by Assistant Dairy Development Officer posted there.

Under the offices mentioned above the government of Assam has created three types of infrastructure namely i) Milk Processing Plants, ii) Milk Chilling plants and iii) Bulk Milk Cooling Center.

i. **Milk Processing Plant**: An establishment with equipment and machinery where milk or milk products are procured, handled, processed, pasteurized, packaged, stored, aseptically processed, or prepared for distribution or sell them at bulk or retail is Milk Processing Plant. There are ten such processing plants, one each at Khanapara, Jorhat, Nagaon, Bokakhat, Lahowal, Lakhimpur, Tezpur, Silchar, Umrangshoo and Manza under the Dairy Developed Department Government of Assam.

ii. **Milk Chilling plants:** The process with which the temperature of fresh milk is brought down to 4^0 Centigrade is known as milk chilling, and the plants equipped for the purpose are known as chilling plants. The process by minimization of acidification or souring minimizes the spoilage of milk. The chilling retards souring process and provide ease and ample time for supplying it to the plants for processing and pasteurisation. Thus, it is a midway process between production and processing or product manufacturing. The Government of Assam

through the department after the 1960s till date had installed such Chilling plants in areas of Jagiroad, Joysagar, Tinsukia, Dholla, Biswanath Chariali, Dhekiajuli, Kharupetia, Sariahtali (Nalbari), Sorbhog, Dudhnoi, Hailakandi and Karimganj.

iii. **Bulk Milk Cooling Center:** In the countries where large farming system prevails, it is simply a milk storage tank for dairy farming with an ice-based cooling facility with the help of electric refrigerating compressor. In India and in Assam where the dairying is the business of marginal and landless farmer with small holding keeping a bulk cooling tank by a general farmer is not only beyond imagination but is not cost viable too. Therefore, for the benefit of the dairy farmers of the state the government installs Bulk Milk Cooling Center. In Assam, the government through its Dairy Development Department has installed Bulk Milk Cooling centre one each at Kakopathar, Chabua, Hojai, Bhurbandha, Abhayapuri, Goalpara, Kalain, Lala (Hailakandhi), Badarpur, in the district of Tinsukia, Dibrugarh, Hojai, Morigaon, Bongaigaon, Goalpara, Cachar Hailakandi and Karimganj respectively; two nos. in Nagaon at Kathiatali and Velloguri; three in Barpeta at Nityananda, Howly, and Kolgachiya; three in the district of Dhubri at Chapor, Bilashipara, and Mancachar.

The fact is that the processing plants at Nagaon, Bokakhat, Umrangshoo and Manza are running somehow. The Sarbhog and Kathiatali units are being utilized by WAMUL. All other plants those installed by the Government has been remaining defunct since long years. *Amul* is reconstituting milk somewhere in Guwahati in a private plant and distributing mostly around Guwahati city and other places in Assam.

At Nazira, Sundarpukhuri Milk Cooperative Society has installed 'Milk Processing Plant, Nazira' at Chanbasa, 3 km away from Nazira Town with the cooperation of Deputy Commissioner, Sivasagar and all MLA of Sivasagar and the District Rural Development Agency. The capacity of the plant is 5,000 LPD which is expandable up to 7,500 LPD. The Registered Trade Mark for the product

is "KARENG." The plant is in farmers hand under the cooperative society since the year 2014.

One Processing plant is under construction at Amlighat, Morigaon, Assam. It is a new venture of *Sitajakhala Dugdha Utpadak Samabai Samiti Ltd*. This Cooperative Society after the long experience of sixty years of marketing of raw milk around an average of 15000 LPD has finally decided to install own milk processing plant. It is observed that this processing plant has a bright future since the cooperative need not depend on other parties for raw milk, unlike the Milk Processing Plants that were installed by the Dairy Development Department. The Cooperative has envisioned for a long way and preparing for a modular model of plant with a capacity of 5000 LPD at present extendable up to 25000 LPD in future. The Trade Mark to be registered for the product of this cooperative is *Sitajakhala*.

There are a few other private Milk Processing Plants, *viz.,* Kamrupa Dairy at Khetri, Kamrup, was started in 2009, Dairy Fresh, Prithivi Dairy Private Ltd. and Nandini Dairy also have their respective plants in the state but hardly have any practical impact on dairy business.

4.3.2 The beginning of SJDUSS

The practice of raising livestock for milk was prevalence at Bamungaon (Amlighat) and surrounding area of Morigaon district since the 1930s, but the business was totally unorganised in nature. After independence, when demand for milk in the market had begun to rise, some middlemen paved the way for lucrative profit leading farmers towards more and more distress. That led some socially conscious persons to think in an organised manner so as to be able to fight against the wealthier trader, known as *Paikari*. At the initial stage, 17 cattle Graziers whose only source of livelihood was cattle farming joined their hands to form "*Sitajakhala*" a milk producer co-operative society in the year 1958. Thus, in the necessity of maintaining the sustainability of livelihood, SJDUSS came into inception in the year 1958 and registered *vide* no 67/58-59 at Amlighat, Morigaon, Assam. At the initial stage, the cooperative worked as a negotiating mediator between milk producing farmers and *Paikaris,* the milk trader. Later in the 70s, it

had started functioning fully, performing milk business replacing the private traders. Thus, formed in necessity, SJDUSS enters into the scenario of milk marketing in Assam.

4.3.3 Milk marketing in India

The milk marketing chain in India is running with a mixture of the formal and informal channel of marketing. Traditional milk marketing in India is dominated by private traders. The farmers too are compelled to sell their output to whosoever is within their reach and excess and provides a better price or can persuade them better benefit at present or future in perpetuity. However, the market stability is concerned the cooperatives in our country have the highest impact on the market mechanism for milk; although the traditional milk marketing has the highest market share.

In studies by FAO, the milk marketing system in India has shown that there are at least 8 different marketing channels (Table 4.3). When a producer sells his output directly to consumers, the possibility of middlemen does not exist, and the farmer gets whole the market price as his share. This kind of marketing chain is not suitable for the professional dairy farmer; because of this, the farmer has to spend more time selling products. However, it can be observed that higher the number of intermediaries higher would be the consumer price and least would be the producer's share. On the other hand, more the private parties as intermediaries lesser would be the benefit of producer as well as the consumer in terms of price or quality or both. This was the reason why the beginning of *Amul* was called a 'revolution against corruption initiated by the middleman'. That is more powerful the formal milk marketing channel more would be the benefit for both producers and consumers. Here it is to be noted that, more the farmer's organisations are handy with institutions of marketing channels higher would be the farm gate price and better would be the quality for consumers. This is the reason for higher production in the states where cooperative milk marketing channels are strong. Uttar Pradesh has the highest number of cooperative union/units involved in production, procurement; processing and marketing of milk as on December 2014 also have the highest productions of milk. Gujarat fourth in regards to the number of dairy cooperatives similarly holds the same fourth position in milk production

also. We may not find one to one such matching if we consider the case of all states in India; however, a close look provides evidence of a correlation between the number of cooperatives and total milk production (Table 4.5 and Figure 4.2)

4.3.4 Milk Marketing Channels in India

The marketing channels for any product is very much important infrastructure for achieving the required goal in the in production as well as the distributional aspect of income of the output and quality product for the consumer. All over India, the informal channels of milk marketing are strong enough. The lack of sufficient and remunerative formal institutional channels where milk producer can rely upon is the reasons behind the continuation of informal milk marketing. Milk being the commodity of daily necessity as well as cultural in the context of the Indian cultural sphere, therefore in general people want to have fresh farm milk as far as possible. This creates a large space for informal milk trader. A few other important factors for not picking up of formal milk marketing are the cost of processing, leading higher price in comparison to non-processed milk and the ignorance of consumer regarding the benefits of processed milk as well as dangers of non-processed milk.

On the other hand, the milk marketing channels have an impact ranging from farm gate price to the quality to the consumer. In the case of the informal state of marketing with the unpackaged product, the higher the numbers of intermediaries lower would be the quality to reach consumer as well as lower the price for the producer.

In the field of the milk marketing, the marketing system where the quality of milk finds the consumer's glass without compromising the maximisation of the welfare of the producer farmer is a cooperative system, by the farmer, of the farmer and for the farmer. Cooperative can play the role of milk transporter, processor, trader and retailer accordingly following the call of the situation for the benefit of producer farmer. FAO Studies observes eight types of milk marketing chain in India (Table 4.4). When a producer sells milk to the consumers directly, it eliminates the need for intermediaries. The second chain is formed from the producer to the hawker to the consumer and generates one intermediary. The

number of intermediaries increases according to the process of marketing. Majority of milk producers in India found to be resource poor, and the perishability of the produce itself necessitates the intermediaries

Table 4.4 Milk Marketing Channels in India

Marketing Channel	Number of intermediaries
Producer-consumer	0
Producer-milk hawker-consumer	1
Producer-processor-consumer	1
Producer-processor- retailer-consumer	2
Producer-dairy coop -processor- retailer- consumer	3
Producer- transporter-processor - retailer-consumer	3
Producer-milk trader-processor-retailer-consumer	3
Producer-dairy coop-transporter-processor-retailer-consumer	4

Source: FAO, Rome

4.3.4.1 Cooperative system, the strongest player of milk marketing

In India, it has been observed that the states having more dairy cooperatives with their own processing facilities have a higher level of output. It is already being mentioned that small, marginal and landless farmer has higher opportunity cost will arise on their farm if they have to market the output of their own. Cooperative system had been the instrument which was able to break the vicious circle of Polson cobweb not only free the farmers of greater Bombay but also gifted the nation the *Amul*, NDDB and last but not the least placed India as a highest milk producing country in the world. Therefore, the *Amul*/*Anand model* became the common phrase among policymakers of almost all of the states in India. The following data (Table 4.5) that was tabled by the Minister for Agriculture Shri Radha Mohan Singh on 10th March 2015 at Lok Sabha shows the state-wise number of dairy cooperative union/units involved in the production, procurement, processing and marketing of milk in Indian scenario as an indicator of proper dairy marketing. The basis of this table began with the involvement of cooperatives in production and completed with the word marketing indicating that

for the development of dairy sector it is necessary to look after the tedious production activities to generate sustainability for lucrative processing and marketing. Farmers owned cooperatives if powered with the socio politico's integrity and honest leadership like Tribhuvandas Kishibhai Patel[16], Verghese Kurien and H M Dalaya[17], certainly fosters *Amul* and paves employment generation as well as keeping livelihood security far from danger. It has been observed that the involvement of farmer's cooperative in the process of production, processing and marketing can keep the farm gate price high, optimal consumers price and best quality for consumers. The cooperatives are robust in generating a win-win situation for producer farmer and consumer both. Observing its activities and dealing during the last few years, this fact has been found in SJDUSS, the leading cooperative society in our study area; with an ability to keep adhere producer farmers during last 60 years.

Table 4.5 State-wise number of dairy cooperative union/units involved in procurement, processing and marketing of milk as on December 2014 and milk production

Sl. No	Name of the State/UTs	No. of Dairy Cooperatives	Milk production in '000 tonnes
1	Uttar Pradesh	30	24193.9
2	Maharashtra	26	9089.03
3	Rajasthan	21	14573.05
4	Gujarat	17	11112.18
5	Tamil Nadu	17	7049.19
6	Karnataka	13	5997.03
7	Odisha	11	1861.19
8	Punjab	11	10011.1
9	Andhra Pradesh	10	13007.07

[16]Tribhuvandas Kishibhai Patel(1903-1994) was the founder Chairman of Kaira District Cooperative Milk Producers' Union Ltd., Anand.
[17]H M Dalaya, a close associate of Kurien and the real technical backbone of Kaira District Cooperative Milk Union.

Sl. No	Name of the State/UTs	No. of Dairy Cooperatives	Milk production in '000 tonnes
10	Bihar	8	7197.06
11	West Bengal	8	4906.21
12	Haryana	6	7441.67
13	Madhya Pradesh	5	9599.2
14	Himachal Pradesh	3	1150.81
15	Kerala	3	2654.7
16	Jharkhand	2	1699.83
17	Assam	1	814.52
18	Chhattisgarh	1	1208.61
19	Goa	1	67.81
20	Nagaland	1	80.61
21	Pondicherry	1	47.25
22	Sikkim	1	45.99
23	Tripura	1	129.7

Source: AHS Unit OM No.26-1-4/2013/ParlM/AHS dated 04.03.2015

It is evidently clear from the researches throughout the world by FAO, ILRI, USDA and other universally accepted that dairy development is fully dependent upon the marketing system of milk. The marketing system must be under the control of the producers. In this regard, Verghese Kurien states that primarily '*Amul* was its success in combining the native wisdom of our farmers, and the skills and knowledge of professional managers. By forging this partnership, *Amul* placed the instruments of development into the hands of the people' (Kurien, 2004). By partnership, he implied a relationship of mutual trust, faith and respect between professional managers and producer farmers.

Regarding business and marketing, cooperatives need to be active enough. 'Cooperatives should also be like 'business enterprises' and should also function

as a ‘business enterprise’. If any cooperative forgets this, then failure is certain and such cooperative institutions will reach the verge of downfall. So, it should always be kept in mind that the aim of milk cooperatives should not be profit maximisation for a higher dividend, like other trade institutions, but should be the maximisation of the ‘price paid’ to the producers.’ (Kurien, 2005) This vision of Verghese Kurien is the *mantra* on which Kaira District Cooperative Milk Producers Limited (KDCMPL) reached the peak of success leading the formation of Gujarat Cooperative Milk Marketing Federation (GCMMF). Therefore, in this study attention has been paid to studying how the institutional adherence effect the income level of a farmer and its impact on employment avenues in the next subsection.

4.3.5 Milk marketing in Assam

The milk marketing channels in NER and Assam are not similar to India level. In other milk producing states of India the strong infrastructure of milk marketing, the three tiers cooperative structure is highly active. In Assam, according to the International Livestock Research Institute, 97 percent of milk marketing is controlled by traditional milk market agents’ (Kumar *et al.* 2010). The organised marketing and processing of milk in Assam remains insignificant. ‘Formal milk Pasteurisation and dairy product processing channels, both under co-operative and private sectors, account for hardly 3 percent of the total locally marketed milk.’

According to ILRI research, ‘no dairy development is possible in Assam unless it addresses the problems facing the traditional dairy sector.’ That is until dairy plan ‘strengthen the predominant existing dairy system and help it to evolve into a system that blends modern practices with the best traditional practices’ rather than development plan ‘that focuses mostly on pasteurized milk’ (ILRI Annual Report, 2007). Till today the government of Assam did not trust for facilitating high tech processing plant in the hand of the farmer. Therefore Government has installed milk processing plants in different areas in Assam under its department and took venture to run them with a view to fruition the objective ‘to supply milk to the consumers on 'no profit no loss' basis and to provide incentive for breeders for increased production by advancing loans for

purchase of milk stock, feed,and equipments and to promote measure for better breeding feeding and management of cattle'. (Amlan Baruah, 1999)

4.3.6 Milk Marketing Channels in Assam

Before entering into the study of formal and informal milk marketing in Assam, it is necessary to look into the definitions of Informal and Formal Sector, milk marketing.

4.3.7 Informal sector and milk marketing

Informal sector (IS) first introduced by Hart in the year 1971, with 'a presentation on "Informal income opportunities and urban employment in Ghana" in Institute of Development Studies (IDS) in September at a conference co-organized by Rita Cruise O'Brien and Richard Jolly on urban employment in Africa' (Naik, 2009). Hart viewed that IS is the product of lack of capacity of the Formal sector to provide employment to all the unemployed masses. When unemployment aggravates, large-scale migration takes place from rural to urban areas. Where these unemployed masses begin different types of production and business activities in and around the urban places they reside and become self-employed. (Hart, 1976). In a similar fashion in the study of 'Economics of Informal milk Producing units in Guwahati city' assumes that the dairy sector around Guwahati city is an Informal sector (Saikia, 2009). However, the 15th International Conference of Labour Statisticians Resolution (ILO 2000) defined *informal sector enterprises* on the basis of some criteria, and the last one reads 'engaged in non-agricultural activities, including secondary nonagricultural activities of enterprises in the agricultural sector'[18]**.**The harmonised definition of the informal sector resulted from recommendations of Third Meeting of the International Expert Group on Informal Sector Statistics can be spelt as ′private unincorporated enterprises (excluding quasi-corporations), which produce at least some of their goods or services for sale or barter, have less than five paid employees, are not registered, and are engaged in non-agricultural activities (including professional or technical activities)' (Expert Group on Informal Sector, 1999). The milk production activity in India is regarded as an agricultural activity.

[18]http://www.ilo.org/public/libdoc/ilo/2002/102B09_137_engl.pdf

Therefore, the sector itself does not form the part of the Informal Sector. However, the milk marketing activity of vendors, *Paikaris* and itinerant milk traders without any legal registration comes under the informal Sector. That is, the marketing of non-reconstituted milk in Assam is dominated by the informal sector.

Processing and marketing of milk are always lucrative and easier when there is a big gap between demand and supply. It also provides easy passage for reconstituted milk. WAMUL also markets standardised reconstituted milk to fulfill market demand. The comparative cost condition of the milk production in Assam is higher than that of states north-west to it. Our survey data shows that the production cost at present is not less than ₹ 36.21. During this study once in a discussion, the WAMUL Chairman said, "Where do in India farmers get more than ₹ 25 for a litre of milk?" This clears the point that formal processors are ever ready to import milk for marketing rather than procuring locally as a production cost in Assam is much higher for the same.

