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DAIRY FARMING IN PUNAKHA: UNDERSTANDING CONSTRAINTS AND OPPORTUNITIES

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ABSTRACT: The study was undertaken to gain a deeper understanding of the constraints and opportunities of dairy farming in Punakha District. The field survey was conducted using both open and closed-ended structured questionnaire with dairy farmer groups in seven subdistricts of Barp, Dzomi, Guma, Kabisa, Shelnga-Bjemi, Talog and Toedwang in Punakha district. A total of 60 respondents; 30 existing milk suppliers of Pungdzong Dairy Farmer's Groups and 30 non-milk suppliers, were drawn using a simple random sampling technique. The data were analyzed using the Statistical Package for Social Sciences software version 20. The study found that the daily mean milk production by each household was higher in DFGs which was found to be 12.23 ± 7.89 litres in comparison to 8.75 ± 5.03 litres in Non-DFGs. The result showed the majority (87%) of the respondents do not have improved pasture developed. Further, the area of landholding under improved pastureland was only 0.44 ± 0.63 acres per household. Women have a major contribution in all areas of dairy farming activities such as cattle herding, milking and processing of milk into butter and cheese. It was found that 85% of the respondents were ready to increase their milk production capacity despite of limited land holdings of 2-3 acres per households being a limiting factor for dairy sector growth. To this, the land lease rules and regulation formulated in 2018 allows the farmers to develop pasture in the state reserved forest land under lease which provides opportunities for dairy commercialization. Further, the study concluded that DFGs are ahead of Non-DGs in terms of milk production and dairy management system, that provides avenue for linking smallholder dairy farmers to modern dairy value chains which will be a special feature in encouraging Non-DFGs to form the groups for sustainable milk production and marketing. Overall, there is good scope for the dairy value chain and achieve milk self-sufficiency in the District.

Keywords: Dairy farming; dairy farmer groups; milk production.

1. INTRODUCTION

Dairy farming is a primary livelihood income for most of the rural population in developing countries. In most of the countries, milk produced by smallholder farmers play an essential role in the dairy value chain, and milk production contributes directly to household livelihood, food security and nutrition (Chagunda 2016). The global milk output was recorded at 811 million tons in the year 2017, which is 1.4% higher than in 2016 (Food and Agriculture Organisation [FAO] 2018). Particularly in Asia, the milk output increased by 1.9% with a significant contribution from India and China. Dairying in Bhutan is a very important economic activity to the farmers and a flourishing sector with various resources and potentials. By volume, 21.88% of liquid milk is consumed in the country out of 52,496 MT of milk produced in 2018 (Department of Livestock [DoL] 2019). It has also reported that self-sufficiency for fresh milk, butter and cheese combined is 88.80% as of 2018 (DoL 2019). Dairy farming in Punakha District is kept mainly for subsistence; however, the trend is picking up towards commercialization. Out of 6,079 households in the district, 30.71% (n = 1867) of the families owns dairy cattle (DoL 2018). The district has 11,045 cattle heads with improved dairy cattle of jersey and brown Swiss breeds accounting to about 30% of the total cattle population in the year 2017. The DoL (2018) also indicated that close to 1251 MT of milk is being produced in the district, achieving milk self-sufficiency of about 62%. The rest 38% of the milk shortfall is being imported from a dairy processing company within the country as well as from India in the form of fresh milk and tetra pack milk respectively. The district has to put a further concerted effort to attain self-sufficiency in the dairy sector by taking realistic approaches. The district livestock sector during the 11th FYP (2013-2018) had worked closely with relevant stakeholders to enhance production, market access and innovation in the dairy sector and is mandated to focus on a similar approach of mainstreaming value chain in 12th FYP (2018-2023) as documented in 12th FYP of

Livestock Department (DoL 2019). The demand for fresh milk and dairy products in the market is increasing with high marketing scope, mainly from urban settlement and neighbouring district (Regional Livestock Development Centre [RLDC] 2015). Going by this trend, the need for milk is anticipated to increase further in the future with a growing population and an increase in purchasing power. In addition, with the increasing awareness on the importance of dairy products in healthy diets, the demand for milk and milk products is expected to increase in the future.

Therefore, this study was undertaken to gain a deeper understanding of the constraints and opportunities of dairy farming in Punakha District.

