Advances in Bioresearch

ORIGINAL ARTICLE

Constraint Analysis of Milk Production and Marketing in Jorhat District of Assam

Shweta Priyamvada,, B. K. Mishra,
Department of Rural Development and Agricultural Production,
North-Eastern Hill University, Tura Campus, Tura-794002, Meghalaya

ABSTRACT

Dairying in India, over the years, apart from insuring nation's nutrition, has been recognized as an instrument for social and economic development. Interestingly, in the state of Assam, organized development of dairy processing infrastructure was initiated even before the launch of OF (Operation Flood) Phase-I. The first processing plant in the state was established at Jorhat in 1966 with daily milk processing capacity of 5,000 litres. However, in spite of that, there is huge gap in demand and supply of milk in the district. Thus it becomes very important to understand the constraints faced by the dairy farmers operating in organized dairy sectors and unorganized dairy sectors. In the organized dairy sector, the most important problem reported by dairy farmers was the "problems in marketing of raw milk at reasonable rate". Since it is an organized sector, this should not have been the case. But it was reported that the TMSS/DUSS do not take the entire milk. And whatever milk they collect, they do in morning hours. Thus, dairy farmers have to depend on other channels to dispose their milk. The second most important problem identified was the "lack of veterinary facilities". This again is surprising, considering that the farmers are in organized system, and the DUSS/TMSS can arrange proper and dedicated veterinary services. The third most important problem faced was the "low price of crossbred cow milk". However, the crossbred cows are the only hope because they give maximum production. The productivity of local cow is very less. In unorganized dairy sector, the most important problem reported by dairy farmers was the "high cost of feed and fodder". The "problems in marketing of raw milk at reasonable rate" was reported as the second most important problem faced by the farmers of the unorganized dairy sector. The "low price of crossbred cow milk" was reported as the third major problem.

Keywords: *Organized dairy sector, unorganized dairy sector, milk production constraints, milk marketing constraints*

INTRODUCTION

Dairying in India, over the years, apart from insuring nation's nutrition, has been recognized as an instrument for social and economic development. Dairy has an important role in improving the overall economic conditions of rural India [5]. There are proven evidences that dairy farming has emerged as a major allied enterprise for supplementing the income of farmers [12, 16]. There are also evidences that dairy sector contributes significantly in generating employment opportunities and supplementing the income of small and marginal farmers by providing them food security [9]. Thus, dairy development has assumed significant importance in the rural economy of India due to its immense potential for supplementing income and employment generation for the rural people. In Assam also, though agriculture is considered as the mainstay of the economy it is also a fact that about 83 per cent of the total land holdings are small and marginal and is a major concern for formulation of any agricultural development strategy. This necessitates the importance of allied sectors like dairy in States economy [10, 18, 19].

Interestingly, in the state of Assam, organized development of dairy processing infrastructure was initiated even before the launch of OF (Operation Flood) Phase-I. The first processing plant in the state was established at Jorhat in 1966 with daily milk processing capacity of 5,000 litres [17]. However, in spite of that, the present estimated production of milk in the district is about 70000 litres per day as

against the total demand of 160000 litres per day and this gap is bridged by importing milk from Dimapur and other places. Under this situation, it becomes very important to clarify the possible reasons for such a huge demand- supply gap. This will became clear when we understand the constraints faced by the dairy farmers operating in organized dairy sectors and unorganized dairy sectors. As dairy sector has potential for giving self-employment and generating income and livelihood of the rural people therefore, the finding of the study will help in designing policies to improve the production and marketing structure in dairy sector.

MATERIAL AND METHODS

The study was conducted in Jorhat district of Assam. Total geographical area of Jorhat district is 2,859.35 sq km. equivalent to 3.63 % of the State. The district consists of 3 civil subdivisions, 8 development blocks and 111 Gaon panchayats with 866 revenue villages. Jorhat district consists of one municipality and six towns. The basic criterion considered in selection of sample farmers was their market orientation or commercial attitude. Ghule, *et al* [6] also set a similar criterion in their study on dairy farming. Convenience sampling technique was used to select the commercial dairy farmers. With the help of pre-tested schedules, the study was done on 100 commercial dairy farmers under organized dairy sector and 100 commercial dairy farmers under unorganized dairy sector in Jorhat district of Assam.