Table 4.6 Requirement and Availability Milk in Assam

(in million litres)

Year	Requirement	Availability	Shortage	Shortage (%)
2011-12	2338	838	1500	179
2012-13	2395	845	1550	183
2013-14	2423	857	1566	183
2014-15	2452	873	1579	181
2015-16	2480	888	1592	179

Source: Economic Survey, Assam 2016-17

In Assam, till 2017 WAMUL was the only milk processing sector player. The demand for milk in the different towns in the state and Guwahati city itself were much higher than that of milk produced locally. The total requirement of milk in Assam had been far above its availability. The data worked out from the economic survey, Assam 2016-17 show that the shortage of milk in Assam has been observed 1500, 1550, 1566, 1579 and 1592 million litres in the year 2011-12,2012-13, 2013-14, 2014-15 and 2015-16 respectively (Table 4.6). Therefore, to

meet up the demand it is inevitable to market reconstituted standardised milk. However, large sections of consumers in the state, particularly in Guwahati city like to have non reconstituted milk. The only sources of non-reconstituted or fresh milk are the local farmer. On the other hand, 99 percent of the dairy farmers hardly have any time for going to the market to sell their own milk. Secondly, the milk price offered to the farmers by the formal processing sector has been substantially less than that of the prevailing price in the market. This has been encouraging informal milk marketing in Assam.

Informal milk marketing in Guwahati has begun just after independence. During the Chinese aggression, the government had taken steps to the formal procurement of milk and supplying it, for fulfilling the necessity of Indian Army. This gave rise to a large gap between demand and supply of milk in different towns of the state. The situation had given rise to the practice of adulteration. Even till date many itinerant traders and *paikaris,* even formal players like *Amul* found to be selling SMP made milk in the name of fresh milk. This was revealed by the customers in Guwahati city when visited to interact with the milk consumers after supplying *Zero Water* milk[19] to them.

4.3.8 Formal milk marketing

The formal milk marketing in the state of Assam has been very weak since long. During the 70s, when TMSS had been good, and some cooperatives formed in the state were supplying milk to it. It had succumbed to the over bureaucratisation. The decisions to be taken in regards to the milk which has self-life less than eight hours if not processed needs immediate action. The Directorate of Dairy Development, assumed to run the affairs of milk business in the state needs not only months to clear a file but even years also. Therefore, the milk marketing once dreamt by the government of Assam failed. At present WAMUL has been working well in the milk marketing field. It has been the only institution with a processing plant and procuring a little of the production in Assam. *Amul* has also entered the market in Assam with its liquid milk. The *amul* to date does

[19] To control the quality of milk procured SJDUSS Amlighat has been applying the method of scanning milk for added water contention and accepting the milk with 0Percent water. SJDUSS has been supplying same milk in the Guwahati city during last three years.

not have any procurement centre in the state. Hence, it does not have any use value for the farmers of Assam. Neither can it contribute to raising the income level in the state. Above these, in the state, various packaged milk and milk product brands are there in the market. But our interest is to study milk market channels having relations with an impact on the milk-producing farmers of the state.

The very first stage of milk marketing starts with the selling of milk to the neighbors of the farmer, where the consumers purchase at the farm itself. This kind of marketing involves no intermediaries. Secondly, the milk producer farmer gives the remaining milk to the itinerant traders as a time-saving measure. Here the itinerant trader or hawker is the intermediary player. Thirdly, in Assam, the direct flow of milk from producers to formal processors is almost absent. Some of the small informal processors, processing milk for the production of sweets, *paneer* (cottage cheese), curd, *Mawa* (milk boiled and got dried to get a solid form with minimal moisture) *etc.* purchase milk for the purpose of retailing the product. Hence, this type of chain also involves single intermediaries. Fourthly, some informal processor and hotelier procure milk from farmers directly and some from farmers cooperatives. One of the typical situations found in milk marketing in Assam is that milk once procured by formal cooperative reverts back again to the informal sector. Till date, a part of raw milk procured by SJDUSS regularly goes in the hands of the local private trader. During 2012 to 2017, even the WAMUL had been receiving milk from SJDUSS indirectly through mediating player. However, the player of the game had run the business managing in the name of some MPI, which hardly have any legal entity.

In Assam, all the milk marketing channels that prevail in India can be observed (Table 4.7). It is also observed that as the number of intermediaries increases the benefit to the farmer decreases. On the other hand, more the involvement of private players less would be the quality to the consumers. This has been observed during our study in the market with *Zero Water* milk[20].

[20] Milk free from external addition of water is the concept of zero water. This has been implemented by SJDUSS through the cooperative during this study.

Table 4.7 Milk Marketing Channels in Assam

Sl. No.	Channels	Number of intermediaries
1	Producer-consumer	0
2	Producer-milk hawker-consumer	1
3	Producer-informal processor-consumer	1
4	Producer-processor- retailer-consumer	2
5	Producer-dairy co-operative -processor- retailer-consumer	3
6	Producer-milk transporter-processor - retailer-consumer	3
7	Producer-dairy coop - milk transporter/trader-processor-retailer- consumer	4

Source: Food and Agricultural Organisation, Rome

Among the established players except for SJDUSS, no formal player in the field of milk marketing deals in 100 percent of the milk produced in the state. WAMUL procures only a part of locally produced milk and imports large volume from out of the state in the form of Skimmed Milk Powder (SMP), Butteroil and even liquid milk.

4.4 The market price of milk shared with farmers

The milk price shared with farmers by the different formal milk marketing players in the state indicates whether the state of affairs of milk marketing was in favour of milk-producing farmers. Higher the producers' shares in consumer rupee better the state of affairs in favour of producing farmers. Review of literature shows that producers' share in consumers price fluctuates around 70 percent for the milk marketed through formal cooperative channels. Evidence could be reiterated from study of 'Economic Analysis of Production and Marketing of Milk in Tamil Nadu' where Producers' share was '65.96 percent of consumers price' (Edhayavarman, 2011)and the 'producers' share in consumer rupee was about 58 percent in Bihar (Singh, *et al.* 2012) marketing their milk through co-operatives.

Table 4.8 Producers share on consumer's rupee by formal milk marketing players of Assam

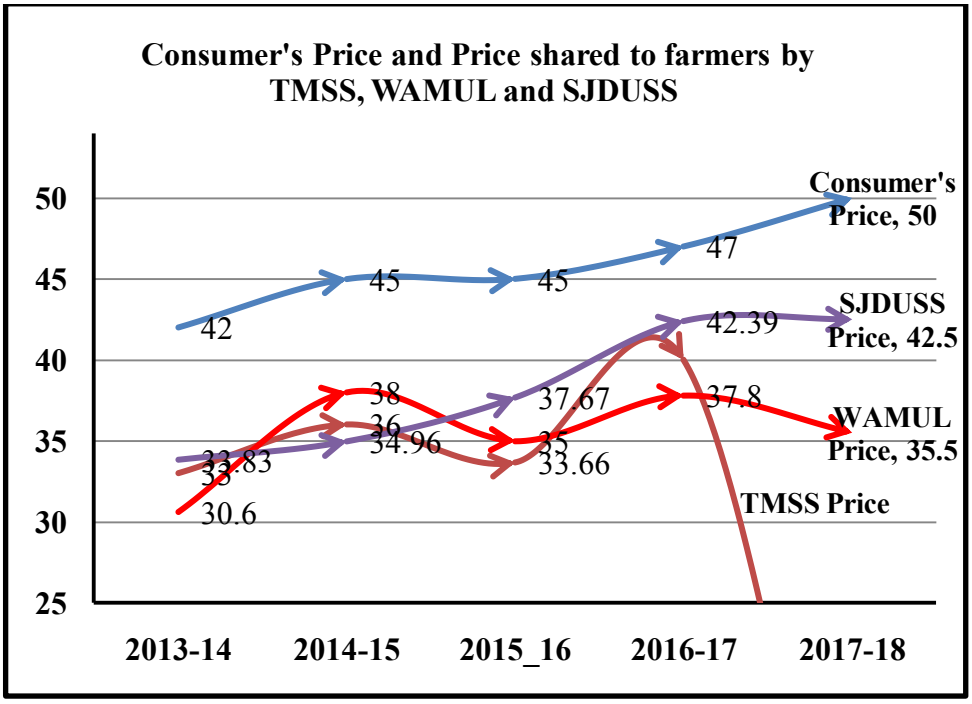
Year	Average market price	Average Price paid to Producers by		
		TMSS#	WAMUL	SJDUSS
2013-14	42	33 (78.57)	30.6 (72.86)	33.83 (80.55)
2014-15	45	36 (80.00)	38 (84.44)	34.96 (77.69)
2015-16	45	33.66 (74.8)	35 (77.78)	37.67 (83.71)
2016-17	47	40 (85.10)	37.8 (80.43)	42.39 (90.19)
2017-18*	50	NA (--)	35.5 (71.00)	42.5 (85.00)

Source: Records of SJDUSS
Figures in parenthesis show the percentage of the market price paid to the producer.
*Provisional estimates, over the proceeds up to March 2018
TMSS referred to is TMSS Guwahati, remained defunct since 2016-17.

The average market price is the consumer's price. TMSS, WAMUL and SJDUSS are three major formal players of the state in the milk marketing scenario. Among these SJDUSS, do not possess modern processing plant. Guwahati city is the main milk and milk product market of all. In last five years, it was found that SJDUSS had been returning higher share as producer's price out of the consumer's price in the market in comparisons to TMSS and WAMUL except in the year 2014-15. In the year 2014-15, SJDUSS returned 77.69 percent of consumer's price to its producers. The cooperative had returned highest by 90.19 percent in the year 2016-17. (Table 4.8, Figure 4.2)

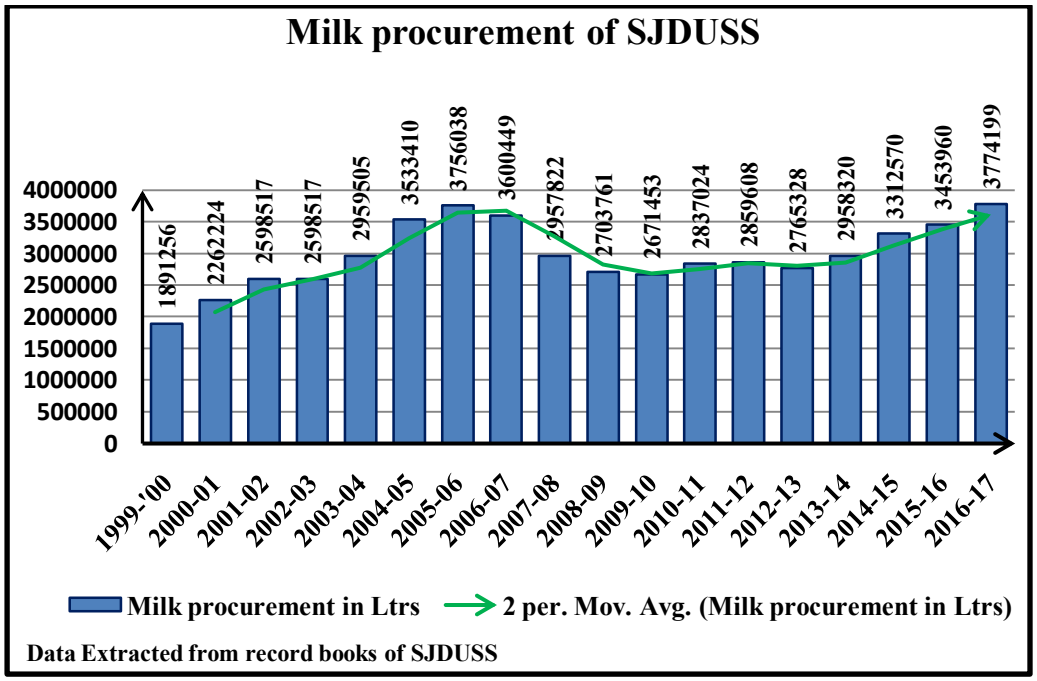
In comparisons to other parts of India, TMSS and WAMUL also found returning a higher percentage of consumer's price to producers. TMSS had last returned 85.10 percent of the market price as producer's share, beforehand it succumb due to the too small scale of business. On the other hand, WAMUL had been returning 72.86 percent, 84.44 percent, 77.78 percent, 80.43 percent, and 71.00 percent in the years 2013-14, 2014-15, 2015-16, 2016-17, and 2017-18 respectively. (Table 4.8, Figure 4.2).

Figure 4.2 Consumer's Price and price shared to farmers by TMSS, WAMULand SJDUSS



It is already mentioned in the previous part of our discussion that the cooperative system is the strongest player in milk marketing. The SJDUSS as a farmers' cooperative in the last 60 years has been procuring milk from its member farmers for the purpose of providing easy, stable and remunerative marketing for them. It has been successfully serving purpose envisaged during its formation. The following figure (4.3) depicts the year wise volume of milk that SJDUSS deals in since 1999-2000 to 2016-17. During 2017-18, the cooperative has a procurement target of 4,000000 (forty lakh) litres. During the period of 1st April `17 to 31st December `17, the procurement already crossed 3500000 (thirty-five lakh) litres. As such the cooperative would be able to procure over 4700000 (forty-seven lakh) litres of milk in the year 2017-18.

Figure 4.3 Milk procurement and marketing of SJDUSS



4.4.1 Milk marketing of SJDUSS

SJDUSS, from the beginning, has been dealing in whole raw milk marketing. The cooperative had been selling milk of the quality what it receives from its farmer in the last sixty years.

In its early stages, the Samiti had acted as an arbitrator between the farmers and the milk traders, due to lack of capital as well as a dearth of knowledgeable persons. After running in this way until 1970, the scenario changed a little. However, the milk marketing system of SJDUSS is still under evolution. Until 2015 there was not any other product making unit except cream separation. In the year 2015 for the first time, the benefit of product making was tested for its viability and profitability at its Amlighatcentre with the product *paneer* (the cottage cheese) and *rasagulla*[21]. Slowly demands for its products are rising for its quality. At present, the cooperative is able to utilize 9 percent of its procurement (Table4.9) through product making. In the case of milk, SJDUSS in its history has been dealing in whole milk only.

[21]A kind of Indian sweet, prepared by boiling the small balls in sugar syrup made out of moister solid acquired by sieving of instantly coagulated milk at the temperature more than 65^0centigrade.

To compete with the situation and viewing for providing remunerative price to its producer farmers SJDUSS has been adopting various different strategies. From an observation of the marketing undertaken by the *Samiti*, we find that it can be divided into two distinct parts -

a. Direct marketing, and
b. Indirect marketing

4.4.2 Direct marketing

That part of the milk business is regarded as direct marketing in which the cooperative has direct relationship with the consumers of milk and milk product. The cooperative sells 31 percent of its raw milk procured directly to the consumer in the form of whole milk. The cooperative is also able to convert over 9 percent of procurement to value-added product and sell it directly to the consumer. It was found that the cooperative in an average sales over 39 percent of its procurement through direct marketing. Inspecting the records of SJDUSS, the gross revenue returned from the product found to be ₹ 61.92 per litre of milk used, and the direct marketing of whole milk accrues ₹ 54.00 per litre. In Guwahati city, the cooperative has been paying commission to some agents for supervising the milk marketing field and required information thereof. The cost of such commissions sums to the average of ₹0.35 per litres on the volume of milk sold in Guwahati city. The scenario of direct marketing through product making is very much encouraging from the point of revenue earning. On the other hand, the direct marketing of milk provides avenues for one man/day employment per 100 litres of milk. In this system of milk marketing, the office bearers ought to be careful to the utmost level so as the quality dispatched remains intact until it reached to the consumer. Therefore, during the interaction on marketing with the Board of Directors, it was suggested that the cooperative should introduce packaged pouch so as the dispatched quality reaches to the destined customers.

