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Determinants of Marketed Surplus of Milk: A Micro Level Study in Khasi Hills Region of Meghalaya

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ABSTRACT

Dairy sector has been playing a pivotal role in India's socio-economic development by providing employment and income generating opportunities in the rural areas. At the micro level, it provides livelihood to millions of households. Animal husbandry has multi-dimensional role in improving socio-economic condition of agrarian community. In North eastern states the development of livestock sector is very slow which reflects the less production and consumption of milk. The study investigates the production, consumption, disposal and factors determining marketed surplus of milk in the state of Meghalaya. There lie opportunities for value addition and formation of dairy cooperative or farmer's producer organization (FPO) for development of dairy sector in the state of Meghalaya.

Keywords: Correlation, Dairy, Determinant, Marketed, Surplus

INTRODUCTION

Emerging economies of the world including India are coping with the issues relating to poverty, hunger, malnutrition, farmers suicide and community welfare *etc.* (Uchoi and Singh, 2020). Animal husbandry has been a vital and integral agricultural component in India since ages due to its numerous contributions to the rural areas as food products, draught power, clothing, income and employment (Saxena *et al.*, 2017). Out of all the livestock enterprises, dairy plays a pivotal role in our national economy. It occupies an important place in the development of the country's economy via employment generation for thousands of rural households families (Gupta and Sharma, 2010; Lalrinsangpuii *et al.*, 2016). India is bestowed with a bovine population of 192.49 million cattle, 109.85 million buffalo and 148.88 million goats (Livestock census, 2019). At the micro level, it provides livelihood to millions of village households, thus ensuring continuous supply of quality milk and its products to urban as well as rural areas (LMIS, 2015).

The state of Meghalaya being agrarian, economy also depends on animal husbandry (Singh *et al.*, 2020). Meghalaya's cattle population has been 903.57 thousand (Livestock Census, 2019). During the inter census period of 2007-2012, the livestock population has increased from 1.82 million to 1.96 million (Livestock Census, 2012). The gross milk production in Meghalaya is about 85 thousand tonnes and per capita availability is about 83 g per day which is much lower as compared to country's average of 375 g/day (GoI, 2017). The average yield was 8.951 kg per day per cow for CB cows while it was 0.774 kg per day per cow for local cows during 2017-18 (GoM, 2019). The returns from livestock sector especially from dairy and mixed farming in small and medium holdings is

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larger and highly sustainable (Singh *et al.*, 2016) in the state of Meghalaya. Most of the livestock readers are below the poverty line; consequently huge gap exists in the production and consumption of milk in the region (Beauty *et al.*, 2013). The consumption is highly correlated with production and at the same time it is highly interlinked with marketed surplus of milk of the household. Therefore, the analysis of factors associated with marketed surplus of the households in the state of Meghalaya has become the immense for further certain interventions for enhancement of marketable surplus at micro level. Hence, keeping in view the above facts, the present research paper is an attempt to work out the determinants of marketed surplus of local cattle in the state.

METHODOLOGY

The study was conducted in West Khasi Hills (WKH) and South West Khasi Hills (SWKH) districts of the state of Meghalaya. Khasi Hills Region comprises of four districts namely; East Khasi Hills, Ri-Bhoi, West Khasi Hills and South West Khasi district of Meghalaya. The WKH and SWKH were selected on the basis of low milk production of 4.62 thousand MT and 1.91 thousand MT, respectively, in the region (GoM, 2019). One block from each of selected district was selected in consultation with the officers in the Department of Animal Husbandry and Veterinary of the state. Further, two villages from each of selected block were selected. A list of farmers who were rearing livestock for milk purpose was prepared for each selected village. A sample of 73 respondents through random proportionate sampling was drawn. Primary data were collected on herd strength including breed details, human labour allocated to dairy, milk production, producer's surplus of milk, consumption, losses and disposal pattern and agencies involved in disposal of milk from producers to consumers.

The primary micro level data were analyzed by applying the different statistical tools like Marketed surplus of milk and Correlation analysis of factors of marketed surplus (Pearson's coefficient of correlation).