Table 1: Registered DCS in Jorhat

Sl. No.	Name of the DCS	Av. Milk production (Lts/day)	Av. Milk procurement by Dairy Dev. (Lts/day)	Employment generated
1	Phesual DUSS,Phesual	150	80	31
2	Lachit DUSS,Gohaingaon	210	80	30
3	Dahikhur Bhuyanchuk DUSS, Bahona	170	70	33
4	Annapurna DUSS, Rongdoi	40	-	34
5	Agrajyoti DUSS, Nowboisa	80	120	10
6	Kalyani DUSS, Kalyani	70	20	31
7	Luitparia DUSS, Patiagaon	80	--	31
8	Surabhi DUSS, Parbatia	280	100	36
9	Panchamukhi DUSS, Borigaon	60	20	25
10	Ma-Bhawani DUSS, Mariani	650	-	35
11	Kaliani Amarjyoti DUSS, Kathkotia	85	120	17
12	Swarnadhenu DUSS, Falengichuk	250	140	37
13	Amrit DUSS, Barholla	150	70	35
14	Chengeli Chetia DUSS, Chungi	110	60	28
15	Rupali DUSS, Mariani	350	-	20
16	Panchamukhi DUSS, Rangajan	70	60	18
17	Paschim Titabor DUSS, Titabor	185	150	18
18	Suryodaya Mahila DUSS, Amgurikhat	85	15	11
19	Lakhimi DUSS, Pirakota	70	25	16
20	Kamini DUSS, Titabor	30	--	12
21	Maa-laxmi DUSS, Meleng Gayan Gaon	60	20	16
22	Pokamura Mahila DUSS, Pokamura	50	---	18
23	Panichokuwa DUSS, Panichokuwa	40	--	16
24	Ashray DUSS, Dhekiakhowa	40	20	22
25	Dristi DUSS, Chirotia Gaon	100	--	18
26	Sri Ganesh DUSS,Lichubari	70	--	15
27	Lakhimi DUSS, Borhola	140	70	15
28	Sanmilita DUSS, Kakajan	50	--	15
29	Sri Diganta Kalita (MPI)	50	20	3
30	Sri M Bora,Meleng Gayan Gaon (MPI)	50	15	5
31	Sonali ,JLSG, Rajabahar	80	30	5
32	Krishna DUSS , Ladoigarh.	40	20	15
33	Dibyajyoti Sarma MPI , Bahek Gaon	30	15	5
34	Bikram Kotoky , MPI , Garmur Noapam	40	10	3
35	Noren Kalita , MPI , Rongdoi , Da- Gaon	25	15	2
36	Surabhi SHG , Titabar	80	60	10
37	Chitralekha DUSS	40	26	15
	Total	**4160**	**1451**	**706**

Source: Town Milk Supply Scheme (TMSS), Jorhat, Assam

The organized sector sample farmers were drawn from randomly selected DUSS namely Surabhi DUSS, Chitralekha DUSS, Sonali DUSS, Titabor, Swarnadhenu DUSS, Amrit DUSS, Paschim Titabor DUSS, Panchamukhi DUSS, Dahikhur Bhuyanchuk DUSS, Lakhimi DUSS, Lachit DUSS, Phesual DUSS (A brief list of the registered DCS of the district is given below in Table 1).

The time series data for different periods were collected from the State level reports published by Directorate of Economics and Statistics, Government of Assam. "Basic Statistics of NER" published by North Eastern Council, Shillong was considered. Secondary data was also collected from various websites and report of various committees, etc.

Regarding data analysis, first, to understand the changes in milk production, growth rate and stability examination was done by working out compound annual growth rate, standard deviation and coefficient of variation. The compound growth rates were calculated by using the exponential function of the form

$$Y = a.b^t$$

Here, Y = milk production; a= Intercept; b= Regression coefficient of log y on t; t= Time in year

To examine the stability with respect to milk production, mean, standard deviation and coefficient of variation worked out.

Garrets Ranking technique was used to analyze the production and marketing constraints faced by the milk producers in both organized and unorganized dairy sectors. Milk producers faced many constraints at different level of milk production and marketing. The constraints were listed and milk producers were asked to relist the constraints according to their importance. Afterwards these constraints were converted into ranks with the help of given formula-

$$\text{Percent Position} = \frac{100\,(R_{ij} - 0.5)}{N_j}$$

Where, R_{ij} = rank given for i^{th} factor by j^{th} individual; N_j = Number of factors ranked by j^{th} individual.

The percent position of each rank was converted into rank based on table given by Garrett [20].

Then for each constraint, the scores of each respondent were added and after that, total value of scores and mean scores was calculated. These mean scores were arranged in descending order to rank the constraints.

RESULTS AND DISCUSSION
Contribution of Animal Husbandry in Economy of Assam

Livestock is basically an important component of production system and thus higher productivity level in livestock products will surely lead to higher income generation of rural households (as observed by Jaiswal, Chandravanshi and Netam, 2018; Belhekar and Dash, 2016; Yasmin and Ikemoto, 2015 and Nargunde, 2013 in different parts of India and well as world). For the State of Assam, the animal husbandry can be considered as one of the most important and potential sectors for rural development. Figure 1 proves the role of animal husbandry in Assam's economy. It shows that the contribution of animal husbandry to agricultural & allied sector during 2006-07 to 2015-16 has marginally declined from 5.33 per cent to 5.08 per cent while the contribution of animal husbandry to GSDP declined from 1.32 per cent to 0.95 per cent during the reference period. However, this may not nullify the contribution of animal husbandry as this declining share may be possibly due to increased contribution of secondary and tertiary sectors to the GSDP.
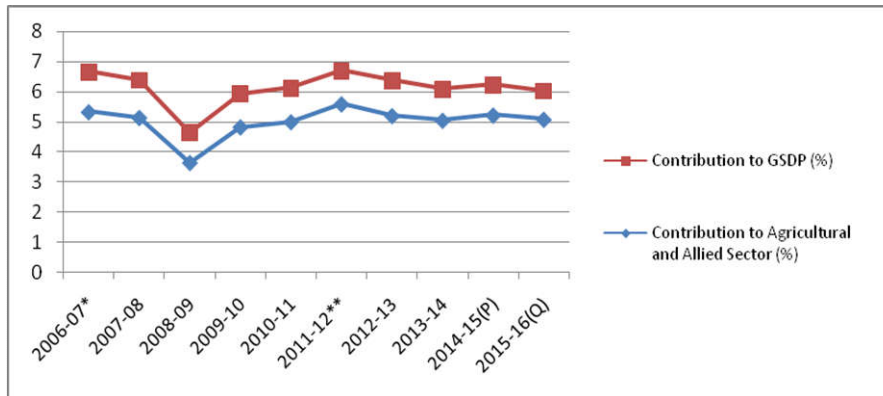