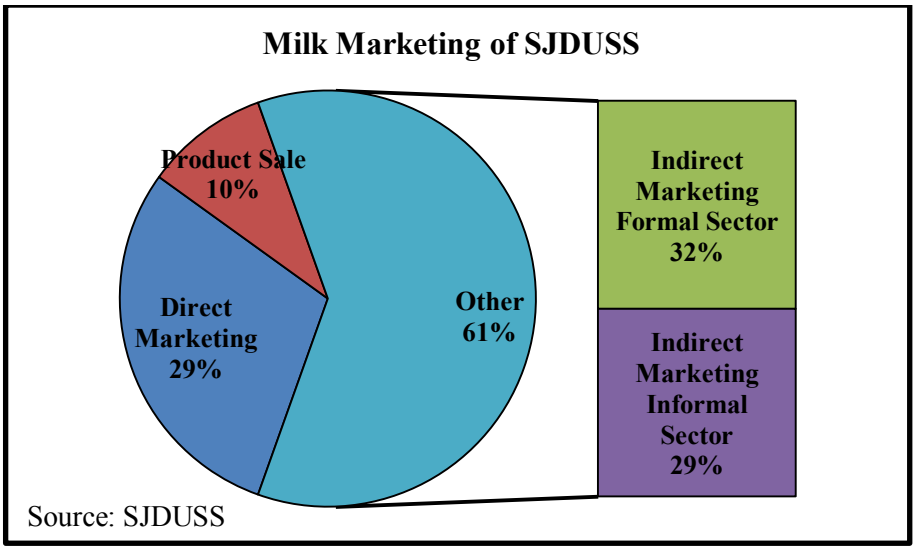
Table 4.9 Milk marketing of SJDUSS

Milk in litres

Direct Marketing	Product Sale	Indirect Marketing		Total
		Formal Sector	Informal Sector	
4600	1500	5000	4500	15600
(29.49)	(9.61)	(32.05)	(28.84)	(100)

Source: SJDUSS
Figures in parenthesis show the percentage of total

Figure 4.4 Milk marketing of SJDUSS



4.4.3 Indirect marketing

Indirect marketing of SJDUSS composed of whole milk only. The indirect marketing is composed of selling of milk to the formal parastatal institution and informal private traders of different distances around middle and lower Assam. In this segment of marketing whether by policy or by compulsion SJDUSS has been adopting discriminating price policy. At present, it is found that the cooperative is supplying milk to different private parties at different prices. It is supplying milk to the parties who deal in milk in Nagaon town, Guwahati city, Morigaon town and Rangia at the rate ₹ 48.00, ₹ 48.00, ₹ 49.00 and ₹ 45.00 per litre respectively. The indirect marketing of milk generates less scope of employment avenues in the

hands of the cooperative. On the other hand, the cooperative is supplying 31 percent of its procurement to the formal parastatal institution at an average price of ₹ 35.57, which is less than its procurement price by about ₹ 7.00 per litre.

Here the question arises that how the cooperative (SJDUSS) has been able to provide relatively higher net price to the farmers when it is incurring a loss. The cooperative sells 29.49% of its procurement directly, sells 9.61% of milk after value addition; it sells 28.84% to the informal player of the market (Table 4.9). SJDUSS earns a profit on these three categories of marketing; whereas, it bears loss only from the milk sells to the formal and parastatal institution. That is the cooperative sells more than 67% of milk in profit. The value addition provides gross profit to cooperative almost ₹ 20.00 per litre of milk used in product making. From selling milk to the informal players it earns gross profit around at the rate of ₹ 6.00 and from direct marketing of milk, the cooperative accrues almost ₹ 7.00 per litre. With the help of this strategical marketing and it's no profit no loss philosophy the cooperative it has been able to provide remunerative to its farmer members.

4.5 The new Development in the marketing of SJDUSS

With the direct marketing of milk by Sitajakhala, it is tried to pick into the fact behind the ILRI research team result that 97 percent of the marketing of milk produced in Assam is in the hands of traditional traders. Here it is to be noted that SJDUSS had not entered the Guwahati market before 2015. After looking at the quality of milk sold by numbers of traditional milk trader, it was considered that city dwellers perhaps hardly have quality milk. *The essence of fresh milk may prove to be a new experience for the city consumers, particularly the new generation consumers*. With this thought, SJDUSS determined to enter into the Guwahati city to reap the benefits of a large market. It was not an easy task to establish itself in the large market, with big commercial houses the cooperative a farmers' organisation comparatively unknown player, an underdog in the fray. Therefore, it was thought that something extra should be there for the consumer. All the big players in the field of milk marketing have meagre or no local

procurement. They are bound to sell reconstituted milk, 100 percent fresh milk by them is merely an impossible job. On the other hand, the traditional milk trader had all the reasons to create barriers for entrance, since the unadulterated milk sold by the cooperative might endanger the existing market scenario, as they hardly sell milk free from adulteration. Therefore, a few milk scanner machines were bought. The society redefined the quality of milk with *Zero Water* concept, and it had begun to procure only the milk with zero added water, providing the flat rate to the farmers irrespective of the content of butterfat and Solid Non Fat (SNF) therein. This has increased the faith and enthusiasm among the farmer over the egalitarianism of the cooperative, since no farmer in the area rear bovine other than cows. However, a few exceptions were found, and a few farmers have begun to pour their milk to WAMUL showing dissatisfaction on *Zero Water* concept for persuaded by the vested interest of their own.

4.5.1 Quality matters a lot in marketing

With *Zero Water* milk, SJDUSS has knocked the milk market of Guwahati city from 3rd September 2015 selling only 26 litres of milk on the first day. For the purpose to increase its market share, neither any hoarding nor any media advertising has been adopted. The organisation believes their milk is, 'Original and of a kind not seen before in Guwahati city' and one to one verbal communicative advertisement through the consumer (word-of-mouth advertising). The strategy suggested was of Reverse marketing. It has been observed during odds that customers come forward to defend the milk selling of the cooperative. It is also found that numbers of customers tried to increase the consumers for SJDUSS product so as cooperative continuously supply its milk in their locality. As such, it is confirmed that quality matters a lot.

4.5.2 The feedback of marketing and Food safety

For the reaffirmation and to find the possibility of further market expansion data have been collected from 100 milk customers of SJDUSS in Guwahati city supplying questionnaires to them. The feedback from the customer results in the following findings:

Table 4.10 City dwellers' response over SJDUSS milk

Customers Purchase SJDUSS milk for	Number of customers
Quality	93
Timely Availability	2
Price	0
Need	5
Total	100

Source survey data

Out of the 100 responses, 93 percent of the consumers informed that they are purchasing SJDUSS milk for its quality (Table 4.10). 31 percent of the same set of customers said that the quality supplied is excellent and 64 percent reported the quality has been better in comparison to the other brand and hope that the quality shall remain intact in future. However, 1 percent of consumers reveal that quality is inferior, 4 percent judged the quality similar to the quality of other brands (Table 4.11). On another question querying on what basis the consumers are assigning the quality of milk, it is found that 50percent customers attribute taste and 25 percent customers attribute *malai* (butterfat)contention for judging the quality of milk. Whereas, 25 percent of consumers are found to be confident enough on SJDUSS milk that it is free from adulterations.

Table 4.11 Consumers' view upon the quality of SJDUSS milk

Consumers' view	**Number of customers**
Excellent	31
Better	64
Similar	4
Inferior	1
Total	100

Source: survey data

At last, it was enquired whether they would accept if SJDUSS supplies milk in the pouch. The answer ‘no’ registered 60 percent and ‘yes’, 40 percent. (Table 4.12)

Table 4.12 Customers' response to pasteurised packaged milk

Response	Nos. of customer
Yes	40
No	60
Total	100

Source: survey data

After the feedback result, a few group discussions were held to know, why the milk consumers of Guwahati city hesitate to accept milk in the pouch. During discussions, it was revealed by a class of customers that they believe that processors sometime can add external fat. They also believe that after processing the natural fragrance and flavour of milk may not remain intact.

It is upon the cooperative to make the consumers believe that pasteurising and pouching of non-reconstituted milk do not change both the fragrance and flavour but provides longer life and makes it healthier for human consumption. If the government of the state strictly adheres itself with the International Food Standard (IFS) Certification and Food Safety and Standards Act, 2006; the pasteurising and packaging of milk becomes inevitable for cooperatives to keep secured and save the livelihood of its member farmers.

On 14th November 2017, as was suggested SJDUSS launches its pasteurised packaged milk Brand *Gonand*[22] **,** ***'the milk of Assam'*** with a target to reach out the requirement of busy and needy customers, containing whole cow milk, as it is milked, only pasteurised and packaged at government processing plant, Bebejia, Nagaon; paying processing charges @ ₹ 6.00 per litre. At present, it is not a business of profit for the cooperative. It is believed that it would help, milk cooperatives as well as consumers of our state to be accustomed to food safety norms. In future, not only milk exporting countries of the world but also even some of the milk abundant state of our country itself may exert pressure to our central government to strictly implement the Food Safety Act 2006.

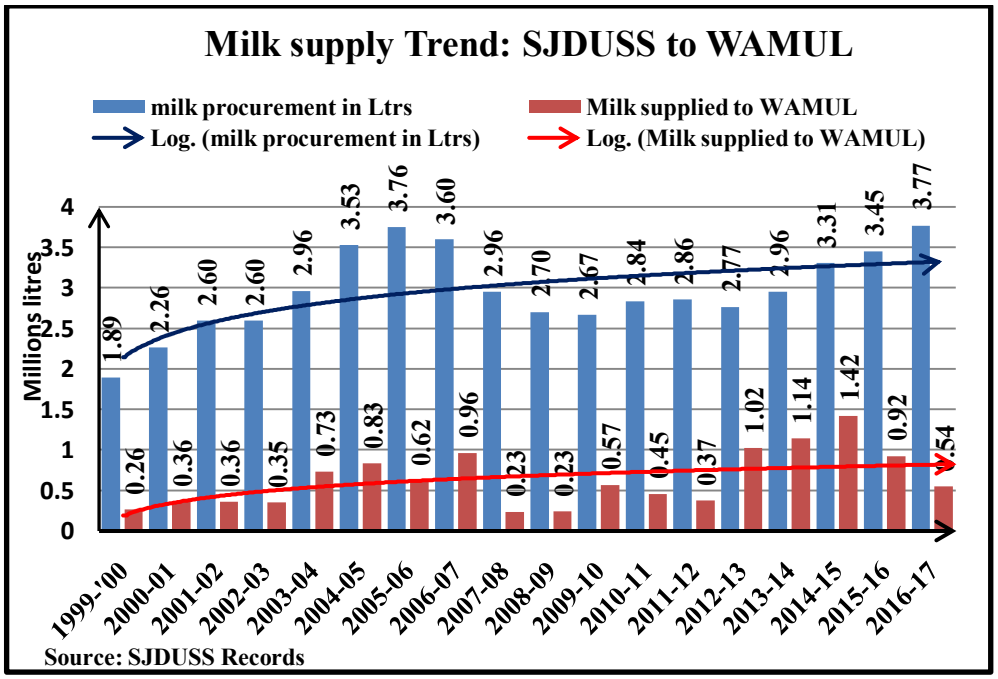
[22] The cooperative has leter in 2018 changed the brand name to *Sitajakhala*.

4.5.3 The SJDUSS and WAMUL, the Relation and Difference

In the above discussion, it has been observed that almost one-third volume of milk procured by SJDUSS is to be supplied to WAMUL at the losses up to over ₹ 7.00 per litre. During the discussion it also comes to light that since 1972, so long the TMSS Guwahati was running, the cooperative had supplied milk to it, since inception receiving price less than that had been paid to its producer farmer. In the history of SJDUSS, the cooperative always had received prices less than that of its procurement price for the milk supplied to government patronised institutions, whether it was TMSS or WAMUL. Even at present, the price paid to SJDUSS by WAMUL is below the production cost as calculated from our survey data. In such a situation any dairy cooperatives if remain fully dependent for marketing, upon such institution cannot ensure sustainability because of inability crept in for 'ensuring deserving and remunerative returns to its members' (Upadhaya & Devi, 2017) for their produce. On the other hand, even the farmer's price set at the level of production cost can hardly survive the farming due to lack of incentive for managing the family itself. This has been the reason of dilapidation of many dairy cooperatives formed in Assam during '70s and '80s due to a continuous decline in the activities of member farmers.

The milk procurement and the volume of milk supplied to WAMUL by SJDUSS, and the difference between the price paid by SJDUSS to its farmer and price received from WAMUL is worth studying for the knowledge about the milk marketing in Assam. The (Figure 4.5) shows the milk supply trend of SJDUSS to WAMUL. The figure clearly depicts that the milk supply is continuous and volume of supply varies in between 7.82 percent to 42.82 percent of the total procurement of SJDUSS during last two decades. SJDUSS has to supply its additional procurement over its own raw milk marketing.

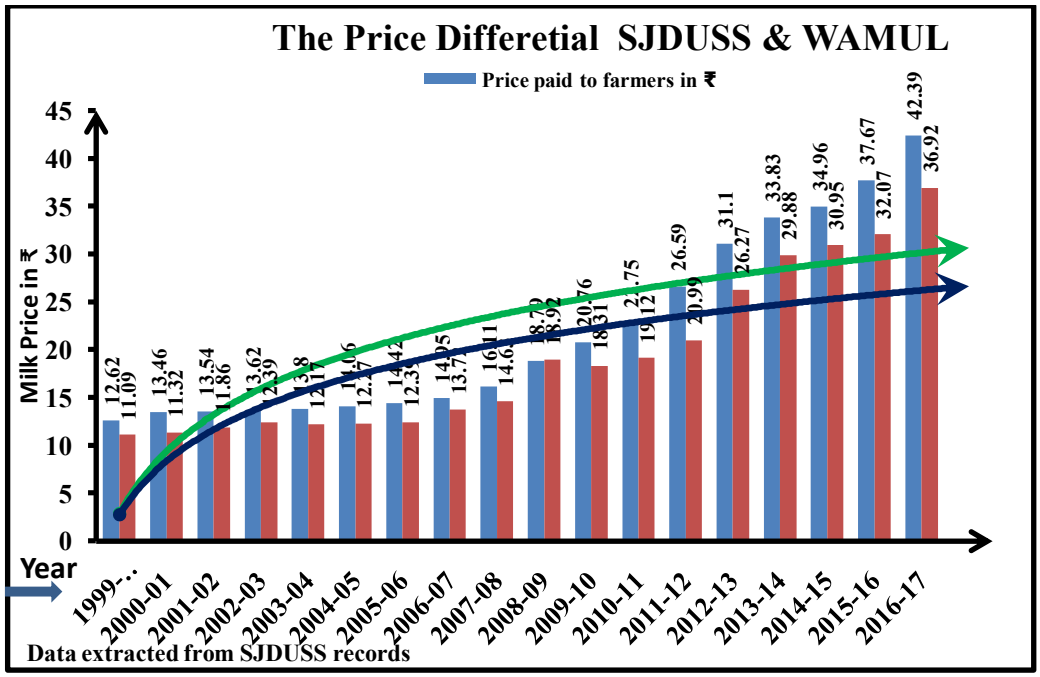
Figure 4.5 Milk supply Trend: SJDUSS to WAMUL



4.5.4 The Price Differential, SJDUSS &WAMUL

SJDUSS a DCS was established beforehand the dairy development department, still waiting for its own full-fledged milk processing plant. Therefore, it has the compulsion to supply its extra procurements to other processing units. Before the establishment of WAMUL, it had been supplying its extra procurements to TMSS Guwahati. After the establishment of WAMUL, although the government of Assam has created separate directorate for dairy development, state of affairs gone wrong somewhere along with the Letter of Credit (LOC) scam during the period of Operation Flood III and at present almost all the dairy plants under this directorate have been lying defunct. Therefore, SJDUSS is bound to supply milk to WAMUL that too at a price lower than the procurement price. As such SJDUSS has supplied milk to government patronised institutions from 1971-72 to till date in losses except in the year 2008-09 with a margin of ₹0.13 (Figure 4.6).

Figure 4.6 The Price Differential SJDUSS&WAMUL

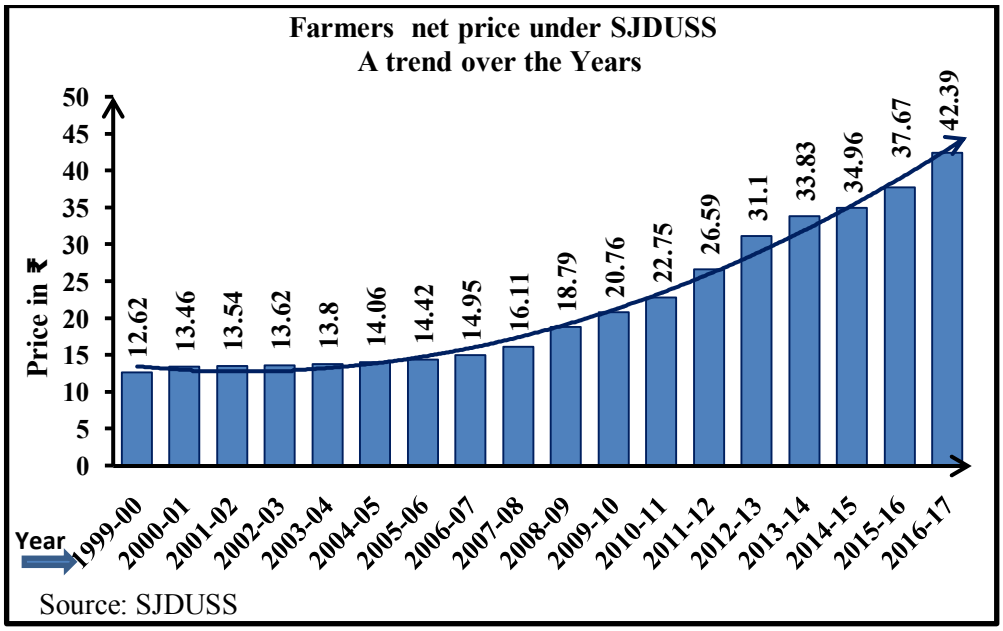


4.5.5 Pricing policy of SJDUSS: the saviour of farmers and cooperative itself

Researchers have remarked inept procurement pricing as one of the reasons behind Institutional Failure of Formal Milk Processing Sector in Assam (Sirohi, Kumar, & Stall, 2009). In such an atmosphere when the price of milk does not remain remunerative to the farmer, any institution it is difficult to keep its primary member adhere to it. This has been found that it is fully known to the management of SJDUSS since long. Therefore, they have been conscious enough in keeping farmer's price remunerative. SJDUSS as a cooperative adopting and adhering to the principle of *no profit no loss* kept the price paid to the farmers as a dynamic variable. SJDUSS determines the price to be paid to its farmers for the milk supplied to, on its board meeting. The board if profit exists increases the procurement price time to time with utmost care that, the price once increased does not necessitate decreasing in future. The cooperative also distributes accumulated profits to its farmer as incentives for production at the end of each year, on the basis of milk supplied by them during the period in which profits had been earned. That is, the farmer's net price at the end of the year always has been more than the price paid during the period of business. This has been the reason

for cohesion between the farmers and the cooperative. The net price paid by SJDUSS to its farmer for their supply of milk since 1999-2000 has been presented in figure (Figure 4.7). In the figure bars and the trend line, shows that the price paid to farmers by SJDUSS has been a dynamic variable, increasing with the time. The profit earned by the cooperative has been distributed among the producer farmers. The cooperative at the end of each year apportions a part of its total profit for encouraging the dairy farmers to produce more. This provisioned part of the profit is distributed among the farmers according to their volume of milk supplied to the cooperative society during the financial year. This is the most important characteristic factor for sustainability of dairy cooperatives as well as farmers. Here the farmer's net price is the sum of price received and the production incentive received by the farmer for at the end of each financial year.