RESULTS AND DISCUSSION

All the sampled households (100%) possessed 'in milk and not pregnant' cattle in the entire study area. It was observed that 94.60 per cent and 77.80 per cent household maintained in-milk and pregnant cattle in WKH and SWKH, respectively. In case of dry and pregnant cattle, 49.30 per cent sampled households (56.80% in WKH and 41.70% in SWKH) had the possession (Table 2). Hence, all the sampled households were having in-milk cattle in the study area of both the districts.

Table 1: Households reporting ownership of cattle (%)

Category of animal		WKH	SWKH	Overall
In milk and not pregnant		100.0	100.0	100.0
In milk and pregnant	94.6	77.8	86.3	
Dry and pregnant		56.8	41.7	49.3
Dry and not pregnant		37.8	38.9	38.4
Pregnant heifer		8.1	-	4.1
Calves <1 year	Male	97.3	88.9	93.2
	Female	91.9	97.2	94.5
Calves >1 year	Male	62.2	19.4	41.1
	Female	51.4	22.2	37.0
Adult male		64.9	80.6	72.6

Source: Field Survey

The average (mean) cattle 'in-milk' and not pregnant' was 3.03 standard Animal Unit (SAU), 3.38 SAU in WKH and 2.67 SAU in SWKH whereas; for 'in-milk and pregnant' cattle, it was 1.08 SAU in the combined study area, WKH having 1.32 SAU and SWKH having 0.83 SAU. In the category of 'dry and pregnant' cattle, the average SAU was reported to be 0.81 SAU overall, with WKH having 0.84 SAU and SWKH having 0.78 SAU, whereas, in case of' dry and not pregnant' cattle, the average SAU was 0.82 SAU (0.62 SAU in WKH and 1.03 SAU in SWKH). In case of 'pregnant heifer', low average SAU (0.04 SAU) was observed, with WKH having 0.08 SAU and no reported SAU (0.00) from SWKH (Table 3). Hence, analysis of SAU showed the healthy size of herd in both the districts under study.

It was observed that the mean milk yield was 3.68 l/ day per household in the state, while it was 3.83 l/ day per household and 3.52 l/ day per household in WKH and SWKH, respectively. Low milk production per household may be due to lack of sufficient resources and knowledge among the farmers to maintain dairy cattle. The mean production of milk per milch animal in the state

Table 2: Milk production and marketed surplus

Particulars	Unit	WKH	SWKH	Overall
Milk production	L/day			
Average/household		3.83	3.52	3.68
Maximum/household		8.40	7.70	8.40
Minimum/household		1.50	0.90	0.90
Average/milch cow		0.82	1.01	0.89
Maximum/milch cow		1.10	1.60	1.60
Minimum/milch cow		0.50	0.45	0.45
Milk retained	L/day/household	1.42	1.20	1.31
Marketed surplus	L/day/household	2.41(63.03)	2.32(65.98)	2.37(64.42)

*Figures in parentheses are percentages of total milk production; Source: Field survey

of Meghalaya was recorded 0.89 l/ day, whereas, in WKH and SWKH district it was recorded of 0.82 l/ day and 1.01 l/ day, respectively. The overall maximum milk production of the state was recorded of 1.60 l/ day per milch animal in the state, whereas it was 1.10 l/ day per milch animal and 1.60 l/ day per milch animal recorded WKH and SWKH district, respectively as an upper limit (maximum) of mill yield. The minimum production of milk per milch per cattle was recorded to be of 0.45 l/ day at state as a whole out of which 0.50 l/ day and 0.45 l/ day in WKH and SWKH district, respectively (Table 2). Similar study by Vedamurthy (2004) also reported that the milk yield was low of local cows of Karnataka in compare to cross bred and buffalo.

The overall average amount of milk retained per household for home consumption in the entire study area was estimated 1.31 l/ day while it was 1.42 l/ day and 1.20 l/ day in WKH and SWKH district, respectively (Table 2). Marketed surplus (MS) accounted for 64.42 per cent (2.37 L/day/household) of total production in the state. The total Marketed surplus in the district of SWKH was estimated to be of 65.98 per cent (2.32 L/ day/household) of the total production which was higher than the total Marketed surplus in WKH which was observed to be of 63.03 per cent (2.41 L/day/household).