2. MATERIAL AND METHODS

2.1 Study area

Punakha district is located in the west-central part of Bhutan and stretches over an area of 1,109.81 square kilometers with an altitude of 1200–5400 meter above sea level (National Statistical Bureau [NSB] 2017). The district is administratively divided into eleven subdistricts, with a population of 29,391 people and 6,079 households (NSB 2018). The favourable climatic conditions make this district most suitable for dairy compared to other districts. The study was conducted in seven subdistricts; four existing subdistricts (Dzomi, Guma, Kabisa, Toedwang) currently supplying the milk at Milk Processing Unit (MPU), Khuruthang and three subdistricts (Barp, Shelnga-Bjemi, Talo) which are near and having potentials to deliver milk to MPU.

2.2 Research methods and sample size

The data were collected through a survey using both closed and open-ended structured questionnaire. A sample of 30 respondents was drawn using simple random sampling technique from 108 registered Pungdzong dairy group members currently engaged in milk supply and marketing chain from four subdistricts of Dzomi, Guma, Kabisa and Toedwang. Similarly, a total of 30 respondents out of 76 registered dairy farmers from three subdistricts of Barp, Shelnga-Bjemi and Talo. This technique had been proposed confirming each member had an equal probability of being chosen through random draws using random calculating function Microsoft Excel 2016. The top 30 samples drawn from the sampling frame were surveyed from both groups in July 2019 using semi-structured questionnaire.

2.3 Data Analysis

The data collected from the survey were computed using MS Microsoft Office Professional Excel 2016, and the coded data were analyzed using Statistical Package for Social Sciences (SPSS) IBM statistics version 20. Both descriptive (mean, proportion, crosstab) and inferential (Chi-square) ($\chi 2$) statistics were used to analyze the data. Simple bar graph, pie charts and contingency tables were used where appropriate to interpret and present the survey findings.

3. RESULT AND DISCUSSION

3.1 Socio-demographic information of the study area

The socio-demographic information of the respondents is presented in Table 1. From the total respondents interviewed (n = 60), 16 were male and 44 female respondents. The mean age of respondents in DFGs was 51.70 years and 53.53 years for non-DFGs indicating the respondent selection was within the same age range. Majority of the respondents were illiterate with exceptionally some respondents having a primary and secondary level of education. The household family labour ranged between one to six members and farming land between 0.25 acres to 6.30 acres.

Table 1: Socio-demographic information of the study area

Variable	Groups	Male	Female	Total
No. of respondents	DFGs	6	24	30
	Non-DFGs	10	20	30
	Total	**16**	**44**	**60**
		Level of education		
		Illiterate	**Primary**	**Above secondary**
Educational background	DFGs	23	7	0
	Non-DFGs	21	6	3
	Total	**44**	**13**	**3**
		Mean	**Minimum**	**Maximum**
Age of respondents (Years)	DFGs	51.70	26	80
	Non-DFGs	53.53	32	78
Household family labour (Nos.)	DFGs	2.97	1	6
	Non-DFGs	2.37	1	5
Farmland (Acres)	DFGs	2.02	0.25	5.00
	Non-DFGs	2.64	0.50	6.30

Table 2: Cattle population and milk production in the study area

Variable	Groups	Mean	SD	Minimum	Maximum
Local cattle holding (Nos.)	DFGs	0.90	2.14	0	10
	Non-DFGs	4.13	5.13	0	16
Improved cattle holding (Nos.)	DFGs	4.80	2.34	1	11
	Non-DFGs	4.40	3.45	0	16
Total cattle holding (Nos.)	DFGs	5.70	3.14	1	16
	Non-DFGs	8.53	4.99	3	19
Milking cows (Nos.)	DFGs	2.07	0.83	1	4
	Non-DFGs	2.43	1.46	1	6
Morning milk production per household (Litres)	DFGs	7.53	4.87	3.50	22.00
	Non-DFGs	5.23	3.40	0.50	15.00
Evening milk production per household (Litres)	DFGs	4.70	3.08	0.00	12.00
	Non-DFGs	3.51	2.14	0.00	8.00
Daily total milk production per household (Litres)	DFGs	12.23	7.89	5.00	34.00
	Non-DFGs	8.75	5.03	1.00	23.00

3.2 Cattle population and milk production

The finding reveals that the non-DFGs had a maximum number of cattle holding (8.53 ± 4.99) in comparison to DFGs with 5.70 ± 3.14 number of cattle (Table 2). However, DFGs had a maximum number of improved cattle breeds of 4.80 ± 3.14 cattle when compared to non-DFGs of 4.40 ± 3.45 number of cattle. The finding also shows that the total daily milk production per household was higher in DFGs which was found to be 12.23 ± 7.89 litres in comparison to 8.75 ± 5.09 litres in Non-DFGs. Similarly, the mean daily milk production per cow was higher in DFGs which was estimated at 6.25 litres when compared to 3.60 litres in Non-DFGs.