Figure 4.7 Farmer's net price under SJDUSS



Source: SJDUSS

The pricing policy of SJDUSS has the accent of Kurien philosophy. This states that a dairy cooperative should forward like a business house in the business for profit but not to swell the dividend but for the better price of farm produce which leads to the ultimate development of the masses resulting in the development of the nation ultimately. Therefore, to bring the philosophy to fruition, SJDUSS has not distributed any dividend to the passive shareholder. If any person remains passive for more than two years at a stretch, he/she may

withdraw his share capital. Further, only those farmer pouring milk to the cooperative are allowed to hold shares. The shares are limited in number, and the number is determined by the General Council, subject to the approval of the Cooperative Department. Therefore, any benefit or profit accrued goes to the account of real farmers only. Therefore in the last sixty years, the farmers, particularly smallholders with dairy cattle farming as their primary source of income are satisfied and are in the sense of 'feel good' with the cooperative.

4.6 SJDUSS and Anand, Comparison

The comparison between SJDUSS and *Anand* do not bear any logic in common parlance. It is felt important to study that SJDUSS was formed just after twelve years of formation of *Amul*, unlike other dairy cooperatives in Assam, has been running till today but unable to rise if compared to; for the adversaries or exclusion is the subject matter. Secondly, almost all the time the policy makers reiterate the ANAND model and stress about the replication of the Anand model. Therefore it bears more meaning for comparison of presently running oldest dairy cooperative of India with the oldest dairy cooperative that is running till date in Assam.

4.6.1 Background of *Amul* and SJDUSS

In 1929, a private dairy named Polsons was established at Anand. It procured milk for Bombay Milk Supply Scheme from the producers of Anand through some middlemen. After processing, the Polsons sent milk to the market in Bombay and profited immensely but refused even to a modest increase in price. This provoked the milk producers went on strike. Observing the problematic situation Sardar Vallabhbhai Patel advised Morarji Desai to call a farmers' meeting for finding out the solution. On 4th January 1946, a cooperative was formed for fighting excessively greedy and grasping milk contractors. 'It was Sardar's vision to organize farmers, to have them gain control over production, procurement and marketing by entrusting the task of managing these to qualified professionals, thereby eliminating the middlemen. Tribhuvandas Patel was selected by Sardar Vallabhbhai Patel for the task of "making the Kaira farmers happy and organize them into a cooperative unit"' (Kurien, Verghese, 2004).

Thus, the famous Kaira District Cooperative Milk Producers' Union Limited (KDCMPUL), at present popularly known as *Amul* came into existence in necessity. According to necessity, Tribhuvandas Patel managed Verghese Kurien as co crusader, and Kurien convinced H.M. Dalaya, MS from the University of Michigan in dairy engineering, to come to Anand "just for a few days" but passed his life in *Amul* as the technocratic backbone of India's milk revolution**.**

Similarly, within our study area Practice of cattle farming for milk was prevalence in the area ever since the pre-independence period. The business of milk was totally unorganized in nature. The milk production was procured at a nominal price by some private trader and marketed in the adjacent Guwahati city at a much higher price. After independence, when demand for milk in the market began to rise, these middlemen paved the way for lucrative profit leading farmers towards more and more distress. This awakened some socially conscious persons to go in an organized way. At initial stage 17 nos. of members, whose only source of livelihood was cattle farming with their meager production of 120 LPD joined their hands to form "*Sitajakhala*" a milk producers' co-operative society, with Sri. Chabilal Sharma (Regmi) as the founder president for the purpose of put an end to the exploitation. Later, since the year 1961, the society came under the stewardship of Late Nandalal Upadhyaya, who left a comfortable job of a school teacher in Jagiroad High School to lead the society.

Thus, the geneses behind the inception are almost identical and differ only in the scale of business.

The operational structure of SJDUSS is known to be successful as the longest-running dairy cooperative in the context of Assam. But, this has not been able to climb up like *Amul*. Therefore, the *Anand model* and operational structure of the SJDUSS are worth discussing.

4.6.2 The Anand (*Amul*) Model

The example of the best cooperative, which has been able to reach the peak of success is Anand, *i.e.* Kaira district cooperative milk producers union limited. Efforts to replicate it in any place of India and abroad, are not new. But here naturally the question arises, what is the Anand model? Under what type of

environment and situation did the Patel-Kurien-Dalaya trio materialise the ascent of Anand to success? The answer to these questions can be found in the study of the basic structure of the *Amul* model. In Kurien's words,

> 'The basic structure of the *Amul* model is the milk producers' cooperative society at the village level. Membership in these cooperatives is open to all who need the cooperative's services and who are willing to accept the responsibilities of being a member. Decisions are taken on the basis of one member exercising one vote. No privilege accrues to capital, and the economic returns, whether profit or loss, are divided among the members in proportion to patronage'**.** (Kurien, Verghese, 2004)

In simple words, the salient features of the *Anand model* can be mentioned as follows (Singh, 2006):

1. A single commodity approach.
2. Decentralised decision making and producers elected leadership.
3. A three-tier organizational structure.
4. The employment of professionals.
5. Accountability of these professionals to milk producers.
6. Provision of providing technical inputs.
7. Integration of production, procurement, processing and marketing functions.
8. Regular audit.
9. Contribution to the development of the village.

On a minute study of the aforementioned features, one can observe that the *Amul* model provides full scope for farmers to control their own cooperative. Farmers elect only those people to the governing body, who take their interests seriously. The governing body then selects the salaried employees with the same awareness, so that the responsibility of interests of the farmers can be properly carried out. In Kurien's words,

> ‘The primary milk producers democratically govern this entire federal cooperative structure to ensure that the higher tier organizations are geared to serve the purpose of the lower levels, and the gains at all levels flow ultimately back to the milk producers in a significant measure’.

Whether the cooperative is a primary village cooperative or a district cooperative union or state federation, its structure and governance should be necessarily democratic. These unions and societies have such an organisational structure where producers themselves prepare the financial plan for milk and keep an eye on its working so that the producers can get full benefits of the plan. (Kurien, Verghese, 2004)

The basic structure of the *Amul* model begins at the primary milk collection cooperative society of rural areas. Then, District cooperative unions are formed comprising of many such societies, and a state cooperative federation is formed by such district unions. This is called the three-tier structure. On the other hand, the main function of the dairy cooperative is forward as well as backward marketing in favour of the milk-producing farmer. The business of dairy cooperatives is also commercially divided into three tiers, *i.e.* Collection, Processing and Marketing. The work of production depends mainly on the personal interest of the farmer members.

4.6.3 The operational structure of SJDUSS

SJDUSS is a unitary DCS operating from the village Amlighat, district Morigaon in the state of Assam. It was formed democratically in necessity way back in the year 1958. Since the beginning, it has been operating on the basic philosophy of *no profit no loss*. Its operational area comprises two Community Blocks in the district of Morigaon and Kamrup (M).

The Hierarchy of SJDUSS can be divided into four classes:

i. General Council, comprising of all the active general members.
ii. The Board of Directors

ii. Office Staff with Secretary as Chief Executive.

i. Field worker.

4.6.3.1 The General Council of SJDUSS

The General Council consists of all the general members of SJDUSS. This council generally sits once in a year. In certain case, if the Board of Directors feels necessary, regarding the decision on vital issues with far-reaching implication, the Secretary of the Samiti calls General Council meeting or extended Executive on the basis of the importance of the issue. In this council, every legitimate member always has an equal say. In the history of SJDUSS till date, all the General Council had elected the members to the Board of Directors unanimously.

4.6.3.2 The Board of Directors (BOD)

The BOD consists of fifteen director members elected directly by the General Council members. The Chairman, Vice Chairman and Executive Chairman are elected by the director members on the simple majority rule from and among themselves. In the history of SJDUSS, the director members have always been elected unanimously in the General Council, although there is a provision for contesting for the same. This signifies the unity and trust among the members. When the Samiti feels it necessary to have some more members in the BOD, the General Council entrusts the right to nominate them as advisors or invitee member or both on the BOD. On behalf of the BOD, the Chairman nominates them after a brief discussion with the elected BOD members.

4.6.3.3 Office Staff

Secretary is the Chief Executive of the office. Overall responsibility of looking after day to day matter of business and managing regularity of all affairs lies on the soldier of the Secretary. He has every right to deploy each employee when requires as per their grade wherever dim fit. Each of the office bearers is accountable to the Secretary; Secretary is accountable to the BOD and BOD in turn accountable to the General Council.

4.6.3.4 Field worker

The duty of Procurement and distribution of milk as well as the cattle feed maintaining proper quality, quantity and price as per directives from the office lies on the Field workers.

The BOD also forms sub-committees to vigil over the activities of all level of workers so as no irregularities crept in.

4.6.3.5 Other basic information of SJDUSS

Briefing on the basic structure of the present Chairman of SJDUSS revealed 'The basic Hierarchical structure may be changed in future as necessary, by bringing the proposal in the General Council meeting'. Further, he adds that the BOD has to implement the proposal adopted by the general council. This shows that the BOD of SJDUSS is fully accountable to the General Council and the cooperative itself possess pro-farmer philosophy as in *Amul*.

The basic particular of information and activities of SJDUSS reflects that SJDUSS has been deeply following the principles laid down by the International Cooperative Alliance (ICA) for the full satisfaction of its farmer members.

a. Business Activities: Among the business activities, the procurement and sale of milk and milk products are the prime approaches of the business. All other businesses that the cooperative has been undertaking are a supplementary requirement for augmenting the production and productivity of its farmer. Therefore the cooperative procures ingredients of feed and prepares balanced cattle feed and sells at fair prices to farmers. At present SJDUSS has started silage making as a pilot project of its own in *Sitalage* brand so as the problem of fodder shortage can be arrested in the Mayong block and operational area in particular and the state of Assam in general.

The cooperative has been maintaining its procurements of over 15500 litres of milk from its 12 numbers of collection centres located at different places in Mayong block in Morigaon district and Dimoria block in Kamrup Metropolitan.(Table 4.13)

Table 4.13 Centre wise procurement of milk By SJDUSS

Sl no.	Centre	Approximate procurement LPD*		Total
		Morning	Evening	
1	Amlighat -A	789	488	1277
2	Amlighat -B	3526	2656	6182
3	Amlighat-C	802	491	1293
4	Hawlabheti	605	461	1066
5	Udmari	345	261	606
6	Matiparbat	53	38	91
7	Killing valley	505	372	877
8	Jagiroad	206	150	356
9	Topatuli	508	447	955
10	Khetri	821	509	1330
11	Paliguri	826	600	1426
12	Dharbam	106	62	168
	Total	9092	6535	15627

SOURCE: SJDUSS

*approximate daily Average of March 2018

Among the centre of procurements, centres Amlighat-A, Amlighat-B and Amlighat-C covers sample villages Bamungaon and Raumari, the centre Killing valley is located at the middle of the sample village Barkhal, Hawlabheti covers the Hatiamukh sample village, the sample village Udmari and Matiparbat also have procurement centres of SJDUSS at their respective location.

The cooperative procures milk from its registered farmer twice daily, in the morning and in the evening and the milk collected is entered in the personal record book of the respective farmer. There are cattle feed Storehouses for each procurement centres; farmers can purchase cattle feed and feed supplements at fair prices and can avail of credit for ten days. At the end of ten days, the cooperative

transfers value of milk supplied by the farmers during the last ten days to their respective bank accounts.

b. Financial activities: The cooperative as far as possible make its every transaction through banks. This cooperative regularly helps farmers to get a loan from commercial banks and subsidies *etc.* from Government agencies and different financial institutions when they are in need, which ensures the growth of production as well as the welfare of dairy farmers. During the lean period, the cooperative provides necessary Short Term advance according to the records of the financial credibility of the farmer. The cooperative retain ₹ 0.50 per litre of milk from the farmer and at the end of the year purchases LIC policies or others on the advice of the farmer concerned.

The cooperative regularly holds its General Council meeting before the month of June every year and provides its balance sheet to its entire farmer members in the presence of an official representative from the Department of Cooperation, Government of Assam.

c. Welfare Activities: SJDUSS since 2013 has been maintaining routine De-worming, Vaccinations, and trying to systematize the maintenance of pedigree information for the benefit of farmers. It is also adopting Breeding Policy for high pedigree, with time to time induction of better progeny and Artificial Insemination (AI) with an aim to increase average milk Yield per cow from the present level of 8 LPD to 15 LPD and more. The cooperative, time to time organises various workshops, training programmes and seminar on the modern way of cattle farming for the benefit of members as well as other farmers of the region.

d. Education: According to the principle of the International Cooperative Alliance, education is one of the important basic elements that cooperatives have to follow. According to this rule, it is necessary to organise a systematic training and education programme for staff management and other user members of cooperatives. In regards to education, SJDUSS is found to be quite positive. Going further ahead, it had played a major role in establishing Jagiroad College, Sitajakhala H.S School and numbers of other lower primary and upper primary schools. The cooperative also found to be providing financial assistance for the

improvement of sports, Culture and other socio-educational Institutions. It also annually provides financial assistance to poor and talented students of the locality. At recent the cooperative is also envisaging for a permanent agricultural training centre for entrepreneurship development, specializing in animal agriculture in Private Public Partnership (PPP) mode.

e. Achievement: The cooperative was able to receive the coveted biennial award "Cooperative Excellence Award-2006" from National Cooperation Development Corporation

The cooperative in addition has taken an action plan with a view to generating twenty thousand employments within the year 2020. This has been planned as 'Vision 2020 Sitajakhala'. The basic objectives of 'Vision 2020 Sitajakhala" by SJDUSS could be depicted as follows:

1. Associating further 10000 farmer's families directly and other 20000 families indirectly in dairy farming with a target to produce milk more than 50000 LPD in middle Assam within 2021.
2. Launching "*Sitajakhala"* as an indigenous brand of Assam with pasteurised milk and milk products, so as a maximum of benefits from milk marketing could be provided to the producer.
3. Reaching new areas of middle Assam to motivate young unemployed youths to adopt dairy farming as a viable source of livelihood and creating small dairy cooperative societies in new areas to make farmers self-reliant.
4. Transforming its expertise acquired through the challenges it faced in the long journey of cooperation as an opportunity to address the chronic problem of unemployment in the state of Assam.

4.6.3.6 Outline of similarities and dissimilarities between *Amul* & SJDUSS

Outline of similarities and dissimilarities between *Amul* & SJDUSS can be made only on the ethos of the *Amul* model and the basic principle of cooperatives

put forward by the International Cooperative Alliance as well as the architecture of the *Amul* model.

The genesis of *Amul* itself was comprised of the bliss of big personalities of India. However, farmers of SJDUSS have been still waiting for an opportunity to find the path for its ascent.

The *Anand* or *Amul* model was based on the single commodity approach, *i.e.* milk. SJDUSS also has been running during the last sixty years with single commodity milk. Moreover, other activities, *e.g.* the provision and facilities of veterinary care, facilities of cattle feed for the farmers, providing short-term advances and other have been devoted to increasing the production and productivity of milk. However, in the scale and area of operation, any line of comparison cannot be drawn between *Amul* and SJDUSS.

Decentralised decision making and producers elected leadership signifies the member control over the institution. SJDUSS till now is a unitary institution and has single Board of Directors, and there has been a provision of electing at least one member by the farmers on the basis of areas of their procurement centre in the open General Council meeting. It has already stated that in the history of SJDUSS till date all the General Council had elected the members to the Board of Directors unanimously. However, as a unitary institution, a three-tier organisational structure is absent in SJDUSS.

SJDUSS till date being a low scale low tech institution in the field of milk procurement, processing, value addition and its business lacks the employment of high tech professionals. However, the statement of 'Vision 2020 Sitajakhala' indicates that this cooperative necessarily have to employ professionals very soon.