Figure 1: Trend of Contribution of Animal Husbandry to GSDP in Assam
*Data during 2006-07 to 2010-11 refers to constant prices of 2004-05
**Data during 2011-12 to 2015-16 refers to constant prices of 2001-12
Source: Directorate of Economics and Statistics, Assam, 2017

Growth in Milk Production in Assam

Based on the data Economic Survey of Assam (2016-17, 2017-18), Table 2 presents the trend of total milk production in Assam under different categories of milch animals. It is observed that still today, the contribution of indigenous cattle in total milk production is more than the cross bred cattle in the state of Assam. Presently the milk production from crossbreed cattle was 270.11 million litres in comparison to 470.02 litres from indigenous cattle. However, on a positive note the milk production from crossbreed cattle grew at 2.6 percent in comparison to 1.1 percent from indigenous cattle. In 2015-16 milk production from buffalo was 123.05 million litres (with compound annual growth rate of (-) 0.00 percent. From goat milk production was 25.00 percent. The goat milk production grew at a compound annual growth rate of 4.8 percent. However, high variance (CV of 18.99 %) was observed in goat milk production.

Table 2: Trend of Total Milk Production in Assam (in million litres)

Sl. No.	Year	Cattle		Buffalo	Goat	Total Milk
		Crossbreed Cattle	**Indigenous Cattle**			
1	2011-2012	236.53	455.49	123.41	22.94	838.37
2	2012-2013	247.07	450.42	128.72	18.68	844.90
3	2013-2014	247.17	465.61	125.56	16.15	857.39
4	2014-2015	246.06	475.03	126.25	25.64	872.98
5	2015-2016	270.11	470.02	123.05	25.00	888.18
	Mean	249.388	463.314	125.398	21.682	860.36
	Standard Deviation	12.411	10.185	2.305	4.119	20.400
	CV (%)	4.976	2.198	1.838	18.998	2.37
	CAGR (%)	2.6	1.1	-0.00	4.8	1.4
	R²	0.718	0.693	0.047	0.149	0.981

Source: Economic Survey Assam (2016-2017, 2017-2018)

Distribution of Sample Dairy Farms

Table 3 presents the distribution of sample dairy farms. Based on Cumulative Square Root frequency of stratification [8], the sample dairy farms were grouped into three categories viz. small (up to 5 milch animals), medium (6-10 milch animals) and large (11 milch animals and above). Though some researchers' viz. Singh *et al.* [15] classified the livestock owner having 1, 2-3 & 4 and above number of cows and buffaloes as small, medium and large livestock owners, respectively; the Cumulative Square Root frequency [8] was found to be more scientific and thus used for the purpose of classifying sample dairy farms. In organized dairy sector, 81 dairy farmers found to be in small category, ten dairy farmers were identified to be in medium category and nine dairy farmers were in large category of dairy farmers. In unorganized dairy sector, eight dairy farmers were found to be in small category, 42 dairy farmers were identified to be in medium category and 50 dairy farmers were observed to be in large category of dairy farmer. Over, among the 200 sample respondents, 89 dairy farmers were found to be in small category, 52 dairy farmers were identified to be in medium category and 59 dairy farmers were observed to be in large category of dairy farmer. Here it is to be mentioned that the dairy farmers in organized dairy sector have taken dairy farming under the initiative of TMSS (Town Milk Supply Scheme) very recently with one or two dairy cows. However, the dairy farmers in unorganized dairy sector vary in the dairy farming business since long. In fact most of the dairy farmers under this category were second or third generation dairy farmers.

Table 3: Distribution of Sample Dairy Farms

Sl. No	Category of Dairy Farmers	Sample Size (in numbers)		Total
		Organized Dairy Sector	**Unorganized Dairy Sector**	
1	Small (up to 5 milch animals)	81	8	89
2	Medium (6-10 milch animals)	10	42	52
3	Large (11 milch animals and above)	9	50	59
4	**All**	**100**	**100**	**200**

Sub: Authors Calculations Based on Field Survey

Socio- Economic status of sample dairy farming households

Table 4 presents the demographic statistics of the sample dairy-farming households under the category of organized dairy sector. The average family size was 6.54 members in small category of dairy farming

households, 6.50 in medium category of dairy farming households and 8.44 in large category of dairy farming households. It is important to note that average age of the dairy farmers was between 40-42, showing most of the young people of the villages are now coming up and taking dairy farming as a business. However, the education status was not found very impressive with average education of the respondent in small category found to be 10.56 years of formal education, in medium category found to be 13.70 years of formal education and in large category 13.33 years of formal education. However, the biggest point to be noted here is that most of dairy farmers in small category have taken dairy farming as a secondary occupation. This may be possibly because they are very new to the business and skeptical about the return from the dairy business.

