

# Caught in the Middle: Reasons for Hindered Growth Among Dairy Groups of Haa District in Western Bhutan

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## ABSTRACT

The study aimed to identify and analyze the causes of hindered growth of dairy groups in Haa district of Western Bhutan. The study was conducted in the autumn of 2018, in major administrative blocks of Samar, Kartsog and Bji of Haa district. Sixty key respondents from three blocks were interviewed. The study was administered through field surveys, using the semi-structured questionnaires with open- and closed-ended questions. Except for Kartsog administrative block, there was no significant change in the number of group members before and after more than half a decade since the establishment of dairy groups in Samar and Bji administrative blocks. Dairy groups were dominated by female members. Members with bigger landholdings allocated more land for cultivating exotic pasture that allowed them to rear a greater number of exotic dairy cattle. Dairy groups had low milk production in winter due to acute feed and fodder shortages. Dairy product diversity was negligible and the only major products were butter and cheese. However, the group members expressed their interests to acquire new skills and develop the capacity to produce diverse products. The groups also faced difficulties due to lack of proper and organized markets. However, the current governance of dairy groups was good, except for the Samar administrative block. The study concluded that the pressing issues facing dairy groups of Haa can be addressed by building capacity on preparation of various dairy products; and developing proper and organized markets.

**Keywords:** Dairy group, Forages, Milk cattle, Market, Pasture.

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## INTRODUCTION

Dairy products are a source of high-quality food and a reliable means to earn a decent income for many small farmers in rural settlements round the year (Tshering, 2018). Because dairying is labor-intensive and demands more manpower, it has helped to generate employment, particularly for landless people in less developed regions worldwide. Over the last few decades, the dairy industry witnessed major advances in milk production and processing, often in response to mechanization. However, global dairy farming continues to grapple with issues. The major and common issues are low productivity of dairy animals (Mathur, 2000; Wangchuk and Dorji, 2008), lack of adequate quantity and quality of feed (Alejandrino et al., 1999; Ponnusamy, 2006; Duguma and Janssens, 2016), and

inconsistent quality standards for milk and milk products (Sharma and Baskota, 2002; Ponnusamy et al., 2017; Yangchen et al., 2018).

In Bhutan, the concept of smallholder dairy groups is relatively new, although the smallholder dairying dominates the mixed farming system. Dairy, as an important component of rural economy, receives undue attention. Realizing the potential of dairy to contribute to human nutrition, food sufficiency and food security of the Bhutanese society, the Royal Government of Bhutan vigorously promotes dairy farming in all 20 districts of Bhutan. This led to the formation of several dairy groups across the country, in line with government's policy to transform dairy from subsistence to commercial

**Table 1.** Number of administrative blocks, dairy groups and respondents covered by the study.

Name of Administrative Block	Number of Dairy Groups Covered	Number of Respondents Interviewed
Samar	3	15
Bji	4	30
Kartsog	3	15
Total	10	60

farming. Many rural development projects and plans were implemented to accelerate dairy development, largely targeting youth employment, and to spur economic growth.

Among livestock activities, the Bhutan's Business Opportunity Information Center (BOIC, 2015) identified dairy as the best bet for Haa district in Western Bhutan, considering the district's favourable climatic conditions for dairying in the temperate region (2400 to 3000 m asl). Over the last decade, Haa district saw a rise in number of dairy groups. Following successful establishment and takeover of dairy businesses and facilities from the government, the dairy groups of Haa district were expected to operate the business independently. However, the dairy groups are grappling with a number of challenges over the years, leading to poor performance with no clear and substantive reasons to explain the unprecedented situation. The signs of stagnated growth are evident and unfounded speculations widespread without attempts to investigate the scenario and find lasting solutions to the ongoing problems. Therefore, the primary objective of this study was to identify and analyze factors hindering the growth and progress of dairy groups in Haa district in Western Bhutan.

## MATERIALS AND METHODS

### Description of Study Area

The district of Haa in Western Bhutan is located at an elevation ranging from 1,000 to 5,600 meter above sea level (MASL). The district's main town is about 110 km drive from Thimphu, the capital city of Bhutan. It has a total area of 1865 sq. km. The district has six administrative blocks viz. Bji, Katsho, Eusu, Samar, Sangbaykha and Gakidling. The total human population of the district is 13,655 (National Statistics Bureau of Bhutan, 2018), one of the lowest among the 20 districts of Bhutan. Dairy farming is an age-old tradition and continues to be popular among native communities of all administrative blocks in the district. The administrative blocks of Bji, Kartsog and Samar were identified for the study. These blocks were selected since the dairy groups operate closer to the main town and have easy access to the market. Yet, the groups are reported to face hindered growth in the dairy

business. The study sites, where dairy groups operate, are located in a temperate environment within 2,400 to 3,000 m elevation. The climate is characterized by cool and wet summer, followed by dry and freezing winter. Livestock farming is the major livelihood occupation for most of the communities in the district. These blocks were selected since they have about 70% of the dairy groups in the district. The groups were formed with the objectives to generate employment, earn income and improve socio-economic conditions of residents.