SJDUSS, as observed in comparison to the *Amul* model, is fully accountable to its milk producers to date. This is evident by the percentage of market price percolated as producer's price and regular yearly audit. Further, it has been observed SJDUSS distributes its profit to the producing farmer on the basis of the volume of milk they poured during the year. Since its inception, it had not distributed any dividend, among the non-user members. With the erection of its own processing plant SJDUSS has started to acquire technical inputs so as the

integration of production, procurement; processing and marketing functions could be achieved.

In regards to social development, it is stated above that SJDUSS had contributed a lot to the development of villages paving the way for better education for all in the Mayong Block in the district of Morigaon.

4.7 Conclusion

The discussion in this chapter clears that the activity of dairy farming by the rural poor cannot sustain without pro-farmer, pro-poor marketing facility. In a marketing institution or organisation so long as farmers remain decision taker rather than a part of decision maker farmers may not be fully benefited by the system. Therefore, the farmer's cooperatives are an inevitable part of dairy farming, fulfilling the purpose of milk marketing particularly for the smallholders. This is true not only in our state but also in each and every underdeveloped region with a large number of smallholders. Thus, dairy cooperatives in a practical sense are synonyms of milk marketing organisations. It is proved by the dimensional growth of *Amul*.

Farmers cooperatives, that are formed in necessity by the public and structured in the top-up model has the certainty of longevity. The cooperative formed by the system, administrative or other and implemented in a top-down model with a less 'say' of user members hardly achieves the desired goal. They sooner or later suffer losses in it or become an unprofitable entity to its user members. A cooperative becomes an unprofitable entity to its user members when the management of the organisation for the sake of showing profit pays continuously less and less for the produce of its farmer member rather than controlling other factors. That is as the farmer control on the institution goes down it may become less and less useful for the producer farmer and falls in dilapidation of members. The most important of the elements of milk marketing as stated by Kurien was divide profit 'among the members in proportion to patronage' (Kurien, Verghese, 2004) and it has been observed that this can be achieved only through milk marketing through the cooperatives, by the farmers, for the farmers and of the farmers.

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CHAPTER V
PROBLEMS AND PROSPECTS OF DAIRY FARMING IN ASSAM

5.1 Introduction

Assam is one of the backward states in India in regards to dairy development is concerned. In the state, the demand for milk and milk product has been very low in proportion to the population, if compared to other parts of the country. The dairy activities and milk production by the grazers had been recognized in Assam by the provision of VGR and PGR in the Assam Land Revenue Act 1886. However, in Assam, until the1960's dairy development activities had not been seen after independence. The concept of Dairy development awakened after the Chinese aggression. When the nation had to deploy a large number of troops in the region, the shortage of milk for the soldiers on the frontier made the region conscious about milk production. This had raised the consciousness and endeavour of the government of Assam in the direction of dairy development. Amidst the prospects of Dairy farming that generated on the necessity of dietary requirement for soldiers, problems had been perpetuated since long.

The dairy cattle farming are a complex kind of agriculture. In the developing country like India where these farming are important for generating livelihood for the majority of marginal, and landless section of the society, on the one hand has to depend on the production and productivity of agriculture, *silvicultural* [23] agroforestry, culture of fodder cropping, natural and climatic condition, marketing and financial facilities as well as other socioeconomic structures. On the basis of these factors, the problems of dairy farming have been observed as follows.

[23]Silviculture encompasses planning and investing in future forest resources by manipulating existing stands, which either intentionally or unintentionally have become established in a given species composition and spacing because of historical reasons, in order to meet some future objective. (Oliver, et al., 1994)

5.2 Feed and fodder problem

India has the largest bovine population in the world. With about 2.4 percent of the total geographical area of the world, India 'has 56.7 percent of world's buffaloes, 12.5 percent cattle, 20.4 percent small ruminants, 2.4 percent camel'. Out of the total cattle population, '79 percent of the cattle are Indigenous, and 21 percent are Exotic and Crossbred varieties' (IGFRI, 2015). According to the 2011 Census, it is home to 17 percent of the world's human population. The number of milch animals (in-milk and dry) in cows and buffaloes has increased from 111.09 million to 118.59 million, registering an increase of 6.75 percent (GOI, 2014). This has further raises the demand for not only the food for the human population but also the demand for feed and fodder. India for the robust size of its livestock population has been facing a shortfall of feed and fodder. In India, the shortage of fodder is a perpetual problem since long.

'In animal feed supply, coarse cereals have a major role and four major cereals *viz.*, maize, barley, sorghum and pearl millet account for about 44 percent of the total cereals. Production of these cereals is stagnating at around 30 million tonnes per year.' In addition to this, 'the crop diversification, which is seen in the recent years with commercial crops replacing the traditional cereal crops especially the coarse cereals, is likely to have an impact on the availability of crop residues' (IGFRI, 2015) creating more crunch of feed in the country.

According to the estimate of Indian Council of Agricultural Research (ICAR), although the supply of green and dry fodders has been increasing continuously, the gap between demand and supply has also been rising with the time. The shortfall of green fodder was 61.13 percent in the year 2000, the estimated shortfall reached 63.45 percent in the year 2015, and the shortfall percentage would reach to the level of 64.20 percent in the year 2020 if the rise in population of livestock continues (Table 5.1). The situation would be more aggravated if the number of unproductive stock of animal could not be arrested to a limit.

Table 5.1 Demand and supply of fodder resources in India (in million tonnes)

Year	Supply		Demand		Shortfall	
	Green	Dry	Green	Dry	Green	Dry
2000	384.5	428	988	549	604(61.13)	121(22.04)
2005	389.9	443	1025	569	635(61.95)	126(22.14)
2010	395.2	451	1061	589	666(62.77)	138(23.43)
2015	400.6	466	1097	609	696(63.45)	143(23.48)
2020	405.9	473	1134	630	728(64.20)	157(24.92)

Source: Hand Book of Agriculture, ICAR

Figures in parenthesis show the percent of the shortfall

In Assam, the fodder demand has been continuously rising along with the livestock population. On the other hand, with the time the grazing reserves continue to deplete aggravating more the fodder shortage in the state; thereby increasing the cost of fodder. As per bovine population including goat in Assam in the year 2015; the requirement of green fodder dry fodder and concentrated feed have been estimated (Table 5.2). The estimate shows that feed demand for adult male cattle is highest. Adult male cattle needs 7.78 million tonnes of green fodder, 6.61 tonnes of dry fodder, and 0.36 tonnes of feed concentrate. The total green fodder requirement for cattle, buffalo and goats accounted to the level of 21.57, 15.31 and 1.03 tonnes of green fodder, dry fodder and feed concentrate respectively. Further, it is observed from the table that the male stock of cattle and buffaloes both needs all green fodder, dry fodder and feed concentrate more than the milch cow in the state. In the state adult male cattle, need 7.78, 6.61, and 0.36 million tonnes of green fodder dry fodder and feed concentrate against the feed and forage requirement of in milk cattle accounting to the level of 2.89, 2.75, and 0.3 million tonnes respectively. In the case of buffaloes the requirement of green fodder, dry fodder and feed concentrate for adult male buffaloes have been estimated to the level of 0.48, 0.5 and 0.02 against the counterpart in milk buffaloes requiring 0.41, 0.31 and 0.05 tonnes respectively. However, the government of Assam has been annually distributing thousands of tractors and tillers since long.

Table 5.2 Feed demand in Assam (in Million Tonnes)

	Animal category	Population in Million	Green fodder	Dry fodder	Feed Concentrate
Cattle	In-milk	1.20	2.89	2.75	0.30
	Dry	0.99	1.69	1.45	0.14
	Adult male	3.00	7.78	6.61	0.36
	Young stock	4.13	6.04	3.22	0.07
Buffalo	In-milk	0.11	0.41	0.31	0.05
	Dry	0.06	0.22	0.11	0.01
	Adult male	0.18	0.48	0.50	0.02
	Young stock	0.13	0.29	0.29	0.01
Goat		3.23	1.77	0.07	0.07
	Total	13.03	21.57	15.31	1.03

For calculation of demand of dry and green forages, concentrate feed's data were adopted from the article 'India's livestock feed demand: Estimates and projections. Dikshit, A K, and P S Birthal. 2010. Agricultural Economics Research Review, 23(1): 15-28'.

The feed demand, supply, and shortfall in Assam have been estimated according to Indian Grassland and Fodder Research Institute norms and residues to product ratio (RPR) mentioned in Hand Book Agriculture. The demand for dry fodder, greens fodder and concentrates were estimated according to populations of different categories of animals multiplying the populations with their respective feed consumption rates as estimated in the research *'India's livestock feed demand: Estimates and projections'* (Dikshit & Brithal, 2010)since it was adopted as valid assumptions by IGFRI under ICAR in their 'Vision 2050' (IGFRI, 2015)'The availability of dry fodder, greens fodder and concentrates was calculated using a suitable extraction ratio, also called as residues to product ratio.' (Suresh, *et al.* 2012) The coefficients used for conversion in the present study are given in Appendix5-I and the table of supply data for fodder and concentrate feed estimation is depicted as Appendix 5-II, and estimated supply, demand (Table

5.2) and a shortfall of green fodder, dry fodder and concentrate feed has been depicted in Table 5.3. The Table shows that in Assam green fodder, dry fodder and concentrate feed, all have a shortfall of supply by the volume of 16.11, 8.02 and 0.35 million tonnes respectively. The estimation shows that the green fodder, dry fodder and concentrate feed shortfall of green fodder, dry fodder and concentrate feed account 74.69 percent, 52.38 percent and 33.98 percent respectively.

Total forest area in Assam is approximately 1,935,173.32 hectares. According to an IGFRI estimate, 1.5 tonnes of green fodder per hectare per annum can be extracted from the forest area. As such, forests in Assam should have been able to produce approximately 2.9 million tonnes of green fodder per annual. On the other hand, the absence of proper silvicultural practices, inefficient management of *taungya system*[24] and impact of socio-political unrest in Assam has even degraded the forest to such an extent that forest faunas often found loitering around the human habitat in search of their required forages and feeds. The dairy farmers of Guwahati metropolitan fringes often imports green fodder from Meghalaya also signifies the shortfall fodder in the state.

Assam has tropical temperate Monsoon Rainforest Climate, with the temperature ranging between a maximum of 35^0–38^0 Centigrade during summer and a minimum of 6^0–8^0 Centigrade during winters. The state also experiences heavy rainfall and high humidity. This climate is suitable for the growth of vegetation. The forest in the state, with proper planning and implementation of silvicultural practices, can, not only produce more than double the fodder produced presently but also can improve its ecosystem and provide a better environment for the diverse nature of floras and faunas.

[24]Taungya**:** A Burmese word that is now widely used to describe the practice, in many tropical countries, of establishing tree plantations by planting and tending tree seedlings together with food crops and fodder. Cropping is ended after a few years as the trees grow up. The system is prevalence in Assam also. (A Dictionary of Ecology, 2004)

Table 5.3 Supply, Demand and Shortfall of Green Fodder, Dry Fodder and concentrate feed in Assam (in million tonnes)

	Green Fodder	Dry Fodder	concentrate feed
Supply*	5.46	7.29	0.68
Demand	21.57	15.31	1.03
Shortfall	16.11	8.02	0.35
Shortfall (%)	74.69	52.38	33.98

Source: Statistical Handbook of Assam 2016; Agricultural statistics at a glance, 2007; *residues to product ratio (RPR) is adopted from Suresh, Ravi Kiran, Giridhar, & Sampath, 2012 (Appendix 5-I) and Presentation for Krishi Karman Award, 2013-14, Government of Assam, 14th October. 2014.

In Morigaon district the demand for green fodder, dry fodder and feed concentrate is estimated on the basis of numbers of animals estimated by Animal Husbandry & Veterinary department, Assam, and for the volume of consumption requirement, the consumption rate has been adopted from the research *'India's Livestock Feed Demand: Estimates and Projections'* (Dikshit & Brithal 2010). On account of non-availability of data, the volume of feed and forage supply could not be estimated. The estimate shows (Table 5.4) Morigaon district require a total of 1,218,968.4 tonnes of feed and forage of which comprises green fodder, dry fodder and concentrate feed 680,800 tonnes, 494,479.3 tonnes, and 43,688.9 tonnes respectively. In Morigaon district too adult male of both cattle and buffalo category require more feed and forage than that of milch animals. The volume of green fodder, dry fodder and concentrate required for adult male cattle are 244,863.5, 20,791 and 11,468, tonnes respectively; the total amounting to 464242.5 tonnes, against the total requirement of in milk cattle, amounting to 215,088.7 tonnes. The requirement for in milk cattle by components of green fodder, dry fodder, and feed concentrates is estimated to be approximately 104,807.6, 99,435.4, and 10845.7 tonnes respectively. For male buffaloes of Morigaon, requirement of green fodder, dry fodder and feed concentrate as per estimate found to be of the volume of 13,495, 14,173.6, and 678.5 tonnes

respectively. However, the requirements for in milk buffaloes are 12,239.10; 9,253.60, and1, 366.50 tonnes of green fodder dry fodder and feed concentrate.

Morigaon district is covered by 85 square kilometres of open forest and 47 square kilometres of dense forest[25]. Adding up, the total forest area amounts to 132 square kilometres. This equals 13,200 hectares, and according to the fodder extraction ratio, this area of forest can produce 19,800 tonnes of green fodder annually. On the other hand, as per the animal population, the district requires at least 680,800 tonnes of green fodder annually.

Earlier the fodder cropping has not been the culture in the state, neither it is drawing due importance till date. The cattle culture in the state even today is dependent upon free grazing in VGRs, PGRs, forest land and other wastelands. The government of the state has not felt necessary to pay heed to the requirements of the Animal Husbandry sector during dereserving of VGR and PGRs in the state.

In Northeastern Region, particularly Assam is dominated by a monoculture of paddy. Primary dairy farmers of the state are mostly dependent on paddy straw comprising 'high lignin, high silica and anti-nutritional oxalate', (IGFRI, 2015) have been creating a different kind of deficiency diseases pushing farmers to huge losses which they do not know.

On the other hand silage making, making of fodder block has not yet received due attention in the state. In the month of March 2018 in a pioneering venture for maize silage making by SJDUSS, it has been observed that only half of the farmers were confident about its nutritional quality. In Assam during Rabi season, sufficient volume of silage can be prepared, but the lack of proper storage facility for bulky volume found to be the major problem. Secondly, the machinery and equipment are not available in the state.

[25] Ministry of Environment, forest & climate change, India data retrieve on 19/04/2018 URL: http://isbeid.gov.in/report/State_Report_advanced.aspx?id=2718133F6AA38E2483E8B932247164DF&val=2106911100

Table 5.4 Feed demand in Morigaon (in tonnes)

	Animal category	population	Green Fodder	Dry Fodder	Feed Concentrate	Total
Cattle	In-milk	43484	104807.6	99435.4	10845.7	215088.7
	Dry	33797	57955.6	49568.9	8429.6	115954.1
	Adult male	94505	244863.5	207911	11468	464242.5
	Young stock	131825	192553.4	102571.7	8701.9	303827
Buffalo	In-milk	3342	12239.1	9253.6	1366.5	22859.3
	Dry	1790	6339.6	3231.9	339.8	9911.3
	Adult male	5202	13495	14173.6	678.5	28347.1
	Young stock	3651	8132.6	2957.3	255.6	11345.5
Goat		73848	40413.6	5375.9	1603.3	47392.9
Total		405429	680800	494479.3	43688.9	1218968.4

For calculation of demand of dry and green forages, concentrate feed's data were adopted from the article 'India's livestock feed demand: Estimates and projections. Dikshit, A K, and P S Birthal. 2010. Agricultural Economics Research Review, 23(1): 15-28'

5.3 Labour problem

Professional dairy cattle farming for milk productions require continuous labour to manage feed, forage, cleaning of cowsheds, milking of animals, marketing of milk and for observation as well as maintenance of veterinary care. Households taking up the dairy cattle farming necessarily need the help of outside labour having knowledge of cattle maintenance. Therefore, a cattle farmer cannot deploy labour which does not have the requisite knowledge. Further, maintaining a farm needs long hours of service each and every day. Therefore securing sufficient and satisfactory labour with the necessary skills for a dairy farm is very much difficult. The ability to pay for labour depends upon the return from the business and wage rate. If the return from the production of milk does not correspond with the time to time market wage rate, the entrepreneurs face the problem. During the period of data collection, over 50 percent of farmers viewed,

that the rate of rising in wage rate has been comparatively higher than that of the rate of rising in the price of milk.

Table 5.5 Indices of Govt. Wage rate and Milk price

Milk price/Wage rate	Year					
	2005-06	2008-09	2009-10	2011-12	2012-13	2017-18
Farmers Milk Price SJDUSS in ₹	14.42	18.79	20.7	26.59	31.10	42.50
SJDUSS milk price Index	100	130.31	143.9	184.40	215.67	294.73
Farmers Milk Price formal sector in ₹	12.39	18.92	18.30	20.99	26.70	35.50
Formal sector milk price Index	100	152.70	147.70	169.41	215.50	286.52
Govt. Wage in ₹	62.00	79.60	10.00	130.00	136.00	183.00
Govt. Job guarantee Act wage rate index	100	128.39	161.2	209.68	219.36	295.16

Source: Work out on the basis of data from i) Time to time Gazette Notification of India. ii) Record books of SJDUSS
2005-06 has been taken as the base year for calculating indices.