Table 4: Demographic Statistics of Sample Dairy Farming Households in Organized Dairy Sector

Sl. No.	Category	Number of farms	Average Family size	Age of Respondent	Education Status Respondent	Dairy Farming as	
						Primary Occupation	Secondary Occupation
1	Small	81	6.54	42.58	10.56	6	75
2	Medium	10	6.50	41.40	13.70	9	1
3	Large	9	8.44	40.67	13.33	1	0
4	**Pooled**	**100**	**6.71**	**42.29**	**11.12**	**16**	**76**

Note: Figures are average per farm

Table 5 presents the demographic statistics of the sample dairy-farming households under the category of unorganized dairy sector. The average family size was 5.63 members in small category of dairy farming households, 5.93 in medium category of dairy farming households and 5.88 in large category of dairy farming households. It is important to note that average age of the dairy farmers was between 38-42, showing most of the young people have taken dairy farming as a business. However, the education status was not found very impressive with average education of the respondent in small category found to be 10.88 years of formal education, in medium category found to be 10.57 years of formal education and in large category 10.58 years of formal education. However, the biggest point to be noted here is that most of dairy farmers in this category have taken dairy farming as a secondary occupation. This may be possibly because they may not find it very remunerative or may have sufficient time to do other income generating activities.

Table 5: Demographic Statistics of Sample Dairy Farming Households in Unorganized Dairy Sector

Sl. No.	Category	Number of farms	Average Family size	Age of Respondent	Education Status Respondent	Dairy Farming as	
						Primary Occupation	Secondary Occupation
1	Small	8	5.63	38.75	10.88	3	5
2	Medium	42	5.93	42.49	10.57	11	31
3	Large	50	5.88	41.92	10.58	25	25
4	**Pooled**	**100**	**5.86**	**41.82**	**10.6**	**39**	**61**

Note: Figures are average per farm

Distribution of Cattle in Sample Dairy Farms
Table 6 presents the distribution of cattle in sample dairy farms in organized dairy sector as 213 milch cows, 17 dry cows, 13 heifer and 33 calves by small category of dairy farms. Medium category of dairy farms reported 63 milch cows, 4 dry cows, 7 heifer and 9 calves. Large category of dairy farms reported 116 milch cows, 31 dry cows, 11 heifer and 24 calves. The entire 100 sample dairy farms 392 milch cows, 52 dry cows, 31 heifer and 66 calves were noted. A total of 541 cattle were observed in 100 sample dairy farms with 276 in small category, 83 in medium category and 182 in large category of dairy farms.

Table 6: Distribution of Cattle in Sample Dairy Farms in Organized Dairy Sector

Sl. No.	Cattle	Categories of Dairy Farms			
		Small	Medium	Large	Total
1	Milch Cow	213	63	116	392
2	Dry Cow	17	04	31	52
3	Heifer	13	07	11	31
4	Calf	33	09	24	66
	All	**276**	**83**	**182**	**541**

Sub: Authors Calculations Based on Field Survey

Table 7 presents the distribution of cattle in dairy farms in unorganized dairy sector. In this sector, there were 31 milch cows, 6 dry cows, 2 heifer and 16 calves were noted by small category of dairy farms. Medium category of dairy farms reported 302 milch cows, 71 dry cows, 47 heifer and 145 calves.

Table 7: Distribution of Cattle in Sample Dairy Farms in Unorganized Dairy Sector

Sl. No.	Cattle	Categories of Dairy Farms			
		Small	Medium	Large	Total
1	Milch Cow	31	302	536	869
2	Dry Cow	06	71	158	235
3	Heifer	2	47	117	165
4	Calf	16	145	242	403
	All	55	565	1053	1672

Sub: Authors Calculations Based on Field Survey

Large category of dairy farms reported 536 milch cows, 158 dry cows, 117 heifer and 242 calves. In the entire 100 dairy farms 869 milch cows, 235 dry cows, 165 heifer and 403 calves were observed. A total of 1672 cattle were observed in 100 dairy farms with 55 in small category, 565 in medium category and 1053 in large category of dairy farms respectively.

Distribution of Cattle Breeds in Sample Dairy Farms

Table 8 presents the distribution of cattle breeds in sample dairy farms in organized dairy sector. Three categories of cattle breeds were observed in sample dairy farms. These are local (non- descript), Indian breed and Crossbreed. In small category of dairy farms two cows of local breed (two milch cows), 11 cows of Indian breed (11 milch cows) and 217 cows of cross breed (200 in milch and 17 in dry) were reported. In medium category of dairy farms, 3 cows of Indian breed (3 milch cows) and 60 cows of cross breed (56 in milch and 4 in dry) were reported. In large category of dairy farms, 5 cows of Indian breed (5 milch cows) and 142 cows of cross breed (111 in milch and 31 in dry) were reported. Overall in 100 sample dairy farms 6 local (Non-Descript), 19 Indian breed and 419 crossbreed (367 in milch and 52 in dry) were reported.

Table 8: Distribution of Cattle Breeds in Sample Dairy Farms in Organized Dairy Sector

Sl. No.	Breeds	Category of Sample Dairy Farms							
		Small		Medium		Large		Total	
		Milch	Dry	Milch	Dry	Milch	Dry	Milch	Dry
1	Local (Non-Descript)	02	0	04	0	0	0	06	0
2	Indian Breed	11	0	03	0	05	0	19	0
3	Crossbreed	200	17	56	04	111	31	367	52
	Total	213	17	63	04	116	31	392	52

Sub: Authors Calculations Based on Field Survey

Table 9 presents the distribution of cattle breeds in sample dairy farms in unorganized dairy sector. In small category of dairy farms 37 cows of cross breed (31 in milch and 6 in dry) were reported. In medium category of dairy farms 60 cows of local breed (53 cows in milch and 7 cows in dry) and 304 cows of cross breed (240 in milch and 64 in dry) were reported. In large category of dairy farms 143 cows of Indian breed (117 in milch and 26 in dry) and 560 cows of cross breed (428 in milch and 132 in dry) were reported. Overall in 100 sample dairy farms 203 local (170 in milch and 33 in dry), and 901 crossbreed (699 in milch and 202 in dry) were reported.