### Study Methods

The study was conducted in the autumn of 2018, in the major administrative blocks of Samar, Kartsog and Bji of Haa district. For interviewing members of dairy groups, we employed livestock development workers who were in a better position to select key informants and respondents, often known to be the reservoirs of information. Only those members, both young and old, who were willing to provide views and opinions, participated in the interviews. In total, 60 respondents from three blocks were interviewed. The number of dairy groups and respondents from each administrative block is presented in Table 1. The study included only those dairy groups established between 2007 and 2012. Dairy groups that started after 2012 were excluded as these groups were new and it was too early to evaluate their growth performance within a time span of five years.

### Field Interviews

Field surveys were conducted, using semi-structured questionnaires with open- and closed-ended questions. The survey questionnaire was broadly divided into six sections, intended to elicit critical information about group information, production inputs, livestock population, milk production and marketing. The first section consisted of general questions on group members, livestock population and land owned by the residents. The second section focused on aspects related to inputs of dairy production, including government interventions and dairy groups opinions on government support. The third section gathered information on seasonal milk production, milk price, and opinions on trends in milk production to track changes in production over the years. The fourth section was

**Table 2.** Size of dairy groups at the time of establishment and in 2018 in three administrative blocks of Haa district in western Bhutan.

Details of Members	Samar (3 Groups)		Kartsog (3 Groups)		Bji (4 Groups)	
	Initially	2018	Initially	2018	Initially	2018
Total no. of members	17.0	18.0	25.0	30.0	33.0	34.0
No. of male members	2.00	3.00	11.0	12.0	7.00	7.00
No. of female members	15.0	15.0	14.0	18.0	26.0	27.0

devoted to questions on feed supply. In this section, the main information sought were; sources of feed, quantity and quality, and seasonal availability of forages and feed in general. The fifth section extracted information on storage, processing and marketing of dairy products. Respondents were asked if they had ever received skills enhancement training for dairy product development. In this section, information was also gathered on the types of dairy products developed by groups and the products of high demand from consumers. The section also covered important aspects of marketing of dairy products. The sixth and final section of the questionnaire solicited information on governance of dairy groups. Respondents were asked if they were familiar with the groups' bye-laws. The section also sought views on whether respondents were happy and satisfied with the current functioning of the administrative management of dairy groups. Finally, the respondents were asked to provide opinions on the sustainability of their dairy businesses. Information collected during informal talks during tea breaks and mealtimes were also used. To categorize information where relevant, we used both three- and five-point Likert scale (Likert, 1932).

### Data Analysis

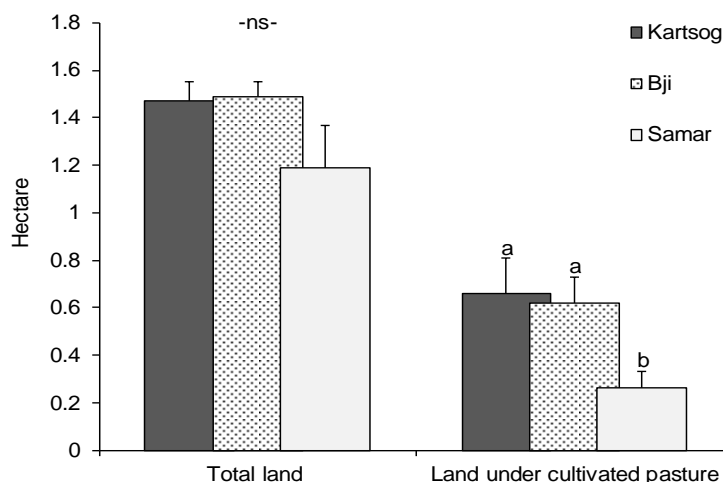
The statistical software SPSS version 23 (IBM Corporation, 2015) was used to analyze the data. The information obtained was segregated into qualitative and quantitative data. The qualitative data were summarized as percentages with descriptive statistics. Frequencies of different answers were tested within the administrative block. A nonparametric chi-square ( $\chi^2$ ) test was performed to test significant difference between respondents' opinions, expressed in percentages. Significant difference at  $p < 0.05$  between percentage figures was denoted by different letters. The quantitative data were subjected to three different types of analysis. In the first analysis, a correlation test was performed to detect if significant correlations existed between variables. The second analysis conducted was a paired t-test, which was performed to detect changes in the number of dairy group members over time. The paired t-test also helped to detect if there were significant differences in the number of dairy groups at two different times that is, before and after over half a

decade of establishment of dairy groups. The third analysis conducted was a one-way ANOVA test. In this analysis, we tested whether significant differences existed among three administrative blocks in the size of total land and land under cultivated pastures. Where appropriate, the Microsoft Excel graphs were used to present the results. In all statistical tests, the correlations or differences between variables were considered significant when p-values were smaller than 0.05.