Table 5.5 shows the indices of milk prices offered by SJDUSS and other formal sector and the indices of wage rate since 2005-06 to 2017-18. Farmer's price of milk by SJDUSS in the year 2005-06 was ₹14.42 per litre which rises to the level of ₹42.50 per litre in the year 2017-18. On the basis of the price in the year 2005-06, the index of milk price by SJDUSS found to be 294.73. Similarly, the price paid by other formal sectors to their producers was ₹12.39 per litre in the year 2005-06. That has risen to ₹35.50 per litre. Taking 2005-06 as the base year the index number of average milk price provided to producers by other formal sector found to be 286.52. On the other hand, the wage rate has risen from ₹62 in the year 2005-06 to ₹183.00 in the year 2017-18. Thus, the wage index for the year 2017-18 found to be of 295.16.

Thus, it is seen that the rate of rising in wage rate is higher than that of the rate of rising in farmers prices of milk signifying that the rate of rising of ability to

pay higher wage is less than that of the rate of rising in the wage rate. In this regard the Agro-Economic Researcher Dr. J. Bordoloi had rightly remarked, 'Implementation of NREGA, increased the wage rate of agricultural operation' and attached labourer in agriculture became scarce as they could to earn more when employed in NREGA. Therefore, it is a matter of concern for agriculture as a whole' (Bordoloi, 2011). Dairy sector, where consistently continuous long hours of labouring are necessary, has been facing the same problem during the last few years. It is also observed that labourers many a time prefer leisure full NREGA work coupled with the facilities under the National Food Security Act (NFSA) rather than working in or enterprising dairy farms.

5.4 The problem of cattle keeping and feeding

The cattle keeping system is under transition in Assam. The stall feed system evolved from the grazing system due to the continuous fall in Grazing and lack of land among cattle farmers. In the stall-feed system, cattle are kept fastened or tied throughout its life from the day the calf is born. This disturbs the full growth as well as the ability to resist different kind of hard situation and diseases leading to low productivity and a shorter lifespan. Further, in northeastern states feed concentrate is fed with water, however, a high proportion of the water a cow drinks never enters her rumen**.** As such, due to the lack of microorganisms and belching the concentrate, feed that fed to an animal does not get fully digested and the low level of occurrence of rumination also reduces the expulsion of fermentation gases, highly increasing the possibility of bloating and other stomach diseases, ultimately reducing the lifespan of cattle. The survey data shows that 97 percent of households have been keeping their cattle in the stall feed system, 22.22 percent have been keeping their crossbreed cattle in the stall feed system, and Lakhimi cattle[26] are often grazed, *i.e.* adopting mixed system whereas 2.92 percent of farmers still fully depend upon grazing in the forest and other (Table 5.6). However, only one household was found to adopt grazing for the whole haul of his crossbreed cattle. Thus, it has been observed that a grazing system is often healthier; however, it is not possible because of the lack of grazing lands in the

[26] Lakhimi Cattle is indigenous cattle of Assam, Registered by ICAR – National Bureau of Animal Genetic Resources, Karnal during 2017-18 bearing Accession Number INDIA_CATTLE_ 200_LAKHIMI_03041.

study area as well as other parts of the state. Fencing or free stall requires more than the land required in stall fed system and cattle are kept free of fastening within a fenced compound, fed in more scientific way and cattle are allowed to drink water at their own will. This method involves more initial capital compared to stall feed. It is the viably healthier system, but farmers have not yet adopted the system.

Table 5.6 Cattle keeping of sample households

Stall feed	Stall feed + Grazing mix	Grazing	Fencing or Free Stall
166	38	5	0
(97.00)	(22.22)	(2.92)	(----)

Source: Survey data.

Figures in parenthesis show the percentage of total sampled households.

In Assam, fodder development on grazing lands has not received any attention till date. Neither has the cultivation of fodder crops been adopted in the state. The conventional culture has been observed that the smallholders not only in rural areas but even in urban and peri-urban areas cattle are kept in a small shed made for the purpose. It is only for the night stay of cattle. The farmers generally after milking cattle in the morning, makes cattle go away for self-grazing. During the day cattle fill their stomachs grazing on open fields nearby surrounded with different agricultural fields. In such open pasture sufficient fodder to satisfy the want of cattle is kind of dream. Therefore, whenever they get chance enters into the adjacent agricultural area, if not open by breaking the fences *etc.* The owner of the cattle, ignorant of the social cost created by his cattle feels happy milking cattle in the morning, no matter how less the volume every day, and remains in complacency.

5.5 The problem of animal diseases and veterinary facilities

Assam with its warm, humid climate is prone to different kind of cattle diseases. Among the diseases, Mastitis, Babesiosis, viral diarrhea, Foot and Mouth Disease (FMD) *etc.* have been the cause of great losses to the farmer every

year. Besides these, the problem of repeat breeding has been the cause of loss of production and productivity. Contagious bovine Pleuropneumonia and Rinderpest have not yet been eradicated. Therefore, the farmers always need well support from the Veterinary Department for better production and productivity.

In Assam, the number of veterinary doctors serving in the fields is less than 500. At present 'as many as 103 veterinary doctor posts have been lying vacant'[27]. As such, there remain far less than 400 doctors against around twenty million livestock in the state (the total Livestock as per Livestock Census, 2012 was 19080304). That is a veterinary doctor has to look after over 50,000 livestock. There are in total 1236 nos. of facilitation centre in the state, and each centre has to shoulder the service for over 15500 animals. As per international standards, for every 5000 animals, a veterinary doctor is necessary to provide the required level of care. Thus, the veterinary facilities in the state and study area are far below the requirement.

5.6 The problem with marketing and price

Not only the marketing of milk but the facilities for the marketing of other by-products, namely dung and animal are necessary for successful dairy farming. The government effort to develop milk marketing has been found on the verge of failure in the state. It has been already stated in the previous chapter that the infrastructure developed through the Department of Dairy Development throughout the state are infrastructures for assisting milk marketing and the department had tried to procure and market through TMSSs, but except a few - namely, the Manza and Umrangshoo almost all are defunct. Moreover, the activities of TMSS in the state as government milk marketer under the Dairy Development Department found to be almost nil at present.

The problem of marketing for the product of dairy cattle farming is not developed in Assam till date. At present scenario, no market has been developed for dung produced by cattle rearing. Cow dung is one of the important elements of the organic farming system. Crossbreed cattle in the state have been reared in the stall feed system, and the volume of dung produced has always been too large,

[27]Statement of Assam Veterinary Minister, published in Telegraph on Wednesday, May 2, 2018

compared to their land holdings, for exhaustive use. Hence, large volumes of dung remain piled up at the farming site. Many times the piled dung as such has been regarded as a hazard in society. However, if the state of Assam, alike in Sikkim, encourage an organic system of farming with well-integrated marketing for dung can be saviour programme of a dairy farmer, cultivator and none the less the environment and ecosystem by reducing the chemical pollution in farmlands.

In rural areas, the difference in income arises between the cooperative and non-cooperative farmers. It has been observed that the bargaining powers of the cooperatives are much higher in comparison to an individual farmer. In urban and peri-urban areas, the markets are much easily accessible to any farmer. However, in rural areas demand for marketable dairy productions over the volume required for local consumption is always dependent upon the urban markets. Urban situations are very much complex for easy and simple producers of rural areas. Further, dairy farmers hardly can spare the time required for marketing twice daily. Therefore, they are bound to be dependent upon intermediaries. As such, farmers owned cooperatives are only the structure in the milk marketing chain which can safeguard the deserving of the nobly docile farmers of the rural areas. In some of the remote villages, not only of Morigaon, Karbi Anglong and other districts in Assam but also in Kamrup (Metro) district the milk producer farmers realising hardly over half the price of milk that prevails in Guwahati city. This reduces the enthusiasm of the farmers to develop and expand farming. This is observed during visits to the villages Garhmari, Gagalmari and other in Morigaon district and some of the remote areas around Panbari village in Kamrup metro district.

The states of Assam till date neither have control over the feed prices that are to be procured out of the state nor have the Minimum Support Price (MSP). Therefore, dairy farmers of the state always have a feeling of insecurity.

5.7 The problem of Risk and Insurance

For a profitable business, farmers must possess better breed stock. In our state, better quality cattle costs around the market price of its five months of milk production. At present, quality cross breed cows are priced in between ₹

50,000.00 (Rupees Fifty thousand) to over ₹ 100,000.00 (Rupees One lakh) according to their productivity, health, age and size. Therefore, a measure of risk aversion is very much necessary. But during the field study, it was found that no farmers had purchased insurance policies for all the cattle stocks they had. They had insured only those cattle which were bought through the bank and yet had repayment dues. Therefore, it was enquired for the reason of not getting all cattle insured. From the enquiry data, table 5.7 and Venn diagram 5.1 have been generated. The cause of not getting all cattle insured has been attributed to the following reasons, based on survey data -

A: Getting a claim is difficult;

B: No damage claim is entertained

C: High Premium rate

Out of the 171 samples, 159 farmers attributed reasons for not getting all cattle insured. 12 farmers found to be ignorant about the benefit of cattle insurance. 131(76.61 %), 133 (77.80%) and 19 (11.10%) attribute reason A, B and C respectively whereas 124 (72.51%) attribute both the reason A and B. On the other hand 4 (2.34%) said that they had not got all the cattle insured for all the reason, *i.e.* Reasons A, B and C.

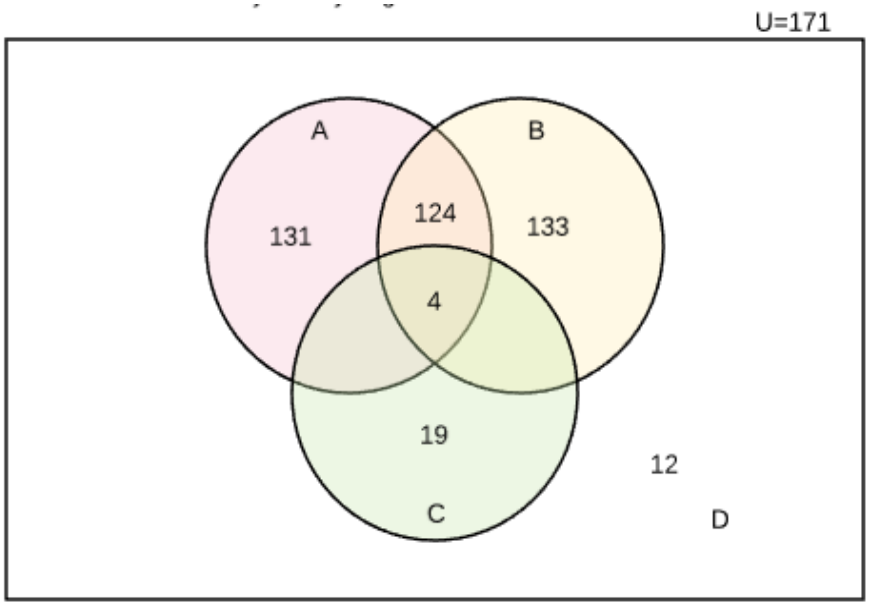
Table 5.7 Problem of cattle Insurance

	Reason attributed	Sample Nos.	A&B	A,B & C	Total
A	Getting claim is difficult	131(76.61)	124(72.51)	4(2.34)	159(92.99)
B	No damage claim is entertained	133(77.80)			
C	High premium rate	19(11.10)			
	Don't know	12(7.02)			12
	Total				171(100)

Source: Survey data

Figures in parentheses show the percentage of the total sample.

Figure 5.1 Venn diagram on Problem of cattle Insurance



The success of the business of dairy cattle farming depends upon the production and productivity. For a farmer, if cattle due to partial injury or any other reason becomes unproductive, then it is a matter of high economic loss. Rearing of such cattle causes concurrent losses. The loss accumulated as such may super shade loss due to mortality of an animal. Therefore, for a dairy cattle farmer health damage insurance is necessary. But no insurance company found disbursing insurance claim for health damage of a cow becoming unproductive.

5.8 Problem of organisational structure and empowerment

. One of the major causes of the underdevelopment of the dairy sector is that the cooperation department has been unable to implement three tier bottoms up model to date. However, in the policy papers, the *Amul* model has been stressed continuously.

The Department of Dairy Development, Assam has been expending money almost regularly for the infrastructure of milk processing and marketing. But the departmental activities in regards to procurement, processing and marketing of milk have not been felt in the market. However, the state officials till date have

not shown any trust to grassroots farmers. Neither of the infrastructures of milk processing and marketing has been allocated to any farmers group or farmers cooperatives. Even the milk parlour constructed decade back at Central Dairy campus at Khanapara has not been allocated to any party although leading dairy cooperative in the state has been asking for it since 2009-10. That is the state machinery is not serious about empowering the farmers with the infrastructural facilities although the departmentally entrusted policy is there.

The experiences of SJDUSS show that so long as price remains remunerative, the numbers of members remain intact contributing longevity of the cooperative.

The present study shows that the production cost of milk in Mayong block area is ₹ 36.21 and the local cooperative at present providing price ₹ 42.50 on an average. Therefore, farmers always adhere to this cooperative society. But this cooperative society has very much limited scope to serve the haul of dairy farmers in the state.

In Assam, till date, neither the milk price nor the feed price has been used by the government of Assam as an instrument of dairy development in the state. To generate enthusiasm for dairy cattle farming return from the business must be remunerative.

Remunerative return can be ensured by two ways, one by facilitating measure to cut cost by controlling the feed prices, encouraging fodder cultivation, silage making, and feed block making, and silvicultural practices suitable for rural economy by the Department of Forest and other or by fixing Minimum Support Price of milk commensurate to prices of input factors.

5.9 Problem of finance

It is already stated that the price of a milk producing cow rounds about the value of the market price of its five months of milk production. According to our survey data, the cost of production is ₹ 36.21, and the level of profit on the current business is around 14 percent of those farmers who are the members of a cooperative society. In the case of farmers not associated with cooperative, the profit level is rather low. The decision to extend the loan for business by any bank

depends upon the recent history of repayment ratio. If the rate of profit remains greater than the rate of the cost of finance, the repayment would always be better. Secondly, an association of a farmer with a financially reliable institution helps him in securing finance from bank *etc.* In the study area, it has been observed that any bank in and around SJDUSS provides loan up to rupees five lakhs without any collateral security to the dairy farmer under Sitajakhala. But in the same locality banks hesitate to finance other farmers not associated with the cooperative. Beyond the government's subsidy schemes, the lack of proper rate of return and reliable farmer's institution plays an important role in securing required finance by dairy farmers.

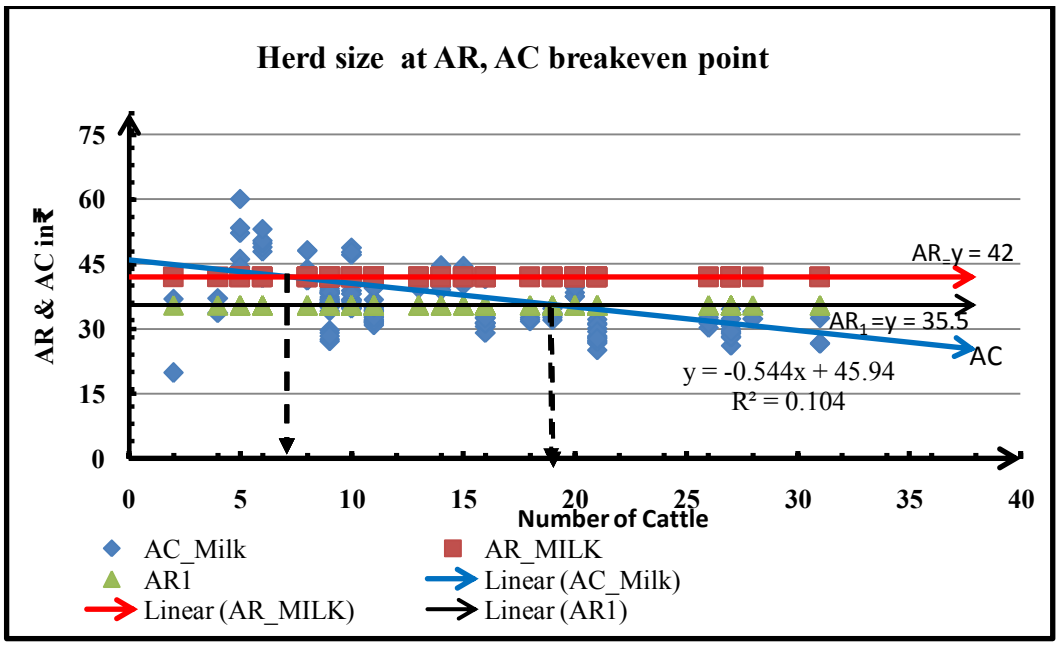
5.10 The institutional adherence and income level: impact on Employment Avenues

The income level of farmers is also dependent upon the institutional adherence of the farmers. In our study area, the farmers of SJDUSS are well off in comparison to the farmers of other cooperative or pouring milk to WAMUL. All the farmers have been facing an identical market situation for feed, fodder and other input materials for their farms. On the other hand, till date, SJDUSS is able to provide remunerative and stable price to its farmer. Therefore most of the farmers of the villages adjacent to this cooperative are associated with it. This cooperative in the financial year 2017-18 is able to provide milk price at the rate ₹ 42.00 per litre in an average; whereas established institution like WAMUL providing only ₹ 35.00 to 36.00 on two axis basis[28], averaging the farmer's price around ₹ 35.5. It has been observed bulks of feed ingredients wheat bran, oil cake *etc.* are to be imported from other state and the feed price basically dependent upon those items. Average feed costs found to be ₹ 20.00 per Kg in the state. The labour cost of dairy farming has the impact of the trend of government wage rate of Job card holder. Some of the feed ingredients like oil cake, wheat bran *etc.* found to be a little cheaper around urban and peri-urban areas than that of the rural interior counterpart. However, the labour cost and fodder found to be cheaper in rural areas. As such, the overall average cost of milk production in regards to

[28] In this system, each milk producer is paid for each unit of fat per Kg of milk, plus SNF per kg. That is, the price of milk is determined on the basis of its contention of Fat and Solid Non Fat (SNF).

factors is almost the same in rural, urban, and peri-urban areas. That is the sustainability of dairy farming depends upon the price of milk or AR of their output. In the figure (5.2) a linear AC has been calculated from the Survey data and AR is the Average Revenue or average milk price that received by the farmers of sample households, and AR_1 is the average price received by the farmers within and in the vicinity of our study area supplying milk to other traders, institutions like WAMUL or other (Appendix 5. III). We can observe in the figure (5.2) that, to arrive at AR, AC breakeven point or parity with different price or Average Revenue situations, different numbers of cattle have to be reared by the two groups. Whereas,at a price provided by SJDUSS the farmer can attain the parity with seven cattle heads, while at the average price provided by other traders or institutions to their farmer, *i.e.* ₹ 35.5, to arrive at the AR, AC breakeven or parity point, it is necessary for them to rear at least 19 number of cattle.