Table 9: Distribution of Cattle Breeds in Sample Dairy Farms in Unorganised Dairy Sector

Sl. No.	Breeds	Category of Sample Dairy Farms							
		Small		Medium		Large		Total	
		Milch	Dry	Milch	Dry	Milch	Dry	Milch	Dry
1	Local (Non-Descript)	0	0	53	07	117	26	170	33
2	Indian Breed	0	0	0	0	0	0	0	0
3	Crossbreed	31	06	240	64	428	132	699	202
	Total	31	06	293	71	545	158	869	235

Sub: Authors Calculations Based on Field Survey

Milk Production by Sample Dairy Farms

Table 10 presents the milk production information by sample dairy farms of the organized dairy sector. The total milk production in 81 samples of small dairy farms was reported as 1747 litres per day with

average milk production of 8.20 litres per day per milch animal. The total milk production in 10 samples of medium dairy farms was reported as 587 litres per day with average milk production of 9.32 litres per day per milch animal. The total milk production in nine samples of large dairy farms was reported as 111 litres per day with average milk production of 9.58 litres per day per milch animal. The total milk production in 100 sample dairy farms was reported as 3445 litres per day with average milk production of 8.79 litres per day per milch animal. The total milk production per day per farm in small dairy farms was observed as 21.57 litres, in medium dairy farms as 58.7 litres and in large as 123.44 litres. Overall, the average milk production per farm in 100 sample households was estimated to be 34.45 litres per farm per day. The total milk production from crossbreed per day per farm in small dairy farms was observed as 1609 litres, in medium dairy farms as 543 litres and in large as 1051 litres. Overall, the total milk production from cross breed per day per farm in 100 sample households was estimated to be 3203 litres per day. The average milk yield from crossbreed per day per milch animal in small dairy farms was observed as 8.05 litres, in medium dairy farms as 9.70 litres and in large as 9.47 litres. Overall the average milk production from cross breed per day per milch in 100 sample households was estimated to be 8.73 litres per milch animals. The total milk production from Indian breed per day per farm in small dairy farms was observed as 134 litres, in medium dairy farms as 36 litres and in large as 60 litres.

Table 10: Milk Production by Sample Dairy Farms in Organized Dairy Sector

Sl. No.	Dairy Farms	Number of Dairy Farms	Total Milk Production/Day				Total Milk Production per Day per Farm	Average Milk Yield/Day/Milch Animal			
			CB	IB	ND	Total		CB	IB	ND	Total
1	Small	81	1609	134	4	1747	21.57	8.05	12.18	2.00	8.20
2	Medium	10	543	36	8	587	58.7	9.70	12.00	2.00	9.32
3	Large	9	1051	60	0	111	123.44	9.47	12.00	0.00	9.58
4	**Total**	**100**	**3203**	**230**	**12**	**3445**	**34.45**	**8.73**	**12.11**	**2.00**	**8.79**

Note: C.B= Cross Breed; IB= Indian Breed; ND= Non Descript
For calculation of average milk production/day/milch animal, only milch animals under lactation were considered and the dry animals were not considered

Overall, the total milk production from Indian breed per day per farm in 100 sample households was estimated to be 230 litres per day, which is very less compared to production from cross breed. The average milk yield from Indian breed per day per milch animal in small dairy farms was observed as 12.18 litres, in medium and large dairy farms as 12.00 litres. The average milk production from Indian breed per day per milch in 100 sample households was estimated to be 12.11 litres per milch animals. The total milk production from non- descript per day per farm in small dairy farms was observed as 4 litres and in medium dairy farms as 8 litres. Overall the total milk production from non- descript per day per farm in 100 sample households was estimated to be 12 litres per day. The average milk yield from non- descript per day per milch animal in both small and medium dairy farms was observed as 2 litres. Overall the average milk production from non- descript per day per milch in 100 sample households was also estimated to be 2 litres per milch animals.

Table 11 presents the milk production information of sample dairy farms of the unorganized dairy sector. The total milk production in eight samples of small dairy farms was reported as 342 litres per day with average milk production of 11.03 litres per day per milch animal. The total milk production in 42 samples of medium dairy farms was reported as 2844 litres per day with average milk production of 9.71 litres per day per milch animal. The total milk production in 50 samples of large dairy farms was reported as 5274 litres per day with average milk production of 9.68 litres per day per milch animal. The total milk production in 100 sample dairy farms was reported as 8460 litres per day with average milk production of 9.74 litres per day per milch animal. The total milk production per day per farm in small dairy farms was observed as 42.75 litres, in medium dairy farms as 62.36 litres and in large as 105.48 litres. Overall, the average milk production per farm in 100 sample households was estimated to be 82.35 litres per farm per day. The total milk production from crossbreed per day per farm in small dairy farms was observed as 342 litres , in medium dairy farms as 2735 litres and in large as 5020 litres. Overall, the total milk production from cross breed per day per farm in 100 sample households was estimated to be 8097 litres per day. The average milk yield from crossbreed per day per milch animal in small dairy farms was observed as 11.03 litres, in medium dairy farms as 11.40 litres and in large as 11.73 litres. Overall the average milk production from cross breed per day per milch in 100 sample households was estimated to be 11.58 litres per milch animals. The total milk production from non- descript per day per farm in

medium dairy farms as 109 litres and in large as 254 litres. Overall the total milk production from non-descript per day per farm in 100 sample households was estimated to be 363 litres per day.

