



Economics of production and marketing behaviour of dairy-farmers of the Himalayan state of Sikkim: A case study of South Sikkim District

Narendra Kharel* • Manesh Choubey

Department of Economics, Sikkim University, Sikkim-737102, India

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ABSTRACT

Rural Indians have been breeding dairy cows for thousands of years. It provides a variety of subsistence options for its inhabitants. In addition to meeting their nutritional requirements, dairy farming helps them satisfy their financial obligations. Agriculture provides animals with food and fodder, and cattle provide drought-resistant energy and organic manure for a variety of agricultural uses. A 2011 census found that rural Sikkim has around 74.85% of the total population, whereas urban Sikkim has only 25%. This article examines the state's dairy producers' production and sales practises. Survey of 300 sample families have been carried out in order to acquire a better understanding of the common dairy production and marketing strategies in the South Sikkim district, which is then followed by a descriptive and analytic study. The information is analysed with the help of statistical software such as the Statistical Package for the Social Sciences (SPSS). The conclusions are supported by tables and figures, which are included in addition to the actual conclusions themselves. In order to pick the district and the houses that would be included inside it for the duration of the operation, a random sampling approach was used. In order to provide greater clarity and context, the authors have also reviewed a number of important publications in addition to their own. Following the completion of the research, a number of policy choices have been produced, each of which is based on the limitations that have been found and ranked.

1. Introduction

As evidenced by the fact that dairy farming is now practised by 70% of Indian farming households, with nearly two-thirds of them owning less than one hectare of land being used for milk production, dairy farming has grown in importance in the country over the past several decades (FAO 2003, GOI 2005). Furthermore, according to the 70th round survey of the National Sample Survey Offices (NSSO), 23 percent of agricultural households in the country with less than 0.01 hectare of land relies on cattle as their primary source of income (NSSO, GOI 2014). It also assists them in meeting their demand for animal protein, which is primarily met through the production of meat, milk, and dairy products (Miazi, *et al.* 2007).

A total of 21 million people is employed in the dairy industry, with women accounting for nearly 70% of the workforce (Kumar *et al.* 2013). In rural areas, it is one of the

few industries that gives employment opportunities both on and off the farm (Kumar, 2010). The implementation of value-adding activities in the dairy industry, such as the processing, marketing, and distribution of milk and milk products, results in the creation of employment opportunities in the community. Milk production, among other agricultural activities, has the potential to support viable small-holder farming in areas where arable land is dwindling and the population is increasing by orders of magnitude, as is the case in many developing countries. Dairy farming production serves a variety of different purposes, including the creation of manure, the generation of money, the management of risk, and the establishment of social prestige (Negassa, 2007). Milk production is also a viable option for people from all walks of life who want to get into the agricultural business for themselves. To work as a dairy farmer, no formal qualifications are required. Even the most illiterate dairy

*Corresponding author: naren_kharel@yahoo.com

farmer may compete on an equal footing with the most literate dairy farmer in terms of production and marketing. Across India, smallholder dairy producers with only a few buffaloes or cattle dominate the industry, which is tightly connected with crop production through the utilisation of crop leftovers such as rice and wheat straw. A total of 69 percent of the total milk production in the country comes from marginal and small landholders (BIRTHAL, 2008). From 50 percent to 98 percent, according to various reports, the producers' portion of the consumer price of milk varies from one region to another (CALIP, 2006., Kumar, *et al.* 2010).

In the absence of field crop production, animal husbandry/dairy farming is the primary source of income for the farmers who live in these harsh and mountainous terrains. The rearing of cattle in these locations contributes significantly to the state's overall economic well-being (Balaram, 1998). Dairy farming is quite important in the context of the studied region. Dairy farming practices are the backbone of rural communities, providing them with the resources they need to succeed in all areas of their lives. Cattle farming has always been a feature of the state's traditional agriculture, and the purpose of generating cash, dairy farming is quite significant. Dairy farming is getting more and more popular in Sikkim these days and with effective intervention from the State Government the number of farmers and production of milk has increased manifolds (Rai, 2022). The establishment of fresh milk markets, the development of milk cooperatives, and the establishment of milk collection centres have all contributed to the change of the rural economy. Livestock and dairy farming have been recognised as vital components of agricultural production. Keeping in view the importance of Dairy farming in the rural economy and economy of farming households in the state of Sikkim the study was conducted with following objectives:

- To study the production and marketing behaviour of dairy farmers.
- To identify the constraints faced by dairy farmers in the production and marketing.