Figure 5.2 Herd size at AR, AC breakeven point



The number of cattle necessary to rear at least to remain at AR, AC parity is also dependent upon Average Cost, higher the AC larger should be the cattle herd and vice versa.

The farmers pouring milk at lower prices are generally have small numbers, *i.e.* two, three nos. of cows feeding a little forage out of their agricultural waste

and let the cows almost regularly off the house anywhere else for forage. As such those farmers hardly have any concern about the cost of rearing cattle, *i.e.* the opportunity cost of household feed, forage and the social cost incurred by the habit of let off to open for graze almost throughout the year. We have also observed that the cattle farmers with milk production as a primary source of livelihood earning have been attached to cooperatives. The membership in cooperative benefits farmers in three ways; firstly it reduces the cost of milk marketing, and secondly it saves the time to be engaged for milk marketing. The time saved is cost reducing, as the farmer gets extra time to look after their farms. The institutional attachment not only saves the farmer from the grabbing of any kind of middleman like the player but also accrues the benefit of the value addition and milk business.

In Assam, the existence of demand for milk could be understood from the requirement, availability and of a shortage of milk in Assam (Table 4.6). But the question is whether the cattle farming can provide secure livelihood to the farmer. With the sample data, we have found that the production cost in the study area is ₹ 36.21. The production cost throughout the state would almost be the same. At the fringe of urban and peri-urban areas, the cost for feed items which are to be imported from outside Assam would cost less. Whereas, the labour cost would be higher in urban areas and the opposite would be the situation in the rural areas. Therefore, it is confirmed that in our state there exists an ample scope of employment avenues through dairy cattle farming, iff the processing, value addition and marketing of milk remains with the farmer-owned institutions where the benefit or profit of the business are not to be distributed beyond the farmer. The fact is found in SJDUSS. SJDUSS has a convention that shares are not to be given to the person who is not a milk producing farmer. If a farmer fails to be an active shareholder by producing milk continuously, he/she has to withdraw their share. Inactive shareholders forfeit their right on the Profit of the cooperatives until they do restart supply of produce to the cooperative. The cooperative during the last 60 years has been providing profit margins to its farmers as an incentive for their milk produced during the cooperative calendar year. Therefore, in the

history of dairy cooperatives in Assam SJDUSS has been running to date successfully satisfying its farmer.

5.11 The prospect

In Assam, if the model of SJDUSS in regards to providing the benefits of milk and milk product business to the farmers pouring their output to it, can be replicated in all other dairy cooperatives in the state the requirement and availability gap or shortage of milk would provide the basis for livelihood creation and employment generation.

According to Economic Survey Assam, 2017-18, the requirement, availability and shortage of milk in Assam for the year 2016-17 were 2511, 904 and 1607 million litres respectively. If the shortage volume of milk can be produced in the state, there would be possible to generate at least 373756 and 24941 numbers of direct farm level employment and employment on milk marketing respectively over the present level of employment (Table 5.8). Thus, it would account for an increment in employment generation for 398697 people over and above the present figures. This is the scope of Employment Avenue from dairy cattle farming.

Table 5.8 Possibility of employment generation through dairying in Assam

Milk in Assam, 2016-17 (in million litres)			***Possibility of employment Generation in nos.**		
Requirement	**Availability**	**Shortage**	**On Farm**	**Marketing**	**Total**
2511	904	1607	373756	24941	398697

Source: Economic Survey Assam, 2017-18.
Estimated with the help of the employment ratio of Survey data
On-farm employment = 0.000232579783108716/ litre of milk.
Employment on Marketing =0.00001552/ litre of milk.

Therefore, hypothesis 2, 'there is ample scope for Employment Avenue in Milk production and marketing' is accepted.

There are few conditions to be fulfilled from the part of procurer of milk not only in Morigaon district but also whole the state of Assam that the farm gate price of milk always remains higher than the cost of production.

In Assam to increase the milk production to bring the shortage down to zero levels, fodder cultivation is to be started, production of silage and fodder block are to be encouraged and popularised. Sufficient land that remains barren during Rabi season can be utilised. A new group of fodder cropper will come up, and gradually fodder marketing will develop. All these in combination not only would bring down the cost of production but also will be able to help in solving the unemployment problem.

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Appendix 5-I Residues to product ratio (RPR) used in the assessment of livestock feed resources

Category of feed sources	Crop residues	Grains	Bran/hull	Oilcake	Green fodder (t/ha)
Straws and stovers					
Rice (*Oryza sativa*)	1.3	0.02	0.08	-	-
Wheat (*Triticum aestivum*)	1.0	0.02	0.08	-	-
Bajra (*Pennisetum typhoides*)	2.5	0.05	-	-	-
Finger millet (*Eleusine coracana*)	2.0	0.05	-	-	-
Maize (*Zea mays*)	2.5	0.4	-	-	-
Sorghum (*Sorghum bicolor*)	2.5	0.05	-	-	-
Small millets	2.5	0.1	-	-	-
(*Panicum miliare*, *P. miliaceum*, *Setaria italic etc.*)					
Tuber crops					
Cassava (*Mannihot esculenta*)	-	0.12*	-	-	-
Pulses					
Gram (*Cicer arietinum*)	1.7	-	0.03	-	-
Red gram (*Cajanus cajan*)	1.7	-	0.03	-	-
Other pulses	1.7	-	0.03	-	-
Oilseeds					
Groundnut (*Arachis hypogaea*)	2.0	-	-	0.6	-
Soya bean (*Glycine max*)	1.6	-	-	0.73	-

Category of feed sources	Crop residues	Grains	Bran/hull	Oilcake	Green fodder (t/ha)
Linseed (*Linum usitatissum*)	-	-	-	0.67	-
Rapeseed and mustard (*Brassica*sps.)	-	-	-	0.67	-
Sunflower (*Helianthus annus*)	-	-	-	0.70	-
Safflower (*Carthamus tinctorius*)	-	-	-	0.70	-
Niger seed (*Guizotia abyssinica*)	-	-	-	0.72	-
Sesamum (*Sesamum usitatissum*)	-	-	-	0.60	-
Coconut (*Cocos nucifera*)	-	-	-	0.056	
Cotton (*Gossypium* sps.)	-	-	-	0.049	-
Castor (*Ricinus communis*)	-	-	-	0.50	-
Greens					
Sugarcane (*Saccharum officinalis*)	-	-	-	-	0.25**
Area under fodder crops within gross cropped area (*i.e.* 2.024 percent of gross cropped area)	-	-	-	-	5.00
Area under fodder crops	-	-	-	-	40.93***
Forest area	-	-	-	-	1.5
Permanent pastures and grazing land	-	-	-	-	5
Land under Misc. tree crops and groves not included	-	-	-	-	1
Cultural wasteland	-	-	-	-	1

Category of feed sources	Crop residues	Grains	Bran/hull	Oilcake	Green fodder (t/ha)
Current fallow	-	-	-	-	1
Other fallow	-	-	-	-	1

Source: Agricultural statistics at a glance, 2007, Directorate of economics and statistics, Ministry of Agriculture, GOI. * Srinivas, T. and M. Anantharaman. (2005). ** Sugarcane top to cane ratio.
*** Weighted average estimated from the yields as per Hand Book of Agriculture, 2005.

Appendix 5-II Calculation of green fodder, dry fodder and concentrate feed in Assam as per Residues to product ratio (RPR)

Category of feed sources	Area (in '000 hectare	Crop Production (in '000 tonnes)	Green Fodder in tonnes	Dry Fodder (in tonnes)	Concentrate Feed (in tonnes)
Straws and stovers					
Rice	2495.00	5125.00	249500.00	6662500.00	512500.00
Maize	NA	77.00	96250.00	96250.00	30800.00
Other croppable area	1587.6		158760.00		
Pulses	142.00	108.00	14200.00	183600.00	3240.00
Oilseeds	330.00	215.00	33000.00	344000.00	129000.00
Sugarcane (*Saccharum officinalis*)	29083	1075.171	268792.75		
Area under sum of Fellow Land & grazing land	348.09		1740465.00		

Total fodder extractable area under forest	1935173.32	2902759.98		
Total Green Fodder Dry Fodder and Concentrate Feed (in tonnes)		5463727.73	7286350.00	675540.00
Feed & Fodder Appoximated in Million Tonnes		5.46	7.29	0.68

Gross cropped area, excluding the area under fodder crops (2.024 percent of gross cropped area) produces green fodder 5 tonnes per hectare per annum.
Sources: Agricultural statistics at a glance, 2007, Directorate of economics and statistics, Ministry of Agriculture, GOI.
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K. P. Suresh *et al.* (2012) *Modeling and Forecasting Livestock Feed Resources in India Using Climate Variables* in Asian-Aust. J. Anim. Sci. Vol. 25, No. 4: 462 - 470, for Residues to product ratio(RPR)
Begum Mahima *et al.* (2016): "Trend of sugarcane and jaggery production in Assam and associated problems and prospects" in SSRG International Journal of Agriculture &Environmental Science (SSRG-IJAES)–Volume 3 Issue 6 Nov to Dec 2016 for sugar cane

Appendix 5-III AR, AC and number of cattle in the study area

Sl.No.	Number of cattle	AC of Milk in ₹	AR of MILK in ₹	AR_1
1	5	46.11	42	35.5
2	13	86.42	42	35.5
3	10	47.16	42	35.5
4	31	26.65	42	35.5
5	10	34.71	42	35.5
6	13	39.43	42	35.5
7	9	27.25	42	35.5
8	9	35.11	42	35.5
9	14	44.61	42	35.5
10	18	32.68	42	35.5
11	11	33.95	42	35.5
12	21	31.35	42	35.5
13	26	32.07	42	35.5
14	27	29.13	42	35.5
15	9	38.40	42	35.5
16	8	43.99	42	35.5

Sl.No.	Number of cattle	AC of Milk in ₹	AR of MILK in ₹	AR_1
17	16	104.09	42	35.5
18	21	28.36	42	35.5
19	9	38.29	42	35.5
20	6	47.97	42	35.5
21	11	31.49	42	35.5
22	11	31.56	42	35.5
23	11	31.26	42	35.5
24	20	41.89	42	35.5
25	19	32.68	42	35.5
26	15	44.48	42	35.5
27	10	35.10	42	35.5
28	27	26.17	42	35.5
29	20	38.50	42	35.5
30	28	34.01	42	35.5
31	5	52.28	42	35.5
32	13	80.12	42	35.5
33	10	48.83	42	35.5
34	31	26.77	42	35.5
35	10	36.51	42	35.5
36	13	41.62	42	35.5
37	9	29.75	42	35.5
38	9	37.02	42	35.5
39	14	42.76	42	35.5
40	18	31.79	42	35.5
41	11	32.25	42	35.5
42	21	30.09	42	35.5
43	26	30.31	42	35.5
44	27	28.09	42	35.5
45	9	38.13	42	35.5
46	8	43.22	42	35.5
47	16	30.65	42	35.5
48	21	26.81	42	35.5
49	9	29.08	42	35.5
50	6	48.92	42	35.5
51	11	33.15	42	35.5
52	11	33.36	42	35.5
53	11	33.52	42	35.5
54	20	37.60	42	35.5
55	19	34.78	42	35.5
56	15	42.87	42	35.5

Sl.No.	Number of cattle	AC of Milk in ₹	AR of MILK in ₹	AR_1
57	10	40.70	42	35.5
58	27	30.69	42	35.5
59	20	37.51	42	35.5
60	28	32.43	42	35.5
61	5	53.41	42	35.5
62	13	81.18	42	35.5
63	10	47.75	42	35.5
64	31	32.53	42	35.5
65	10	35.56	42	35.5
66	13	39.92	42	35.5
67	9	27.57	42	35.5
68	9	35.46	42	35.5
69	14	44.49	42	35.5
70	18	33.41	42	35.5
71	11	34.25	42	35.5
72	21	32.29	42	35.5
73	26	32.71	42	35.5
74	27	30.02	42	35.5
75	9	40.31	42	35.5
76	8	48.16	42	35.5
77	16	29.11	42	35.5
78	21	25.08	42	35.5
79	9	36.13	42	35.5
80	6	41.85	42	35.5
81	11	32.01	42	35.5
82	11	31.66	42	35.5
83	11	32.84	42	35.5
84	20	40.21	42	35.5
85	19	33.60	42	35.5
86	15	41.46	42	35.5
87	10	36.88	42	35.5
88	27	28.90	42	35.5
89	9	39.33	42	35.5
90	8	41.33	42	35.5
91	16	32.63	42	35.5
92	21	28.05	42	35.5
93	9	37.41	42	35.5
94	6	49.92	42	35.5
95	11	36.84	42	35.5
96	11	30.96	42	35.5

Sl.No.	Number of cattle	AC of Milk in ₹	AR of MILK in ₹	AR_1
97	11	31.77	42	35.5
98	9	34.14	42	35.5
99	14	39.84	42	35.5
100	18	32.20	42	35.5
101	11	33.41	42	35.5
102	21	31.09	42	35.5
103	26	31.41	42	35.5
104	27	28.19	42	35.5
105	9	38.86	42	35.5
106	8	41.24	42	35.5
107	16	31.54	42	35.5
108	21	27.29	42	35.5
109	9	36.87	42	35.5
110	6	50.44	42	35.5
111	11	34.35	42	35.5
112	11	34.57	42	35.5
113	11	35.10	42	35.5
114	20	41.78	42	35.5
115	19	32.11	42	35.5
116	15	40.30	42	35.5
117	11	31.97	42	35.5
118	20	41.82	42	35.5
119	19	33.05	42	35.5
120	15	41.71	42	35.5
121	10	35.94	42	35.5
122	27	28.20	42	35.5
123	9	38.70	42	35.5
124	8	41.32	42	35.5
125	16	31.39	42	35.5
126	21	27.00	42	35.5
127	9	36.75	42	35.5
128	14	39.04	42	35.5
129	27	30.68	42	35.5
130	9	41.05	42	35.5
131	8	48.30	42	35.5
132	21	29.37	42	35.5
133	9	39.98	42	35.5
134	11	32.70	42	35.5
135	20	40.85	42	35.5
136	20	39.63	42	35.5

Sl.No.	Number of cattle	AC of Milk in ₹	AR of MILK in ₹	AR_1
137	10	41.39	42	35.5
138	9	28.34	42	35.5
139	9	36.24	42	35.5
140	11	35.04	42	35.5
141	27	29.86	42	35.5
142	8	41.56	42	35.5
143	21	27.72	42	35.5
144	6	53.20	42	35.5
145	11	35.19	42	35.5
146	15	41.23	42	35.5
147	10	38.83	42	35.5
148	20	41.97	42	35.5
149	27	34.58	42	35.5
150	13	93.53	42	35.5
151	9	38.53	42	35.5
152	11	39.47	42	35.5
153	16	31.33	42	35.5
154	19	33.75	42	35.5
155	27	32.31	42	35.5
156	10	41.51	42	35.5
157	31	33.24	42	35.5
158	9	36.23	42	35.5
159	27	29.44	42	35.5
160	16	32.54	42	35.5
161	5	60.06	42	35.5
162	5	90.19	42	35.5
163	11	39.68	42	35.5
164	10	38.17	42	35.5
165	4	33.69	42	35.5
166	2	19.87	42	35.5
167	4	37.12	42	35.5
168	16	41.54	42	35.5
169	5	44.33	42	35.5
170	6	41.83	42	35.5
171	2	37.01	42	35.5

Source

*AR_1 is the Average milk price/litre paid to farmers by formal sector institutions, other than SJDUSS

CHAPTER –VI
SUMMARY OF FINDINGS, CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

The contribution of livestock and milk production had a long legacy and had its genesis since time immemorial in Indian civilization. In ancient India during *Vaidic* period cattle, raising and milk production was a prime occupation. The *Arthashastra* has mentioned systematic record keeping of animals in ancient India. In brief, animal husbandry and cattle rearing have been a way of livelihood generation in India throughout history, to date.