Milk requires quick disposal as it is a highly perishable commodity. Overall, the middlemen or vendors were preferred for disposal of milk through which 76.71 per cent of households disposed milk (Figure 2). Similarly, 64.87 per cent and 88.89 per cent of respondents of WKH and SWKH district, respectively disposed milk through vendors only. Around 2.73 per cent of sampled households

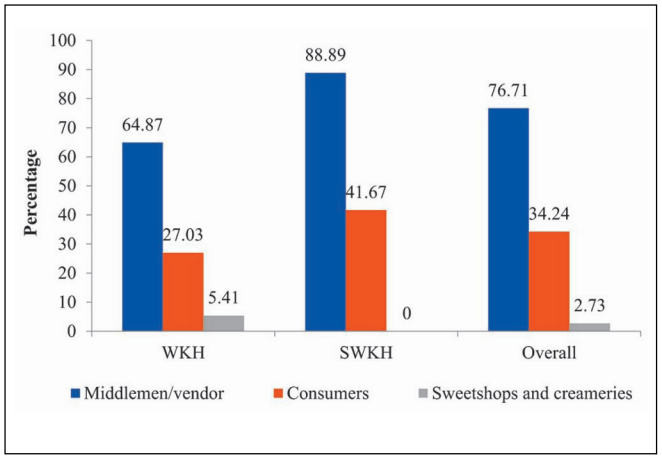

Figure 1: Share of households for milk disposal

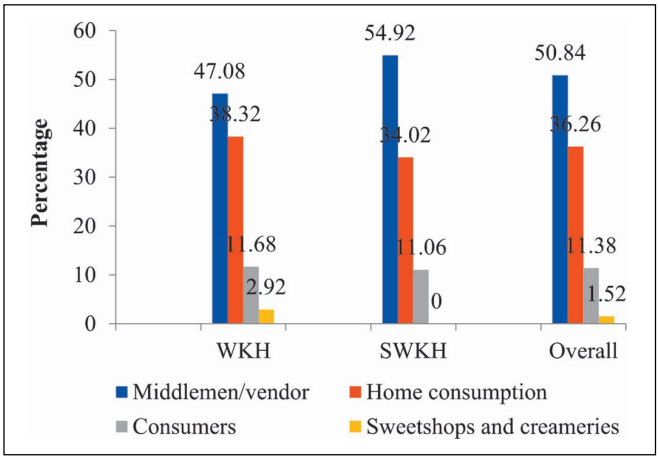

Figure 2: Agency wise share of milk disposal

Table 3: Estimated correlation coefficient (r) between marketed surplus and its factors

Particulars	Independent variable	r	p-value
WKH (n_1=37)	Total Household milk production	0.940***	0.000
	Household size	-0.470***	0.005
	Average milk price	0.686***	0.000
	Market access	-0.151	0.392
SWKH (n_2=36)	Total Household milk production	0.927***	0.000
	Household size	-0.040	0.824
	Average milk price	0.613***	0.000
	Market access	0.003	0.988
Overall (n=73)	Total Household milk production	0.931***	0.000
	Household size	-0.241**	0.049
	Average milk price	0.112	0.369
	Market access	-0.085	0.495

Note: ***, **and * indicates p<0.01, p<0.05 and p<0.10, respectively; Source: Field survey

disposed their milk to sweetshops or creameries and tea shops. The remaining households disposed milk to the consumers of the same village in locality. It was observed that the overall 50.84 per cent of milk has been disposed through middlemen/vendors, followed by consumers (11.38%) and sweetshops/creameries (1.52%). The remaining 36.26 per cent of milk consumed at home only. The milk disposal in West Khasi Hills district has been recorded and disposed through middlemen/vendors (47.08%), consumers (11.68%), sweetshops/creameries (2.92%) and remaining milk consumed (38.32%) at home. Similar trend was observed in South West Khasi Hills district whereas, through middlemen/vendors (54.92%), consumers (11.06%) has been disposed and rest consumed (38.32%) at home (Figure 1). It was observed that there was hardly practice of converting milk into various milk based by-products in the study area. Hence, ample scope was there for the interventions of value addition in milk.