2. Data and Methodology

In order to achieve the stated aims of the study, various forms of technique have been employed. To obtain the information that is required, both formal and informal procedures are used. This research focuses on the production and selling of dairy products, as well as the impact of these activities on the economic well-being of dairy farmers in the study area. The descriptive and analytical research designs that were used in this study, as well as the data that were collected, are both qualitative and quantitative in character. It was carried out in the South District of Sikkim. Because this is the most important allied agricultural area in the state, every sub-division in South District was chosen with care and

consideration. A total of 300 dairy farmers were interviewed utilising an interview schedule and a random sample approach during the year 2021. In the present study, responses from farmers were collected through the use of 10 sets of questions, which were then analysed using the SPSS software, where simple statistical tools were used to supplement the findings. In addition, some cartographic tools were used to supplement the findings of the present study. On a three-point scale, with 1 representing least severe difficulty, 2 representing severe difficulty, and 3 representing most severe difficulty, the common obstacles that dairy farmers face during the course of dairy production and sale have been discussed. It was finally possible to rank these 12 constraints based on their weighted average score.

Table 1 depicts the results of a descriptive data analysis of dairy farmers' production and marketing behaviour/attitudes. In this study, descriptive statistics in the form of different variables of 300 dairy farming households (n=300) were utilised to analyse the whole sampled household's data using SPSS software. These variables included the minimum, maximum, mean, and standard deviation of the sampled houses. Milk production and consumption parameters include variables such as the prime and slack seasons in a year, output in the prime and slack seasons in a year, and the daily milk intake by each household, among other things. Similar to this, milk sold during prime and slack seasons, sale value throughout both prime and slack seasons, and the annual income from dairy farming were all examined as variables that fall under the category of milk marketing criteria.

The maximum production time in a year by dairy cow in prime time was 12 months, and the least time of milk production in a year was 7 months and on an average cow were in milk for about 9 months of a year with a standard deviation of 1.596. In a year, some farmers were able to produce consistently throughout the year, while others were unable to do so. Farmers were able to produce 3.07 and 1.596, respectively. On average, farmers in the study area produce less than their maximum output for three months of the year. Maximum production of 40 litres and minimum production of 6 litres per day occurred during prime season, and maximum production of 30 litres and minimum production of 3 litres occurred during slack season. It has a high standard deviation, 8.065 and 6.973 respectively, which suggests that the quantity of milk produced varies from farmer to farmer, resulting in figures that are spread out over a greater range.

The average milk consumption of almost all the households is similar, i.e., 2 kg per day, with a mean of 2.40 and a standard deviation of 0.621, indicating that the standard deviation (0.621) is close to the set of mean values, indicating that all the households in the study area have the same type of

3. Results & Discussion

Table 1: Descriptive Statistics of the Dairy Farmers

Sl. no.	Variables	Sample Size	Minimum	Maximum	Mean	Standard Deviation
1	Prime Season (in months)	300	7	12	8.93	1.596
2	Slack Season (in months)	300	0	5	3.07	1.596
3	Output in Prime Season (in litre)	300	6	40	13.70	8.065
4	Output in Slack Season (in litre)	300	3	30	9.27	6.973
5	Daily HH Consumption (in litre)	300	2	4	2.40	0.621
6	Output Sold during Prime Season (in litre)	300	4	36	11.43	7.509
7	Output Sold during Slack Season (in litre)	300	1	26	6.87	6.453
8	Sale value in Prime Season (in Rs.)	300	240	2160	686.00	450.567
9	Sale value in Slack Season (in Rs.)	300	60	1560	412.00	387.159
10	Average Annual Income (in Rs.)	300	54000	669600	197640	149787.541

Source: Field Survey, 2021, Authors Calculation

milk consumption pattern, as well as the same quantity of milk consumption, as indicated by the standard deviation (0.621).