## RESULTS AND DISCUSSION

### Group Members, Cattle Population and Land Holding

Except for Kartsog administrative block, there was no significant change in the number of group members before and after over half a decade of establishment of dairy groups in Samar and Bji administrative blocks (Table 2). The lack of significant change in members strength is probably an indicator to suggest that dairy groups have not evolved or made appreciable progress over several years. It also suggests dairy groups being less proactive and attractive to inspire and attract new members. However, it is encouraging to note that the dairy groups were dominated by female members. A large number of female members merely reflects the growing influence and significant roles of women in dairy activities such as milking, milk processing, feeding, feed preparation and fodder collection, as men are often engaged in off-farm labor (Ponnusamy et al., 2017). In all three administrative blocks, the cattle population was dominated by exotic breed. On average, every household in each administrative block owned a minimum of two exotic milking cows as compared to local milking cows. The total land owned by an individual respondent was in the range of 1.20 to 1.50 hectares, with the smallest land in Samar block (Figure 1). The average size of cultivated pastureland was significantly greater for Kartsog and Bji administrative blocks. It should also be noted that there are traditional community grasslands in Haa district. However, owing to greater proportions of exotic cattle and a need to provide them good quality feed, community grasslands are not often used for exotic cattle. This is because



**Figure 1.** Average size of total land owned by each household and area under cultivated pasture.

**Table 3.** Correlation (given as Pearson's Correlation Coefficient) between variables of dairy production in three administrative blocks.

	Cultivated Pasture Area	Daily Milk Production	Quantity of Milk Supply to MPU	Number of Exotic Milking Cows	Number of Local Milking Cows
Total land holding	0.77**	0.12	0.14	0.133	0.10
Cultivated pasture area		0.32**	0.38**	0.29*	-0.05
Daily milk production			0.92**	0.52**	-0.20
Quantity of milk supply to MPU				0.43**	-0.24
Number of exotic milking cows					-0.33**

\* $p \leq 0.05$ , \*\*  $p \leq 0.01$ .

community grasslands constitute only native forage species, considered to be of lower quality than exotic pastures. Roder et al. (2001) highlighted the limited nutritional quality of native grasslands and importance of exotic forage in animal production in Bhutan. Therefore, the total land area presented in Figure 1 does not include community grasslands. The results of correlation tests are presented in Table 3. We detected a significant positive correlation between the total landholding and size of cultivated pasture. Households with bigger land holding allocated more land for cultivating pasture. It demonstrates the willingness of dairy farmers to cultivate more pasture if they own more land. This finding reiterates the earlier fact that insufficient land is probably the primary reason for refraining Bhutanese dairy farmers from cultivating more improved pasture (Roder, 1998; Phanchung et al., 2002), which is a major constraint to dairy production in Bhutan (Ministry of Agriculture, 2001).

The statistical test revealed a significant and positive correlation of the size of cultivated pasture with the amount of milk produced daily, amount of milk supplied to milk processing unit, and the number of exotic cattle reared (weak correlation but statistically significant). This is a positive development, representing a shift from

a tradition of low to more external input-supported livestock production. It also indicates the growing importance felt by dairy farmers to cultivate improved pastures to enhance dairy production. The importance of exotic cattle in dairy production appears scientifically justified by a significant positive correlation between the number of exotic cattle and the amount of milk produced daily, suggesting that more exotic cattle would mean greater milk production. This explains why dairy farmers in the study areas own a greater number of exotic cattle. We also observed a significant negative correlation between the number of exotic and local cattle, suggesting a decline in the number of local cattle with increase in exotic cattle population. Wangchuk et al. (2014) reported a similar finding on increase in exotic cattle and decline in local cattle population in central and western Bhutan. It demonstrates that Bhutanese farmers, over the years, have become more prudent and maintained fewer but more productive cows.