As expected, out of the 4 predictor variables selected *viz.*, total household milk production (p<0.01) was positively correlated and household size (p<0.05) was negatively correlated with marketed surplus, whereas; average milk price and market access were insignificantly connected with marketed surplus over the entire study region. It refers that total household milk production level and household size executes a significant role in influencing the volume of milk marketed surplus. Total household milk production (r = 0.931, p<0.01) was positively linked with marketed surplus over the combined study area. Similar result in district wise analysis revealed that total milk production had positive correlation in WKH (r = 0.940, p<0.01) and SWKH (r = 0.927, p<0.01). It confirms that there exists a linear relationship between total household milk production level and MS; as more the volume of milk produced at household level, higher will be the marketed surplus. Similar observations were reported by Bhawar *et al.* (2019) who stated that there exist positive correlation between total household milk production and milk marketed surplus in North Karnataka. The household size (r = -0.241, p<0.05) had negative association with marketed surplus at overall level. It confirms the fact that as family size goes on increasing; marketed surplus of milk goes on decreasing. In WKH, it had a negative correlation (r = -0.470, p<0.01), while in SWKH, no significant correlation with marketed surplus had been noticed. The average milk price (r = 0.112) has shown positive but insignificant correlation with milk marketed surplus over the entire study area. But district wise correlation result shows that WKH (r = 0.686, p<0.01) and SWKH (r = 0.613, p<0.01) exhibited significant positive correlation between marketed surplus and average milk price. As farmers tend to get higher milk price, they tends to dispose more portion of their production. Similarly, market access (r = -0.085) had

Table 4: Average number of cattle (SAU) owned by the selected households

Category of animal	WKH			SWKH			Overall		
	Mean	Max	Min	Mean	Max	Min	Mean	Max	Min
In milk and not pregnant	3.38	7.00	1.00	2.67	7.00	1.00	3.03	7.00	1.00
In milk and pregnant	1.32	3.00	0.00	0.83	3.00	0.00	1.08	3.00	0.00
Dry and pregnant	0.84	3.00	0.00	0.78	5.00	0.00	0.81	5.00	0.00
Dry and not pregnant	0.62	4.00	0.00	1.03	10.00	0.00	0.82	10.00	0.00
Dry and unfit for breeding	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Not calved even once	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Pregnant heifer	0.08	0.98	0.00	0.00	0.00	0.00	0.04	0.98	0.00
Calves <1 year (male)	1.78	4.26	0.00	1.03	2.84	0.00	1.41	4.26	0.00
Calves <1 year (female)	1.77	4.10	0.00	1.78	4.92	0.00	1.77	4.92	0.00
Calves >1 year (male)	0.52	1.42	0.00	0.22	1.42	0.00	0.37	1.42	0.00
Calves >1 year (female)	0.60	1.64	0.00	0.30	2.46	0.00	0.45	2.46	0.00
Adult male	1.05	3.33	0.00	1.91	4.44	0.00	1.47	4.44	0.00
Total number of animals	11.97	28.67	3.42	10.53	27.63	1.71	11.26	28.67	1.71

Note: Max= Maximum, Min= Minimum, SAU= Standard Animal Unit;

Source: Field Survey*

***Standard Animal Unit (SAU):** 1 SAU equals to 1 mature cow of 450 kg weight (1000 pounds); assumed to intake about 12 kg (26 pounds) of forage dry matter per day.

negative insignificant linkage with marketed surplus of milk over the whole study area (Table 3).

CONCLUSION

The dairy sector in the state of Meghalaya is taking shape however; the pace of development is slow. The sector is attracting entrepreneurship especially among youths in post harvest management of milk. The study area has ample scope of value addition through establishing Farmers Producers Organizations (FPOs) and dairy cooperatives especially in remotely located villages of the state. The factors *e.g.* milk production at micro level, size of household, price of milk *etc.* exert significant influence on marketed surplus and need to be factored in while developing strategy for dairy development in the state.

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