Similar to the buying patterns, the selling or marketing patterns differ from household to household, and the standard deviation is not close to the mean, indicating that some farmers are selling the maximum amount of milk while other farmers are selling the least amount during both prime and slack seasons. Furthermore, the sale value of all dairy farmers varies depending on the season in which they sell

their products. Among 300 households in the South District of Sikkim who were sampled, the average yearly revenue from dairy farming was Rs. 54000/- with a minimum and a maximum of Rs. 669600/- in a calendar year. Its mean and standard deviation are spread out over a greater range, showing that the average income level of dairy farmers varies from farmer to farmer, rather than being consistent across all of them.

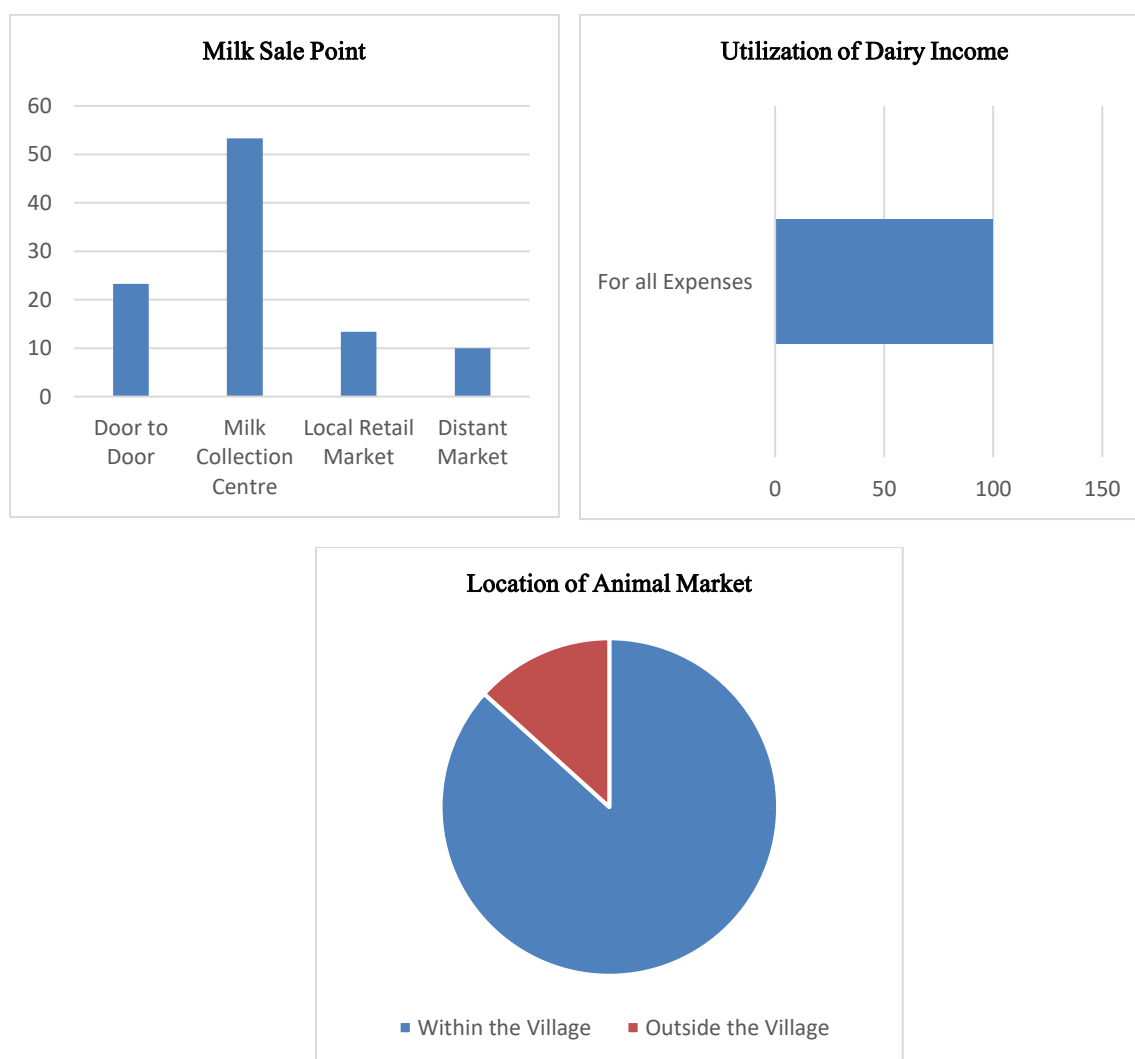
Table 2. Dairy Farmers Frequency of Milk Sale Point, Income Utilization and Location of Animal Market