#### Dairy Production Inputs, Milk Production and Feed Sources

Table 4 presents the respondents' opinions on dairy

**Table 4.** Production inputs and opinions on milk production trend and livestock services.

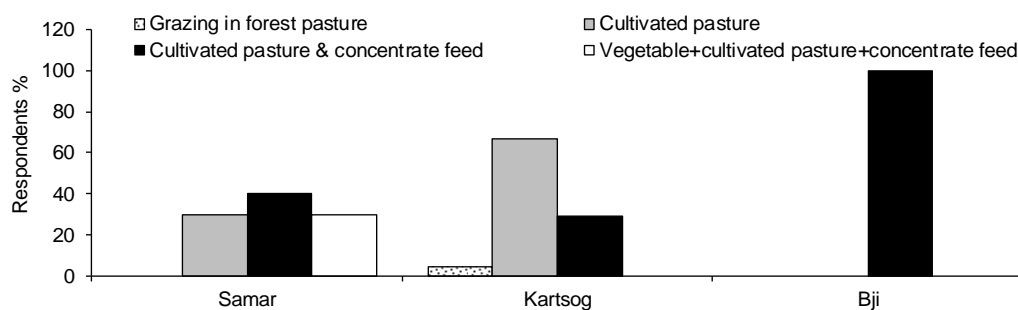
Survey Questions	Respondents (Percentage)								
	Samar			Kartsog			Bji		
	Yes	No	Do Not Know	Yes	No	Do Not Know	Yes	No	Do Not Know
Have you received production inputs from government?	90.0a	10.0b	0.00c	100.0a	00.0b	0.00b	100.0a	0.00b	0.00b
Are production inputs provided by government sufficient?	10.0b	70.0a	20.0b	29.0b	25.0b	46.0a	0.00b	0.00b	100.0a
Is the amount of milk collected in summer by group sufficient for processing?	80.0a	20.0b	0.00c	42.0a	29.0b	29.0b	96.0a	0.00b	4.00b
Is the amount of milk collected in winter by group sufficient for processing?	0.00b	100.0a	0.00b	25.0b	46.0a	29.0b	96.0a	0.00b	4.00b
Milk production was good in the past	60.0a	10.0c	30.0b	00.0a	83.0c	17.0b	88.0a	0.00c	12.0b
Milk production is better currently	70.0a	0.00c	30.0b	83.0a	0.00c	17.0b	88.0a	0.00c	12.0b
Milk production will be better in future	10.0b	0.00c	90.0a	79.0a	0.00c	21.0b	88.0a	0.00c	12.0b
The quality of artificial insemination services from government is good	50.0a	50.0a	0.00b	72.0a	28.0b	0.00c	100.0a	0.00b	0.00b
The quality of veterinary services provided by government is good	80.0a	20.0b	0.00c	100.0a	0.00b	0.00b	100.0a	0.00b	0.00b

production inputs and milk production from three administrative blocks of Samar, Kartsog and Bji. A vast majority of respondents have received dairy production inputs from government. It is the result of a government policy to support any Bhutanese interested to take up livestock farming. The Royal Government of Bhutan provides subsidy support of up to 30% of the cost of a cow for dairy farming. A recent study by the National Dairy Research Center in Bhutan reported that subsidy support led to significant increases in production of milk and milk products, which contributed to enhanced income and improved livelihood among Bhutanese dairy farmers (Choden et al., 2017). However, a majority of respondents felt that the production inputs provided by the government were never sufficient to fully support the dairy business. Such a response seems to suggest that dairy groups perceive government as the co-owner of their businesses, expecting the government to shoulder the major burden of establishing their enterprises. Most importantly, it is a strong reflection of heavy dependence of dairy groups on government support, which is less helpful to the long-term sustainability of dairy groups. Williams and Hendrix (2016) observed retarded development of sense of ownership among group members, as a result of heavy reliance on government even after several years of establishment. As enforced for decades, government provides partial financial support for setting up any farming enterprise. The prime objective of levying a certain cost on farmers is to instill a sense of ownership and induce efficiency among farmers (Ministry of Agriculture and Forests, 2018).

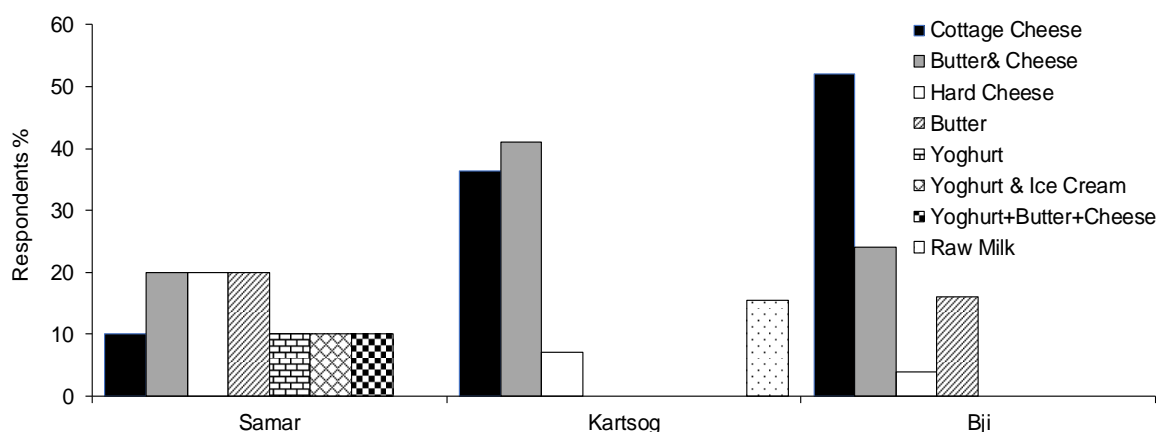
In this study, the statement that government support is inadequate is most likely a response to not fulfilling the