Table 11: Milk Production by Sample Dairy Farms in Unorganised Dairy Sector

Sl. No.	Dairy Farms	Number of Dairy Farms	Total Milk Production/Day				Average Milk Production per Day per Farm	Average Milk Yield/Day/Milch Animal			
			CB	IB	ND	Total		CB	IB	ND	Total
1	Small	8	342	0	0	342	42.75	11.03	0.00	0.00	11.03
2	Medium	42	2735	0	109	2844	67.71	11.40	0.00	2.06	9.71
3	Large	50	5020	0	254	5274	105.48	11.73	0.00	2.17	9.68
4	Total	100	8097	0	363	8460	84.60	11.58	0.00	2.14	9.74

Note: C.B= Cross Breed; IB= Indian Breed; ND= Non Descript
For calculation of average milk production/day/milch animal, only milch animals under lactation were considered and the dry animals were not considered

The average milk yield from non- descript per day per milch animal in medium dairy farms was observed as 2.06 litres, in large as 2.17 litres. Overall the average milk production from non- descript per day per milch in 100 sample households was also estimated to be 2.14 litres per milch animals.
The above findings on milk production, be it from organized sectors or unorganized sectors. In the sample dairy farms, it was observed that maximum milk production was from cross breed cows. This is again different from of the State data (Assam data) where it was reported that maximum milk production in the State comes from Indigenous cattle (Table 4.8). This difference may be possibly because, the sample dairy farms of the study, for both organized sector and unorganized sector, were only composed of commercial dairy farms.

Constraint Analysis in Organized Dairy Sector
Table 12 presents the ranking of constraints in organized dairy sector based on Garrett's Ranking Technique. The most important problem reported by dairy farmers was the "problems in marketing of raw milk at reasonable rate". Since it is an organized sector, this should not have been the case. However, it was reported that the TMSS/DUSS do not take the entire milk. And whatever milk they collect, they do in morning hours. Thus, dairy farmers have to depend on other channels to dispose their milk. This is evident from the different marketing channels adopted by the farmers of the organized dairy sector. Selvi [14] also reported similar problem in his study in Kanyakumari District. The second most important problem identified was the "lack of veterinary facilities". This again is surprising, considering that, the farmers are in organized system, and the DUSS/TMSS can arrange proper and dedicated veterinary services. The third most important problem faced was the "low price of crossbred cow milk". But the cross breed cows are the only hope because they give maximum production. The productivity of local cow is vey less. This was also reported as the fourth major problems faced by the dairy farmers. The fifth major problem reported was "availability of genetically poor quality of bull at village level". The "high cost of feed and fodder" was reported as the sixth major problem. Though feed and fodder take the maximum share of the working expenditure, but since the dairy farmers collect the grass from their farm or the nearby areas, probably because of this, they reported it sixth position. However, the most important reason may that the farmers of the organized sector are getting the feed at highly subsidized rate. Importantly in some foreign countries like Botswana, the high feed costs, feed shortage and unavailability are reported as the major problem [2]. Unfortunately even with the existence of the TMSS/DUSS, the "inefficient/lack of organized milk marketing facilities in village" reported at seventh position, ensuring that they are still not very efficient in their functioning. Since farmers are depending on the nearby areas for the green fodder, which may not be available or accessible round the year, thus "lack of availability of green fodders round the year" was reported as eight major problem faced by the dairy farmers. The "non-availability of land for fodder cultivation" was reported at ninth position. This was evident from the fact that most of the farmers are having very small land, even less than one hectare. In most cases less than half hectare, which was used for building home, cow shelter and cultivation of crops to support the family. Some other important problems reported are improper housing facilities leading to infection, less milk fat percentage in crossbred cows, lack of artificial insemination facilities, relative low conception rate through artificial insemination, inadequate knowledge about balanced feeding, high mortality in female calves, and problem of disposal of male calves. There are some other problems, but not reported significant.

Table 12: Ranking of Constraints in Organized Dairy Sector based on Garrett's Ranking Technique

Sl. No.	Constraints	Total Score	Mean Score	Ranks
1	High cost of feed and fodder	5107	51.07	VI
2	Less milk fat percentage in Crossbred cows	4786	47.86	XI
3	Problem of disposal of old/un-economic milch cows unfit for milk production	3687	36.87	XX
4	Low price of crossbred cow milk	6210	62.1	III
5	High mortality in female calves	4464	44.64	XV
6	Incidence of reproductive disorders among dairy cattles	3955	39.55	XIX
7	Inadequate knowledge about balanced feeding	4539	45.39	XIV
8	Less availability of quality green fodder	4277	42.77	XVIII
9	Problem of disposal of male calves	4428	44.28	XVI
10	Low productivity in local cows	5682	56.82	IV
11	Low availability of dry fodder	4408	44.08	XVII
12	Non-availability of land for fodder cultivation	4917	49.17	IX
13	Lack of availability of green fodders round the year	4972	49.72	VIII
14	Improper housing facilities leading to infection	4788	47.88	X
15	Genetically Poor quality of bull at village level	5609	56.09	V
16	Relative low conception rate through artificial insemination	4583	45.83	XIII
17	Lack of veterinary facilities	6215	62.15	II
18	Lack of artificial insemination facilities	4765	47.65	XII
19	Inefficient/Lack of organized milk marketing facilities in village	5023	50.23	VII
20	Problems in marketing of raw milk at reasonable rate	7585	75.85	I