Sl. no.	Milk Sale Point	Frequency	Percentage
1	Door to Door	70	23.30
	Milk Collection Centre	160	53.30
	Local Retail Market	40	13.40
	Distant Market	30	10.00
	Total	300	100.00
2	Utilization of Dairy Income	Frequency	Percentage
	Household Expenditure	-	-
	Animal Purchase	-	-
	Other Expenses	-	-
	For all Expenses	300	100.00
	Total	300	100.00

	Location of Animal Market	Frequency	Percentage
3	Within the Village	260	86.70
	Outside the Village	40	13.30
	Total	300	100.00

Source: Field Survey, 2021

Figure 1. Dairy Farmers Frequency of Milk Sale Point, Income Utilization and Location of Animal Market



The frequency of milk selling stations, dairy revenue use pattern, and animal selling location of dairy farmers were investigated throughout the research region, as shown in sl. no. 1,2, and 3 of table 2 above. In table 2, sl. no. 1, which shows the frequency of milk sale points by dairy farmers, about 23% of dairy farmers sell their daily milk products door-to-door, 53% sell at the milk collection centre, 13% sell at the local retail market, and 10% sell at a distant market. As a result, the sl.no.2 of table 2 illustrates the dairy producers' dairy revenue use pattern. In this part, the farmers

were given a number of optional questions, however the farmers' use of dairy revenue was found to be consistent across the board, i.e., they utilised it for all costs rather than for specialised purposes such as home expenses, animal purchases, and other expenses. Similarly, sl. no. 3 of table 2 reveals that roughly 87 percent of dairy producers sell their animals inside the community, while only 13 percent sell their animals outside the village. Finally, in figure 1 above, the research area's dairy producers' milk selling point, revenue utilisation, and animal marketing location are shown.

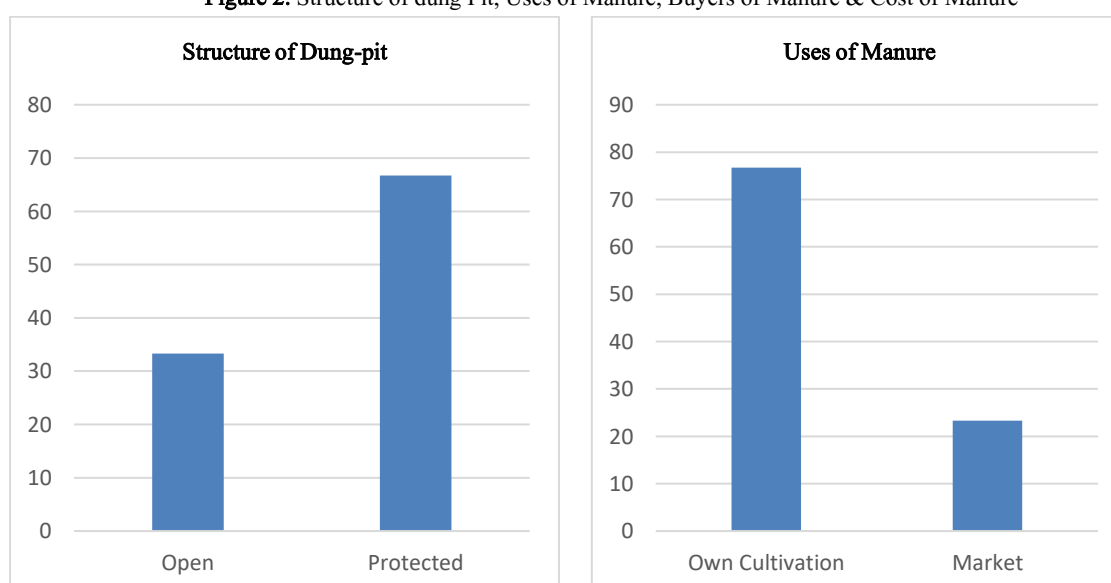
Table 3. Frequency of Cow-dung Pit, Uses of Manure, Buyers of Manure & Cost of Manure