greater expectation of dairy groups. This is because the farmers' reliance on government support is entrenched deeply in the Bhutanese agriculture system. Further, the continued long-term dependence on government support is attributable partly to the lack of proper exit strategy of government intervention. Thus, the farming groups in Bhutan expect government to continue its support in all forms in establishing farm enterprises. The heavy dependence of farmers on government support has also been reported in more developed countries, such as US (Allen, 2011) and Europe (European Commission, 2018).

According to a greater proportion of respondents, the amount of milk produced in summer by dairy groups was sufficient to meet the requirements for further processing. On the contrary, a vast majority of respondents of Samar and Kartsog administrative blocks felt that the milk production in winter was never sufficient to meet the dairy processing requirements, whereas it was opposite for Bji administrative block. A sufficient volume of milk is a prerequisite to groups' profitable functioning. Low volume of milk is a common problem that threatens the economic sustainability of dairy groups in Bhutan (Williams and Hendrix, 2016). Sufficient milk production in summer could be attributed to the abundant growth and availability of forages. The major sources of feed and forages for dairy cattle were cultivated pastures or the combination of cultivated pastures and commercial concentrate feeds (Figure 2). For a few respondents in the administrative block of Kartsog, forest grazing was also a source of forage. Forest grazing was not an important forage resource for a majority of respondents since the majority of herds comprised of exotic cattle that received exotic forages.



**Figure 2.** Common sources of feed and forages for dairy cattle in three administrative blocks of Samar, Kartsog and Bji in Haa district.



**Figure 3.** Types of dairy products produced by dairy groups of three administrative blocks of Samar, Kartsog and Bji in Haa district.

These resources are considered to have good forage quality and suggest that dairy cattle are fed with good forage in summer. However, the acute scarcity of forages in winter can be attributed to cold and dry climatic conditions. Shortage of feed and forages in winter is a common phenomenon in temperate Bhutan (Tshering, 2018; Wangchuk et al., 2008; Roder et al., 2001) and is responsible for low milk production in winter. The current scenario of forage availability points towards the need to have an inventory of various feed resources and understand their potential to address the issue of forage scarcity. Appropriate research and development interventions may be necessary to help dairy groups develop coping strategies to overcome feed shortages, especially in winter. Compared with the past, the current milk production is better, according to a majority of respondents of all administrative blocks. The majority of respondents of Kartsog and Bji administrative blocks were optimistic of having better milk production in future, which is expected to be greater than the current production. However, most respondents of Samar administrative block were unsure of the future scenario of milk production. Among livestock services, a majority of respondents felt that artificial insemination and veterinary services, delivered

over the last several years, were very good.

### Post Production and Marketing

Figure 3 presents the type of dairy products produced by dairy groups of three administrative blocks. The main dairy products were butter and cottage cheese. The next important product produced was hard cheese. Yoghurt and ice cream were produced in least quantities. Among the administrative blocks, raw milk was one of the main products for the dairy groups of Kartsog block. In all three administrative blocks, the dairy product development was limited largely to butter and cheese, suggesting a poor product diversity in dairy business. Poor product diversification results in poor understanding of the important roles of milk components in Bhutan (Wangdi et al., 2016). Butter and cottage cheese attract mostly the Bhutanese consumers as these dairy products are commonly used for preparing the traditional salted butter tea and Bhutanese dishes. It is astonishing to note that, despite the groups being in the dairy business for about a decade, there are no strategic plans to take the business forward in future by developing their capacity to process milk into dairy products. If the groups are to

**Table 5.** Respondents' opinions on dairy skills and product marketing.

Survey Questions	Respondents (Percentage)								
	Samar			Kartsog			Bji		
	Yes	No	Do Not Know	Yes	No	Do Not Know	Yes	No	Do Not Know
Did you receive training on dairy product development?	20.0b	80.0a	0.00c	50.0a	42.0a	8.00b	0.00b	100.0a	0.00b
Do you face problems in marketing your dairy products?	60.0a	40.0b	0.00c	66.0a	17.0b	17.0b	76.0a	20.0b	4.00c
Dairy groups go out looking for customers to sell dairy products	40.0b	60.0a	0.00c	33.0b	67.0a	0.00c	0.00b	100.0a	0.00b
Customers come to MPU to buy dairy products	60.0a	40.0b	0.00c	67.0a	33.0b	0.00c	100.0a	0.00b	0.00b
Do you have skills to develop new dairy products?	10.0b	80.0a	10.0b	0.00b	100.0a	0.00b	4.00b	92.0a	4.00b
Would you like to acquire new skills to develop new products?	100.0a	0.00b	0.00b	92.0a	8.00b	0.00c	96.0a	0.00b	4.00b