India ranks first in milk production, accounting for 18.5 percent of world production, 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.

The contribution of animal husbandry and dairy farming to total Gross Domestic Product in all India level was 3.9 percent in 2013-14 at current prices as estimated by the Central Statistical Organisation.

The success of the dairy industry in India has resulted from the integrated co-operative system of milk collection, processing and marketing. 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 a day. About 22.45 million people work in the livestock sector, which is around 5.8 percent of the total workforce in the country.

In Assam, the prospect of dairy farming was well envisaged during the British rule itself. The genesis of formal milk production activity in the state lies with the advent of British rule in Assam. The Assam land revenue Act 1886, in fact, encouraged it as a profession for a livelihood.

The geographical area of Assam is 78438 sq. Km. supporting 3.12 crore of the population in 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 litre. The per capita availability of milk in the state is almost stagnant around 75 gm/day almost since the 1990s. The local tribes do not have a tradition of cattle rearing for milk, but today it has found that the business of dairy farming has got popular among the SC and ST.

There are several studies relating to the Dairy sector in Assam. But no single study has made on problems and prospects of milk production in terms of cost and returns. Moreover, the cost and return scenario provides the possibility of employment avenues.

Hence, the present study on 'Milk Production and Marketing in Assam: Problems and Prospects with special reference to Mayong Block of Morigaon District in Assam' is undertaken to analyze and compare the cost and returns of milk production and the constraints faced by the producer and the marketer of milk in Assam, especially the producers and marketer of Mayong block in the district of Morigaon.

During the study it has been observed that in Assam no secondary data has been available regarding employment level through animal husbandry and the requirement and availability of feed and fodder, and data for quantifying the employment opportunities that can be generated along different livestock value chains, including on farm, off-farm and nonfarm jobs were 'not available to understand the broader sector level employment'. Therefore employment indicating coefficients have been derived from the survey data, and for the determination of demand and supply of feed and fodder, we followed the line of IGFRI and Handbook of Agriculture.

6.2 Summary of Findings

India's livestock sector is one of the largest in the world comprising 4 percent of the GDP and 26 percent of the agricultural GDP'. The total output worth has been higher than the value of food grains.

The livelihood oriented dairy cattle farming by smallholders cannot be sustained without well-organised marketing in favour of farmers, which is not possible without cooperation. The well-organised structure and farmer-centric

approach is the reason behind the towering of *AMUL* and sustenance of SJDUSS. In comparison, it has also been observed that the states having more cooperatives produce more milk. The present study area is one of the traditional milk pockets of the state since the 1930s, and the ratio among the professional dairy farmer associated with Cooperative to those not associated with it was found to be 93.60 percent.

SJDUSS and AMUL, when compared, found that the genesis behind the inception was identical. Both the cooperatives were formed to free the farmers from rapacious private parties and differ only in the scale of business and geographical location. Moreover, cooperatives like SJDUSS in Assam are still waiting for the association of personalities like Kurien-Dalaya, the technocrats, as well as enthusiasts and powerful supporters like Moraraji Desai, Sardar Patel, Lal Bahadur Shastri and other policymakers.

Assam is unable to raise any of its cooperative structure like *Anand* in Gujarat or *Nandini* in Karnataka or *Verka* in Punjab. This has accrued less benefit to the dairy farmers of the region. Moreover, encroachment and dereservation of grazing land further enhance the problems of dairy cattle farming. This pushed Assam to be a milk scarce state, in place of milk abundant state.

The state of the formal milk processing sector in Assam is that the infrastructure created in the state are either largely defunct or grossly under-utilized. The government is not yet showing its enthusiasm and trust towards farmers owned cooperatives in providing those infrastructures in their hands. However, this could have made the dairy sector self-reliant on the one hand, and on the other, it could have eased the problems of dairy cattle farmer by cutting down the cost of dairy production and marketing.

Fresh liquid milk is the most preferred dairy product and is generally consumed by most of the consumers in Assam. In Guwahati city itself, 60 percent milk consumers in our sample preferred fresh milk and only 40 percent of the consumers were ready to accept pasteurised packaged milk. 60 percent of the consumers believed that pasteurised packaged milk is always produced with reconstituted milk and this lacks fragrance of fresh milk.

In the study area under Mayong block, the culture of rearing cattle progeny of High Yielding varieties was five-decades-long, and most of the cattle have been observed to be crossbreeds of local Lakhimi, Holstein Friesian, Jersey, and Sahiwal. In comparison to Lakhimi, Jersey and Sahiwal, Holstein Friesian produces low-fat milk but higher in quantity. Except for Lakhimi, pure breeds of cattle are rarely found in the study area.

The study reveals that dairy farming has been getting popular among the SC and ST at present. Among the sample of 171 dairy households, the numbers of SC and ST households were 32 and 25, *i.e.* 18.71 percent and 14.62 percent respectively. The number of OBC households found to be of 14.62 percent and the dairying found to be dominated by General Caste comprising 52.05 percent.

In the survey of 2456 numbers of cattle, 2003 were female cattle and out of it the numbers of total milch cattle were 1042, *i.e.* the ratio of milch cattle on total cattle was 42.43 percent, and the ratio of milch cattle on total female cattle was 52.02 percent. Among the survey households, only crossbreed cattle were available

The average revenue earnings from milk, of farmers associated with cooperative found to be significantly higher than the farmers not associated with any cooperatives. Cooperator farmers were able to realise milk price ₹ 42.00 per litre in an average during 2017-18. However, far-flung farmers not associated with any farmer's cooperatives and supplying milk to the local traders, hotels and other institutions were able to get only about ₹ 35.50 per litre.

The production of survey households was found to be 7727.5 LPD, i.e. the annual production was 2820537.50 litre. Estimated total annual revenue earnings were ₹ 118,462,575.00 and farmers average revenue earnings from milk was ₹ 42 per litre.

The information from the survey shows that the sum of total net income from animal production after deduction of the replacement cost of the animals was 12,277,760.00. This amount of income is earning of the dairy farmers as a compensatory bonus of milk production activity. The composite revenue from milk and animal production sums to the tune of ₹ 130,740,335.00. Thus, the share

of animal production in the total income from dairying was found to be 9.39 percent.

It is observed that the dairy sector is very important in the study area. It has been found that the share of income from dairying among the surveyed households was as high as 73.01 percent, with all other sources accounting for only 26.99 percent.

The total cost incurred by dairy households was ₹ 102,132,671.00. The profit from milk proper was estimated at ₹ 16,329,904.00, *i.e.* the profit percentage in terms of milk revenue has been found to be 14 percent. When the income from animal production was added to the profit from milk, the profit amounted to ₹ 28,607,664.00. The business of dairying in the Mayong Block in Morigaon district of Assam accrues profit by 22 percent. The important feature of the milk business in the study area is that it has been under the control of farmers, because of the presence of a strong farmer's cooperative for the last sixty years. It is observed that in other parts of the state, except the fringe areas of Guwahati city and other important towns, due to the lack of milk marketing infrastructure farmers are being unable to reap this level of benefit. Therefore, the growth rate of dairying found to be slow in the state and the occupation is surviving out of city & town fringe areas as well as in the areas with a few dedicated dairy cooperatives.

The gross returns in dairy farming are higher in the case of farmers associated with cooperative than that of the farmers not associated with any cooperative organisation.

Sitajakhala has been able to provide remunerative milk price to the level of farmer's satisfaction out of its additional revenue from value addition and business. During the period of this study, we found that farmer's net price of milk and producer's share on consumer price under SJDUSS found to be more than any other place. In the year 2016-17 and 2017-18 SJDUSS have paid to its farmers ₹ 42.39 and ₹ 42.5 respectively per litre of milk. The return was found to be 90.19% and 85% of consumer's price in the year 2016-17 and 2017-18. This is more than the price shared by WAMUL during the same period. This share is also more than that found in the study 'Economic Analysis of Production and Marketing of Milk

in Tamil Nadu'. Where Producers' share was '65.96% of consumers price' (Edhayavarman, 2011) and the 'producers' share in consumer rupee was about 58 percent in Bihar (Singh, *et al.* 2012) marketing their milk through co-operatives.

That is, so long as the benefit of value addition and business could not be perforated to farmers, dairy farming as a livelihood business is difficult to sustain in the future.

In the areas where farmers do not have any attachment to farmers' cooperative and pouring their milk to a private trader or even to WAMUL has been getting about ₹ 35.50 for their output of milk. The study, has estimated average cost of production to the level of ₹ 36.21 and almost all over the state on the basis of cropping pattern, there exist fair chance of having a similar cost structure in milk production, 'High cost and low return from the production of milk creates disincentives in the occupation of dairy cattle farming' the hypothesis has been rejected, in the study area, but the hypothesis itself holds good for the areas where dairy farmers are getting less than ₹ 36.21 as their milk price.

This study reveals that in 171 numbers of dairy farms, total regular employment of labourers was 485, and the 171 number of entrepreneurs were self-employed. That is, the total employment was 656. The average annual output of milk for one unit of employment was 4299.6/annum litre, *i.e.* the average output of milk for one unit of labour is 11.78 litres per day.

For employment generation through milk marketing, data was collected from Sitajakhala Dugdha Utpadak Samabai Samiti Limited (SJDUSS), and the same has been investigated for the financial year 2017-18. It was found that total regular employment generated through milk Marketing was 144, handling annually 5475000 litres of milk in an average.

On the basis of the findings in regards to employment generation in study area, the employment generated in Assam through dairy cattle farming has been estimated 190509 nos. in the year 2002-03, has increased to the 221820 nos in 2015-16 and for the district of Morigaon it was 4700 in 2002-03 and increased to 6932 nos. in 2015-16. Similarly, it has been found that if the state of Assam can manage to produce whole of its milk shortage, *i.e.* over 1600 million litres it can

generate about four lakhs of new employment over the present day level. Therefore, the concept 'There is ample scope for Employment Avenue in Milk production and marketing' is true in the state of Assam.

In India, the shortfall of green and dry fodder at present has been over 60 percent and about 25 percent respectively. In Assam, the total fodder requirement accounted to the level of 21.57, 15.31, and 1.03 million tonnes of green fodder, dry fodder, and feed concentrate respectively. It is also noted that adult male animals require more feed and fodder than that of female animals. The shortfalls of green fodder dry fodder and feed concentrate have been estimated to be 74.69 percent, 52.38 percent, and 33.98 percent respectively.

The shortfall of feed and fodder could not be estimated for the study area due to unavailability of required data about land and crops. However, the requirement of green fodder dry fodder and feed concentrate has been estimated to be 680,800; 494,479.30 and 43,688.90 tonnes respectively.

During the study, 90 percent of the farmers having an attachment with the cooperative revealed that finance was not a major problem. However, almost all the farmers not attached to any cooperative always face twin problems, *i.e.* of finance and low price of milk resulting low level of profit.

In the study area among other Foot and Mouth Disease, seasonal diarrhea, mastitis, and repeat breeding are the frequently occurring cattle health problems. The problem, coupled with the insufficient numbers of veterinary practitioners, is a major problem in regards to veterinary facilitation.

There is a significant difference between perceptions of the respondents belonging to cooperative and members not belonging to any cooperatives about the problems of non-availability of loan facilities. The respondent belonging to farmers cooperatives have the perception that the loan can be availed when it is required. On the other hand, the farmers who are not associated with any cooperative have the perception that availing loan from banks is a difficult task.

The study observed that farmers were not much interested in favour of purchasing an insurance policy for all of their cattle, because no insurance

companies till date honoured insurance claim in regards to cattle insurance on non-mortality damage cases.

In the state cattle are mostly reared in two ways; in grazing system and in the stall-feed system. It is also observed that the cattle kept in the grazing system hardly escorted by cattle keeper, almost 80 percent of those are let loose like stray cattle. The system involves high social cost on the one hand and creates difficulty for the concerned department in preventing contagious diseases. This, in turn, exaggerates the cost of production. On the other hand, in the stall feed system cattle are kept always tied with rope since their birth. This not only affects productivity by hampering the growth and health of the cattle but also reduces their lifespan.

The planning of the Government Departments to popularize fodder cultivation at institutional wasteland and Silage making is yet to come to fruition. However, SJDUSS under its 'Vision 2020 Sitajakhala', has shown a keen interest in taking venture of silage making, envisaging for a reduction in the cost of production of milk as well as providing symbiotic linkage between cultivator and dairy farmer for employment and income generation.

Conscious farmers of Assam consider the lack of coherence effort of Department of Agriculture, Department of Animal Husbandry & Veterinary, Department of Dairy Development, and Department of Cooperation in the state are one of the causes for the underdevelopment of dairy sector in the state.

6.3 Recommended policy changes

Dairy sector has been suffering from a number of economic and non-economic problems the consequences of which are reflected in the cost of production of milk.

For the development of the rural economy through animal husbandry and dairy development, coherence planning and effort among Department of Agriculture, Department of Animal Husbandry & Veterinary, Department of Dairy Development, and Department of Cooperation in the state are considered urgent and necessary.

The government may rectify the policy of Department of Animal Husbandry and Veterinary, and establishments under it may be developed according to the requirements, *i.e.,* number and quality of animals rather than the political demarcation of the area.

The government should introduce a special scheme for milk producers to construct scientific animal shelters so as the stall-fed system could be systematically transited to the free stall system and the cost of shelters should be borne by both the government and milk producers equally, which is necessary to protect the health of the milch animals, to reduce cost of production and to enhance productivity of cattle.

Regarding forestation of the state, it is suggested for springing back from exotic species like teak, pine, *etc.* to endemic woody perennial of native vegetation with fodder value supporting grasses and shrubs. This would be able to serve trine purposes, *i.e.* protection of the environment, create in situ congeniality for floras and faunas and can enhance fodder production for fringe villages along with conservation of forest and biodiversity. This would not only bring down the cost of milk production in the state but also strengthen the sustainability of rural livelihood economy.

To alleviate the financial problem as well as the risk factor of the cattle farmers in the state, the system of insurance is to be rectified so as the farmers can get the value for a milch cow from insurance when a cow becomes unproductive and sterile. This can not only save the farmer from unforeseen losses but also provide a safeguard to bankers of their extended credit. This would encourage commercial banks to extend more credit for dairy development in rural areas. Therefore, Damage Insurance may be encouraged by the government in association with insurance companies to reduce the risk of a dairy farmer.

No sector can prosper unless it is backed by research and extension services. Therefore, research and extension services should be expanded coordinating dairy farming, agriculture, silviculture, and forestation, so as resources can be suitably balanced for smooth economic growth of rural areas maintaining harmony among agriculture, forestry, and animal husbandry.

In Assam, along with a viable plan for fodder cultivation, silage making, production of fodder blocks, the market for fodder is also to be developed in the line of dairy-rich states in India.

The government may consider budget provision for providing required high tech human resource and technical know-how to successful rural dairy cooperatives. This would help in the speedy generation of employment and income as well as augmentation of production.

For the better marketing facilities, dairy cooperatives in the state should come up with enthusiasm to benefit the farmers and Government should take policy for the three-tier model, or *Anand* Model of cooperative that grows in a bottom-up manner.

The government may also take required steps to include cattle rearing and cooperation in the syllabus of general education beginning from secondary school to colleges as an elective vocational subject with a provision for necessary facilities. This process would motivate the upcoming youth towards dairy farming and other agricultural activities as their occupation.

6.4 Conclusion

Regardless of problems the dairy sector confronts, it bears high prospects as a reliable source of livelihood for the majority of the rural masses. In Assam, this sector provides vast scope for the generation of employment and income in the rural areas and also thereby helps to alleviate poverty and nutritional deficiency. Under the regime of new trade order after liberalisation, farmers are facing new challenges. On the other, this has opened up new export opportunities for the dairy industry, particularly in Asian countries. A comprehensive policy for dairy development in the state must be formulated coordinating all the concerned departments as mentioned above and this should be continuously an integral part of the development policy in the state. This needs integrated effort, enthusiasm and cooperation of various sections of system facilitators of all concerned departments, cultivator, milk producers, feed & fodder producers, traders, transporters, processors, product manufacturers *etc.* involved in the system of milk business for the fruitful growth of the sector.

The suggestions provided above shall certainly provide a roadmap for increasing milk production in the state with remunerative returns to farmers and develop the dairy sector in the state and study area transiting the Assam from milk scarce state to milk abundant one.

6.5 Scope for future research

The following are the areas in which further research may be undertaken in regards to the development of milk production in the state:

i) A study of production and marketing of milk products and by-products of dairy farming in the state;

ii) A study on demand and supply of feed and fodder in the State;

iii) A comparative study on feed and fodder consumption by male and female cattle and their respective return;

iv) A study on the performance of the longest running milk cooperative in the state and its replicability;

v) A study may be conducted on value addition of milk and its impact on rural dairying in the state; and

vi) A study may be conducted on the impact of dairying on rural employment and income generation.

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