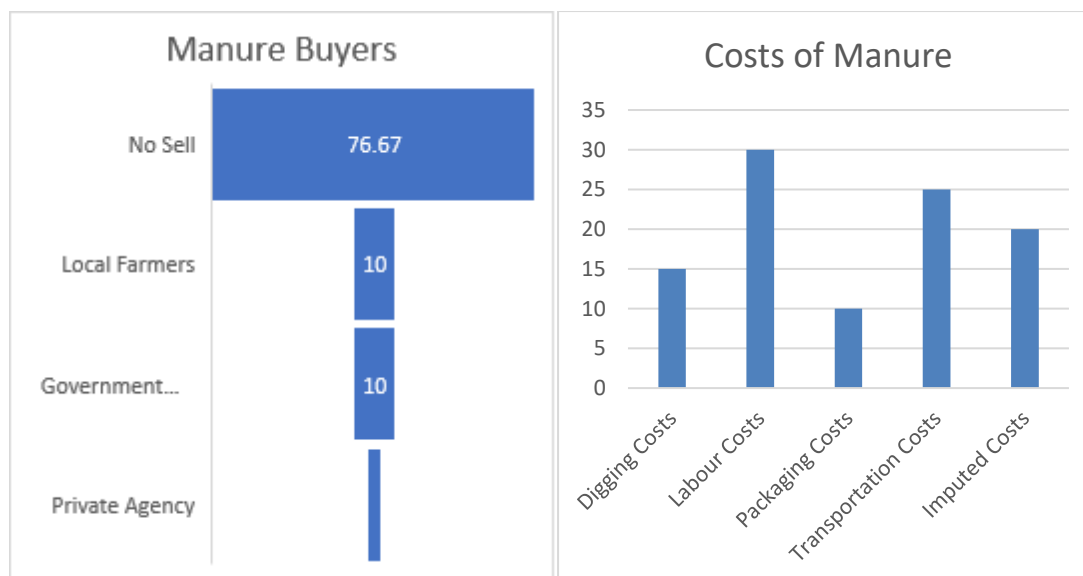
Sl. no.	Dung Pit Structure	Frequency	Percentage
1	Open	100	33.30
	Protected	200	66.70
	Total	300	100.00
Use of Manure			
2	Use of Manure	Frequency	Percentage
	Own Cultivation	230	76.67
	Market	70	23.33
	Total	300	100.00
Buyers of Manure			
3	Buyers of Manure	Frequency	Percentage
	No Sale	230	76.67
	Local Farmers	30	10.00
	Government Agency	30	10.00
	Private Agency	10	3.33
	Total	300	100.00
Average Cost of Manure (Rs. Per Doko/Bora)			
4	Average Cost of Manure	Rs.	
	Digging Costs	15 (15)	
	Labour Costs	30 (30)	
	Packaging Costs	10 (10)	
	Transportation Costs	25 (25)	
	Imputed Costs	20 (20)	
	Total	100 (100)	

Source: Field Survey, 2021

Note: Figure in Parenthesis is Percentage

Figure 2. Structure of dung Pit, Uses of Manure, Buyers of Manure & Cost of Manure