Similar problems though may not be the exact order of ranking as mentioned above was reported by researchers from different parts of the country and abroad. For example Birhan *et al* [4] from their study in Gondar town of Amhara Regional State reported that generally land shortage, scarcity of feed and high price, seasonality of demand particularly in fasting time and absence of processing industry were the major challenges of dairy production and marketing in the area. Anh, Cuong and Nga [1] reported that despite the amazing fact that farmers' participation in the dairy value chain has promised the better outcome, there are still millions of rural farmer households struggling against the inefficient production and marketing, and decline with hope of improving their main source of income. However, in spite of the problems faced the farmers, the cooperative system was always advocated because of the obvious potential advantages it brings. This evident from the findings of Sarkar and Ghosh (2010), where they reported that non-cooperative farms face major constraints and high severity compared with co-operative farms in expanding milk production.

Constraint Analysis in Unorganized Dairy Sector

Table 13 presents the ranking of the constraints faces by the farmers of the unorganized dairy sector based on the Garrett's ranking technique. The most important problem reported by dairy farmers was the "high cost of feed and fodder". This is similar to the findings of Baliyan & Gosalamang (2016) where they reported that in Botswana, the high feed costs, feed shortage and unavailability are identified as the major problem. The "problems in marketing of raw milk at reasonable rate" was reported as the second most important problem faced by the farmers of the unorganized dairy sector. Similar problem was also reported by Selvi [14] in his study in Kanyakumari district.

Table 13: Ranking of Constraints in Unorganized Dairy Sector based on Garrett's Ranking Technique

Sl. No.	Constraints	Total Score	Mean Score	Ranks
1	High cost of feed and fodder	7379	73.79	I
2	Less milk fat percentage in Crossbred cows	5951	59.51	IV
3	Problem of disposal of old/un-economic milch cows unfit for milk production	4195	41.95	XV
4	Low price of crossbred cow milk	6515	65.15	III
5	High mortality in female calves	5553	55.53	VI
6	Incidence of reproductive disorders among dairy cattles	4204	42.04	XIV
7	Inadequate knowledge about balanced feeding	4772	47.72	XI
8	Less availability of quality green fodder	5227	52.27	VII
9	Problem of disposal of male calves	4731	47.31	XII
10	Low productivity in local cows	5161	51.61	VIII

11	Low availability of dry fodder	5009	50.09	X
12	Non-availability of land for fodder cultivation	4287	42.87	XIII
13	Lack of availability of green fodders round the year	3619	36.19	XIX
14	Improper housing facilities leading to infection	3525	35.25	XX
15	Genetically Poor quality of bull at village level	4142	41.42	XVIII
16	Relative low conception rate through artificial insemination	4169	41.69	XVII
17	Lack of veterinary facilities	5135	51.35	IX
18	Lack of artificial insemination facilities	4176	41.76	XVI
19	Inefficient/Lack of organized milk marketing facilities in village	5600	56	V
20	Problems in marketing of raw milk at reasonable rate	6650	66.5	II

Similar to the findings of the organized dairy sector, the "low price of crossbred cow milk" was reported as the third major problem. The "less milk fat percentage in crossbred cows" was reported as the fourth major problem faced by the dairy farmers of the unorganized dairy sector. "Inefficient/lack of organized milk marketing facilities in village" was reported as the fifth major problem. This is a serious issue considering the continuous effort of the government in promoting organized dairy business in the State. The "high mortality in female calves" was reported as the sixth major problem faced by the dairy farmers. Less availability of quality green fodder was reported as the seventh major problem faced by the dairy farmers. Since farmers are depending on the nearby areas for the green fodder, which may not be available or accessible round the year, thus "lack of availability of green fodders round the year" was reported as seventh major problem faced by the dairy farmers. The organized sector dairy farmers reported it as eight major problem faced. Low productivity in local cows was reported by the farmers of unorganized dairy sector as eight major problem. Lack of veterinary facilities is reported as the ninth major problem. With a slight difference from the problems reported by organized sector dairy farmers, the unorganized sector dairy farmers reported "low availability of dry fodder" as tenth major problem.