survive and flourish, it is time that dairy groups adopted a strategy for rapid growth, emphasizing on dairy product diversification and targeting a wide range of customers. Diversification is a tried and trusted strategy that has helped all types of businesses to minimize risks and survive in competing environments (Kariuki et al., 2015; Alvarez et al., 2018). Livelihood diversification increases income (Sharma, 2018) and improves livelihood security (Ellis, 2007). Dairy groups of Haa must aim to develop niche dairy products for the niche market, to have a competitive edge over the cheap Indian dairy products in Bhutanese markets, especially in Paro and Thimphu districts. If pursued vigorously by the dairy groups of Haa, product diversification can be an important aspect of business strategy for increasing profitability, reducing risk, ensuring higher growth and more efficient allocation and utilization of resources (Benito-Osorio et al., 2012; Burgers et al., 2009). Besides, it can create greater chances of producing several high-value food commodities and bring about desirable growth in dairy business. Successful product diversification can also set a good business example for other dairy groups in Bhutan, in addition to generating additional employment.

Responses on dairy skills development and dairy product marketing are presented in Table 5. A vast majority of respondents in all administrative blocks have not received skills development training in the past, particularly on dairy product development. As a result, most respondents are less confident to develop new products other than butter and cheese. This is probably an important factor that could have contributed to poor product diversity over a long period of time in Haa. Given the deficiency in the current scenario, a smart plan to impart product development skills to members is perhaps the need of the hour. Seblewengel et al. (2017) report skills development trainings as a key factor that brings change in the attitude of dairy farmers toward

efficient utilization of inputs and services for improving dairy productivity and income (Ponnusamy et al., 2009), and a large proportion of respondents expressed their interests to acquire new skills to develop new dairy products. The current practice strongly suggests that there is neither a properly regulated market nor a standard procedure of marketing dairy products. This is an issue of serious concern, as marketing is an important factor that decides the success of market-oriented dairy production. Despite being closer to the markets, the dairy groups lack organized market system. This presents a formidable challenge, probably due to traditional practices of most Bhutanese farmers to market local dairy products through an informal and unorganized channel. Poor hygiene, adulteration, irregular supplies and poor quality were some reasons for not being able to sell dairy products to urban Bhutanese (Phanchung et al., 2002). If the dairy groups aspire to attain the goals of dairy business, then greater efforts are needed to upscale the market-based production and design strategies to make efficient use of market opportunities. A display of vast array of milk and dairy products by Bhutan Co-operative Store (BCOOP; a sales counter for agriculture products in the capital city) sends out a message that Bhutanese are now looking for dairy products beyond butter and cheese. Diversifying products should also aim to attract the Indian tourists visiting Bhutan whose number has increased over the years. The changing socio-economic conditions and preferences of Bhutanese and tourists will require dairy products to be processed and packaged in forms acceptable to consumers. Rai and Norbu (2011) recommend a nationwide study to better understand the markets before enhancing dairy production. Wangchuk et al. (2014) reported market as a driving factor for deciding about livestock production practices of dairy farmers. The Royal Government of Bhutan recognizes the importance of market in

**Table 6.** Respondents' opinions on governance and management of dairy groups in administrative blocks of Samar, Kartsog, and Bji of Haa district in western Bhutan. Percentage figures followed by different letters are significantly different at  $p < 0.05$  of nonparametric chi-square ( $\chi^2$ ) test.

Survey Questions	Respondents (Percentage)								
	Samar			Kartsog			Bji		
	Yes	No	No Answer	Yes	No	No Answer	Yes	No	No Answer
Are you happy with the performance of your dairy group?	60.0a	30.0b	10.0c	79.0a	8.00b	13.0b	28.0b	00.0c	72.0a
Is the management transparent with members of your group?	50.0a	50.0a	0.00b	75.0a	13.0b	12.0b	100.0a	0.00b	0.00b
Do office bearers consult members in the decision-making process?	40.0b	60.0a	0.00c	96.0a	0.00b	4.00b	100.0a	0.00b	0.00b
Have office bearers misused their authority in the past?	20.0b	70.0a	10.0c	21.0b	67.0a	12.0c	0.00b	100.0a	0.00b
Do you trust office bearers of your group?	60.0a	20.0b	20.0b	79.0a	8.00b	13.0b	100.0a	0.00b	0.00b
Are you familiar with the bye-laws of your group?	60.0a	40.0a	0.00c	96.0a	4.00b	0.00b	88.0a	12.0b	0.00c

commercial agriculture; thus, it has been a policy objective of the Renewable Natural Resources (RNR) sector of Bhutan to promote and strengthen farmers' cooperatives and markets (GNHC, 2008).