The frequency of dung pit structures (sl. no. 1 of table 3), use of manure (sl. no. 2 of table 3), buyers of manure (sl. no. 3 of table 3) and average cost of manure (sl. no. 4 of table 3) in the study region are depicted in figure 2 and table 3. It is apparent that the interviewees had been involved in dairy farming since they were children (continuity from the ancestor). Sl. no. 1 of table 3 reveals that over 67 percent of dairy farmers have a protected dung pit, while 33 percent still have an open dung pit. Sl. no. 2 of table 3 reveals that roughly 77 percent of dairy farmers utilise manure for their own cultivation of various crops, while the remaining 23 percent produce/use it only for selling purposes. Similarly, sl. no. 3 of table 3 shows the buyers of manure in the study region; the majority of farmers, i.e., about 77 percent, say they use it for self-cultivation and are unable to sell it; however, some farmers sold the manure to local farmers (10%), government agencies (10%), and a negligible of 3% sold it to private agencies. Similarly, the average cost of manure is shown in sl. no. 4 of table 3. Its foundation is per doko or bora. The typical cost of a doko/bora of manure is Rs. 100/-, although they used to sell it to purchasers for more than Rs. 100/-. Farmers in the research region used to spend a larger rupee on labour expenses, accounting for 30% of the whole amount, 25% in transportation costs, 20% in other imputed costs, 15% in digging costs, and 10% of the total amount in packing costs to create one bora of manure.

The dairy farmers in the research region continue to be confronted with a variety of challenges, and the data on the most frequently encountered difficulties is shown in the preceding table 4. The limitations were divided into three categories: the least severe, the severest, and the most severe. Data on restrictions has been analysed using frequency and percentage counts, as well as a weighted mean score and a mean score calculated on the basis of the data collected. Finally, the ranking of the various limitations has been

divided into categories and examined in depth. The final result reveals that the lack of manpower (2.92) was identified as the most severe constraint faced by dairy farmers in the study area by the greatest number of respondents in the study area. This finding is consistent with the findings of previous studies. Numerous factors have contributed to this problem, including low levels of family members' education, labour migration from rural to urban areas in quest of better or more straightforward employment opportunities, and so on. It was discovered during the survey that the farmers were dissatisfied with the prices of milk that were paid by or fixed by the union (2.82), and this was found to be the second most severe constraint experienced by dairy farmers in this study region. Similarly, the third most severe constraint was a scarcity of fodder, which was exacerbated by the fact that cattle grazing is fully prohibited in the state's designated forests, making it impossible for farmers to deal with the resulting scarcity (2.7). Unemployment among dairy farmers in the research region is another limitation (2.68) that is ranked fourth most severe, followed by a shortage in local milk demand (2.6), which is listed as fifth most severe among the study region's restraints. There is a scarcity of marketing infrastructure, which has been recognised as the sixth main restriction (2.59). The poor breed quality (2.57), according to the majority of dairy farmers, is the seventh most severe constraint they face. Lack of institutional credit (2.5) is the eighth most severe limitation experienced by dairy farmers, and low milk yield (2.45) is the ninth most severe constraint experienced by dairy farmers. Low milk surplus (2.25) was identified as the tenth, eleventh, and twelfth most severe constraints faced by local dairy farmers in the study area. The poor veterinary services (2.42), lack of personal capital (2.34), and low milk surplus (2.25) were identified as the tenth, eleventh, and twelfth most severe constraints faced by local dairy farmers in the study area, respectively.

Table 4. Constraints faced by dairy-farmers

Sl. no.	Constraints	Least Severe		Severe		Most Severe		Total freq.	Total %	Mean Score	Rank
		Freq.	%	Freq.	%	Freq.	%				
1	Lack of personal capital	54	18	90	30	156	52	300	100	2.34	XI
2	Lack of institutional credit	38	12.67	73	24.33	189	63	300	100	2.5	VIII
3	Lack of training	20	6.67	55	18.33	225	75	300	100	2.68	IV
4	Lack of Marketing infrastructure	41	13.67	40	13.33	219	73	300	100	2.59	VI
5	Fodder shortage	30	10	30	10	240	80	300	100	2.7	III
6	Low milk yield	45	15	75	25	180	60	300	100	2.45	IX
7	Low milk surplus	75	25	75	25	150	50	300	100	2.25	XII
8	Shortage of local milk demand	30	10	60	20	210	70	300	100	2.6	V
9	Poor breed quality	25	8.33	80	26.67	195	65	300	100	2.57	VII
10	Poor veterinary services	38	12.67	97	32.33	165	55	300	100	2.42	X
11	Low price of milk	9	3	36	12	255	85	300	100	2.82	II
12	Lack of manpower	2	0.67	19	6.33	279	93	300	100	2.92	I