CONCLUSION
The above analysis identifies very less difference in both the sectors. This may be possibly because most of the dairy farmers in organized sector are first generation dairy farmers, at the same time the marketing and veterinary support of the TMSS/DUSS are not very efficient. This cannot be considered as only example in the world as many researchers have pointed out similar findings. Anh, Cuong and Nga [1] reported despite the amazing fact that farmers participation in the dairy value chain has promised the better outcome, there are still millions of rural farmer households struggling against the inefficient production and marketing, and decline with hope of improving their main source of income. Varathan *et al* [18] from their study in Tiruvannamalai district of Tamil Nadu reported that lack of marketing information and type of procurement agencies were perceived as the major marketing constraints among SHG members, whereas non members felt type of procurement agencies and low price of livestock products as serious constraints. Sarkar and Ghosh [13] had reported the constraints that co-operative and non-cooperative dairy farms faced in expanding milk production in the West Bengal. The study had shown that non-cooperative farms face major constraints and high severity compared with co-operative farms in expanding milk production. Also important is that most of the severe or more severe constraints are infrastructural in nature. The study had suggested that for expanding milk production, the expansion of co-operative dairy farms other than non-cooperative dairy farms may overcome most of these difficulties. Thus, the positive of the organized dairy farming can be built upon, and the drawbacks can be rectified for development of dairy in the district.

REFERENCES
1. Anh, N. H., Cuong, T. H. and Nga, B. T. (2013), Production and marketing constraints of dairy farmers in Son La milk value chain, Vietnam. *Greener Journal of Business and Management Business Studies,* 3 (1): 31-37.
2. Baliyan, S. P. and Gosalamang, D. S. (2016), Analysis of constraints and opportunities in dairy production in Botswana: Producer's perspectives. *International Journal of Business and Management*, 11(3): 248- 256
3. Belhekar, S. and Dash, S. (2016), Role of dairy industry in rural development in India. *Paripex - Indian Journal of Research*, 5(11): 509-510.
4. Birhan, M., Teka, K. and Tsegaye, M. (2015), Constraints and opportunities on small scale dairy production and marketing in Gondar town. *World Journal of Dairy & Food Sciences*, 10 (2): 90-94,
5. Dhanabalan, M. (2009), Productive efficiency of milk production in Tamil Nadu. *Indian Journal of Marketing*, 39 (12): 21.

6. Ghule, A. K., Verma, N. K., Cahuhan, A. K. and Pravin Sawale, P. (2012), An economic analysis of investment pattern, cost of milk production and profitability of commercial dairy farms in Maharashtra. *Indian Journal of Dairy Science*, 65(4), 329-336.
7. Jaiswal, P. and Singh, Kh. R. (2015), Economics of milk production and determinants of market participation for small holder dairy farmers in Raipur district of Chhattisgarh. *Indian Journal of Dairy Science*, 68(6): 619–28.
8. Jaiswal, P., Chandravanshi, H., and Netam, A. (2018), Contribution of dairy farming in employment and household nutrition in India. *International Journal of Avian & Wildlife Biology*, 3(1): 78- 79.
9. Kakaty, G. and Das, A. K. (2017), Assessment of the status of dairying and potential to improve socio-economic status of the milk producers and convergence of all central and state schemes at district level in Assam (Study number 150). Sponsored by Department of Agriculture, Cooperation and Farmers' Welfare, Ministry of Agriculture and Farmer's Welfare, Government of India, New Delhi, and conducted by Agro-Economic Research Centre for North-East India, Assam Agricultural University, Jorhat – 13, Assam
10. Kakaty, G. and Gogoi, M. (2001), Employment and income opportunity in dairy enterprises of Assam - A case study. *Agricultural situation in India*, 66 (2): 69.
11. Nargunde, S. and Amarja. (2013), Role of dairy industry in rural development. *International Journal of Advanced Research in Engineering and Technology*, 4: 08-16.
12. Ramakrishnappa, V. and Jagannatha, R. R. (2006), Emerging microfinance issues in dairy development: A case study from Karnataka, India. *International Journal of Agricultural Resources*, Governance and Ecology, 5 (4): 399-412.
13. Sarkar, D. and Ghosh, B. K. (2010), Constraints of milk production: A study on cooperative and non-cooperative dairy farms in West Bengal. *Agricultural Economics Research Review*, 23 (July-December): 303-314.
14. Selvi, V. D. (2017), Constraints of dairy marketing. *Carmelight*, 13(1):1-9.
15. Singh, J. K., Singh, R., Singh, J. P., Mishra, S. K., Kumar, R. and Raghuvanshi, T. (2017), A study of the cost and returns of milk production of cow and buffalo and to find out the break-even point of dairy enterprise in Faizabad district of eastern Uttar Pradesh, India. *International Journal of Current Microbiology and Applied Sciences*, 6(11): 3928- 3938
16. Singh, M. and Joshi, A. S. (2008), Economic analysis of crop production and dairy farming on marginal and small farms in Punjab. *Agricultural Economics Research Review*, 21 (2), 30.
17. Sirohi, S., Kumar, A. and Staal, S. J. (2009), Formal milk processing sector in Assam: Lessons to be learnt from institutional failure. *Agricultural Economics Research Review*, 22 (2): 245-254.
18. Varathan, B. J., Prabu, M., Pandian, A. S. S., Kumar, G. S. and Kumar, K. N. S. (2012), Production and marketing constraints in dairy cattle rearing as perceived by women self- help group members and non-members. *Tamilnadu Journal of Veterinary and Animal Sciences*, 8 (2): 68- 71.
19. Yasmin, S. and Ikemoto, Y. (2015), Women's participation in small-scale dairy farming for poverty reduction in Bangladesh. *American International Journal of Social Science*, 4(5): 21-33
20. Garett H E and Woodworth RS (1969). Statistics in psychology and education. Vakils, Feffer and Simons Pvt. Ltd., Bombay. p.329.