### Governance of Dairy Groups

A vast majority of respondents of Samar and Kartsog administrative blocks were generally satisfied with the performance of their groups, but not for Bji block where most respondents were neither happy nor dissatisfied with their groups' performance (Table 6). Most respondents of all blocks agreed that the administration and management of the group are transparent with the members. While a majority of respondents in Kartsog and Bji felt that the groups' office-bearers consulted and engaged members in the decision-making process, there were more than half of the respondents in Samar block who felt the opposite. Generally, there was a common agreement among majority of respondents that office-bearers did not misuse their authority in the past. Majority of respondents were familiar with the bye-laws of their group. The members' positive opinions on governance and management of dairy group are a sign of good faith and trust they have on office bearers. This is contrary to the reports highlighting mistrust on group leaders as a common social factor, which hinders the progress of dairy business in Bhutan (Sonam and Martwanna, 2011). However, in the case of Samar block, governance may require improvement before it grows out into a major hindering factor in future.

### CONCLUSION

The dairy groups of Haa are confronted with a series of issues causing hindered growth in the dairy business.

The members of dairy groups need more land to cultivate exotic pastures. Appropriate and effective feeding strategies, mainly to address feed and forage shortages in winter, need to be identified to increase milk production. Since the current diversity of dairy products is generally poor, special attention is needed on dairy product diversification. Government requires to prioritize and impart skills and capacity development training to group members. Prior to developing new dairy products, a thorough study may be necessary to understand the market opportunities and guide group members to select products for development. Of several issues, the immediate government interventions are needed to develop skills and capacity of dairy groups, diversity dairy products, and develop proper and organized markets, which could enhance the growth of dairy sector in Bhutan.