Source: Field Survey, 2021, Authors Calculation

Cattle Insurance

According to the information provided by respondents, there is a dearth of knowledge about livestock insurance. Cattle insurance can help dairy farmers reduce losses caused by inadequate animal health care, natural disasters, and other factors. Insured dairy farmers are more likely to embrace contemporary and enhanced dairy farming procedures that can produce more and more output for self-consumption as well as sale in local markets, distant markets, or milk unions, among other things.

Credit Facility

Institutional and non-institutional sources of support for dairy farmers exist in the country, although these sources require farmers to repay a portion of their loan as interest to the credit providers. In the Himalayan state of Sikkim, the government has been providing full support to the people by providing low-cost high-yielding crossbred cattle to poor farmers in order to help them support their livelihoods, which in turn serves to boost the state's productivity in the long run.

Future Vision, Awareness and Research & Development

The demand for dairy and dairy products will undoubtedly increase as the world's population continues to

grow. Its future is certain to create a stable economy for aspiring farmers. Furthermore, the new trend among today's age toward organic farming has boosted the dairy sector, as dairy is a basic or fundamental requirement for the manufacture of organic commodities. As a result, in light of the foregoing, it is thought that all educated people should go to great lengths to encourage farmers to adopt dairy farming as a source of income. Despite the fact that considerable research has been done in the dairy sector and great progress has been made, there are still a few areas in which further study and development is required in Sikkim, such as the fodder crisis, water scarcity, and other issues

Government Participation

The government's involvement with dairy producers in Sikkim is good. Farmers who have expressed an interest in dairy farming are being given crossbred cows at no cost. Through the MGNREGA programme, cow sheds are built in villages. To entice dairy farmers even more, the government has just begun offering a Rs 8 per litre incentive to those who supply milk to the Sikkim Milk Union.

Limitations

The constraints of this paper are its own. There is no way that any research project can cover every facet of the subject.

Some of the study's significant limitations are: the scope of this article is limited to South Sikkim's dairy producing region, the state of entire Sikkim is not represented by this document, due to time and budget restrictions this paper is constrained, this article's accuracy is based on primary survey responses from respondents in the research region, the milk by-products aren't discussed in length in this work, the results of the research field are restricted in this publication, and this article is a micro-level investigation of the research topic only.

Policy Recommendations

In the study region, dairy farming has long been a popular farming activity. For long-term growth, appropriate improvement measures should be performed. Here some suggestions for consideration based on the results are: simple access to bank loans for dairy farming funding is required, the loan's interest rate must be kept low, the price of animal feed must be kept under control, improved animal breeds should be fostered by farmers, farmers will have access to artificial insemination on a continuous basis, and animal husbandry is fraught with dangers such as illness, parasitic bites from snakes, food poisoning, and other dangers. In the absence of animal insurance services, farmers feel safe to extend their investment. Government agencies must implement effective insurance policies and provide enough assistance to farmers in order for them to be aware of them.

4. Conclusion

Dairy cows are the most popular livestock in the study region, and native breeds outnumber cross breeds. Dairy farmers make a regular living by selling milk and milk products. Dairy farming was also found to be the most important source of cash revenue in the study area, and it plays a vital part in the socio-economic growth of the population. Milk cooperative societies collect and sell most of the milk. Although a huge difference in production of milk was seen in the prime and lean season yet the income flow from it remains unhindered throughout the year. For those rearing only single cattle, marketing stops during lean season but those having more than two cattle are able to market throughout the year. Though dairy farming offers several benefits, it also has a number of constraints that need to be addressed. In the study area, there was a prospect of market growth. The research area's favourable climatic characteristics and road connectivity were also identified as push factors for dairy farming growth. Hence the production and marketing strategy followed by the dairy farmers was determined to have a beneficial influence on the research area overall.

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