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### REFERENCES

Alejandrino AL, Asaad CO, Malabayabas B, De Vera AC, Herrera MS,



- Deocaris CC, Ignacio LM, Palo LP (1999). Constraints on dairy cattle productivity at the smallholder level in the Philippines. *Prev. Vet. Med.* 38:167-78.
- Allen A (2011). US touts fruit and vegetables while subsidizing animals that become meat. <https://www.washingtonpost.com/national/health-science/us-touts-fruit-and-vegetables> (Accessed on February 13, 2019).
- Alvarez A, García-Cornejo B, Pérez-Méndez JA, Roibás D (2018). The profitability of value-added products in dairy farm diversification initiatives. *Span. J. Agric. Res.* 16:1-9.
- Benito-Osorio D, Guerras-Martín L, Zúñiga-Vicente J (2012). Four Decades of Research on Product Diversification: A Literature Review. *Manag. Decis.* 50:325-344.
- Business Opportunity Information Center (BOIC) (2015). Resource inventory and business opportunity for cottage and small industry under production and manufacturing sectors, Haa District. Thimphu, Bhutan.
- Burgers W, Padgett D, Bourdeau B, Sun A (2009). Revisiting the Link Between Product and Industry: Diversification and Corporate Performance. *Int. Rev. Bus. Res. Pap.* 5:367-379.
- Choden D, Timsina MP, Rai DB, Tamang NB (2017). Effects of government subsidy support on livelihood of dairy farmers in Bhutan. *Bhutan J. Anim. Sci.* 1:1-4.
- Duguma B, Janssens GPJ (2016). Assessment of feed resources, feeding practices and coping strategies to feed scarcity by smallholder urban dairy producers in Jimma town, Ethiopia. *Springer Plus.* 5:717
- Ellis F (2007). Household strategies and rural livelihood diversification. *J. Dev. Stud.* 35:1-38.
- Gross National Happiness Commission (GNHC) (2008). Tenth Five Year Plan (2008–2013) Vol. I and Vol. II. Royal Government of Bhutan, Thimphu, Bhutan.
- Kariuki AN, Iravo MA, Kihoro JM (2015). Value Addition and Performance of Informal Dairy Enterprises in Kenya: A Product Diversification Perspective. *J. Bus. Manag.* 17:40–49
- IBM Corporation (2015). IBM SPSS Statistics for Windows, Version 23.0. Armonk, New York, USA. Likert R (1932). A technique for the measurement of attitudes. *Arch. Psychol.* 140:1-55.
- Likert R (1932). A technique for the measurement of attitudes. *Arch. Psychol.* 140: 1–55.
- Mathur BN (2000). Current Problems and Challenges Confronting the Dairy Industry in India. *Asian Australas. J. Anim. Sci.* 13:447-452.
- Ministry of Agriculture and Forests (2018). Cost sharing mechanism for RNR sector. Ministry of Ministry of Agriculture and Forests, Thimphu, Bhutan.
- Ministry of Agriculture (2001). Constraints and opportunities in dairy production and marketing. In: Sustainable Development of Smallholder Dairy Farming in Bhutan. Kathmandu, Nepal: International Centre for Integrated Mountain Development:48-52.
- National Statistics Bureau of Bhutan (2018). Population and Housing Census of Bhutan 2017. Royal Government of Thimphu, Bhutan.
- Phanchung DP, Sonam T, Pelden K (2002). Smallholder dairy farming in Bhutan: Characteristics, constraints, and development opportunities. In: Smallholder Dairy in Mixed Farming Systems of the HKH, Tulachan PM, Jabbar MA and Saleem MAM, (Eds.), International Centre for Integrated Mountain Development, Kathmandu, Nepal, pp: 19-34.
- Ponnusamy K (2006). Multidimensional analysis of integrated farming system in the coastal agro-eco system of Tamil Nadu. Unpublished dissertation in partial fulfilment of the requirements for the degree of Doctor of Philosophy, NDRI (Deemed University), Karnal, Haryana, India. Ponnusamy K, Gupta J, Nagarajan R (2009). Indigenous Technical Knowledge (ITKs) in dairy enterprise in coastal Tamil Nadu, *Indian J. Tradit. Know.* 8(2):206-11.
- Ponnusamy K, Chauhan AK, Meena, Sunita (2017). Testing the effectiveness of Pasu Sakhi: An innovation for resource-poor farm women in Rajasthan. *Indian J. Anim. Sci.* 87(2):229-233.
- Rai DB, Norbu PT (2011). Dairy Production, Quality control and Marketing System in Bhutan. In: Dairy Production, Quality Control and Marketing System in SAARC Countries, Pal SK and Siddiky MNA (Eds.), International Centre for Integrated Mountain Development Kathmandu, Nepal, pp:25-52.
- Roder W, Wangdi K, Gyamtsho P, Dorji K (2001). Feeding the Herds-Improving Fodder Resources in Bhutan, International Centre for Integrated Mountain Development, Kathmandu, Nepal.
- Roder W (1998). Fodder sources/fodder development/farmers management—preliminary data from a national survey. Proceedings of the Third Annual National Livestock Research Workshop, Bathpalthang, Renewable Natural Resources Research Center, Bumthang, Jakar, Bhutan, pp:72-79.
- Seblewengel G, Kubota S, Kanayama T, Kono H (2017). Effects of Training on Smallholder Dairy Farmers' Income in West Shewa Zone, Ethiopia. *Asian J. Agric. Exten. Eco. Socio.* 19:1-7.
- Sharma R (2018). Rural Livelihood Diversity and its Impact on Livelihood Outcome: An Empirical Investigation from Jammu and Kashmir. *Indian Econ. J.* 64:203-217.
- Sharma B, Banskota K (2002). Smallholder Dairy Farming in Nepal: Characteristics, Constraints, and Development Opportunities. In: Smallholder Dairy in Mixed Farming Systems of the Hindu Kush-Himalayas: Issues and Prospects for Development, Tulachan PM, Jabbar MA and Sallem MAM (eds), pp:73-92.
- Sonam T, Martwanna N (2011). Smallholder dairy farmers' group development in Bhutan:strengthening rural communities through group mobilization. *Khon Kaen Agric. J.* 39: 413-428.
- Tshering G (2018) Dairy farming enhances household income in peri-urban and rural areas of Choekor in Bumthang, Bhutan. *Bhutan J. Anim. Sci.* 2:107-111.
- Wangchuk K, Wurzing M, Darabant A, Gratzner G, Zollitsch W (2014). The Changing Face of Cattle Raising and Forest Grazing in the Bhutan Himalaya. *Mt. Res. Dev.* 34:131-138.
- Wangchuk K, Dorji T (2008). Animal Feed Production and Management in Bhutan. Best Practices in Animal Feed Production and Management in SAARC Countries, SAARC Agriculture Center, Bangladesh, pp:2-33.
- Wangchuk K, Lepcha I, Wangda P (2008). Forage Production- A Handbook for Feed and Fodder development Worker in Bhutan. 2nd Ed. National Feed and Fodder Development Program, Bumthang, Bhutan.
- Wangdi J, Zangmo T, Karma, Mindu, Bhujel P (2016). Compositional quality of cow's milk and its seasonal variations in Bhutan. *Liv. Res. Rur. Dev.* 28 (1).
- Williams ND, Hendrix JA (2016). Assessment of the performance of smallholder dairy farmers' groups in Bhutan. *Global J. Dairy Farm Milk Prod.* 4:164-170.
- Yangchen S, Norbu PT, Nakanish Y (2018). Moisture content of local cottage cheese and butter in Western Bhutan. *Bhutan J. Anim. Sci.* 2:120-122.