3.3 Cattle housing and management system

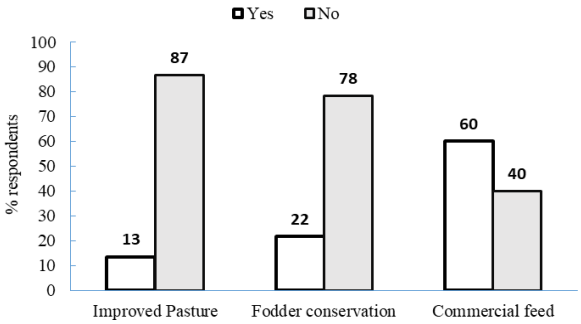
Cattle housing differed significantly within the study areas (Table 3**).** The result showed majority (70%) of respondents had permanent shed over the temporary shed. A day-out & night-in cattle rearing system is predominant (72%) over the stall-feeding system. The study found the presence of more permanent dairy shed when compared to temporary shed in the district. In contrast, Tamang and Perkins (2005) had found that the majority of households had temporary cattle housing made of wooden poles and a bamboo mat or plastic sheet for roofing. The finding is conclusive that the increased support of livestock sector to dairy farmers with shed construction materials and awareness on good dairy husbandry could have probably attributed to the increase in the number of permanent dairy shed in the district. Provision of such supports in the initial years may have motivated farmers for dairy farming which is evident and promoting element for the presence of more permanent dairy shed in the district.

3.4 Availability of fodder resources and source

The findings on the availability of feed and fodder resources in the study area (Figure 1) revealed that the majority (87%) of the respondents do not have improved pasture developed. Further, the area of

Table 3: Number of respondents with the different cattle housing and management system

Variable	Type	DFGs	Non-DFGs	Total
Cattle shed	Permanent shed	23	19	42 (70%)
	Temporary shed	7	11	18 (30%)
	Total	30	30	60 (100%)
Management system	Stall feeding	9	8	17 (28%)
	Day-out night-in	21	22	43 (72%)
	Total	**30**	**30**	60 (100%)



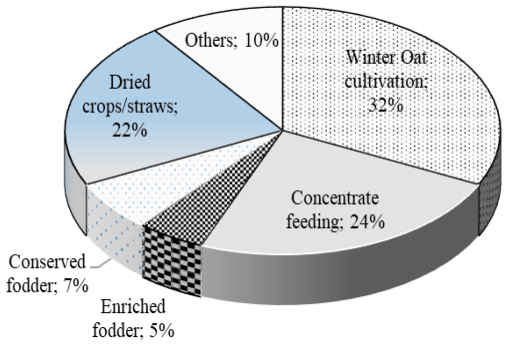


Figure 1: Availability of fodder resources and their resources

landholding under improved pastureland was only 0.44 ± 0.63 acres per household.

To overcome this problem, farmers are dependent on different sources of feed and fodder resources. By proportion, the maximum feed resource comes from winter oat cultivation and the minimum from enriched fodder and others inclusive of vegetables, beverage residues and tree fodder. Thus, the finding revealed that dairy farmers were constrained with inadequate feed and fodder resource due to limited landholding for fodder development. This limitation is common with most of the dairy farmers, though adequate fodder resources are available to meet the nutrient requirement of dairy cattle in the west-central region of Bhutan (Bhujel et al. 2018).

However, this study found that the National Land Commission of Bhutan had recently formulated the land lease rules and regulation 2018 in order to facilitate various socio-economic developmental activities (National Land Commission Secretariat [NLCS] 2018). With this policy change, dairy farmers will have an opportunity to lease in the state reserved forest land to develop Tsamdro (pasture) and enhance feed and fodder development activities in the district. The policy, financial and technical support is vital for the progression of dairy activities. The overall national, regional and district-level support for dairy development program is strong. Dairy farmers are guided by the strong policy as they play a vital role in commercializing dairy production and fulfilling the dairy commodity policy objectives (Sonam and Martwanna 2011). The support for establishment and conservation of fodder resources will lead to better feed, higher productivity and reduction of feed costs for the dairy farmers.

3.5 Household farm labour contribution

Respondents' views on farm labour contribution to dairy farming activities shows that women have a major contribution in all areas of dairy farming activities such as cattle herding, cleaning of sheds, feeding, fodder collection, milking and processing of milk into butter and cheese (Figure 2). Among the 60 respondents, it was reported that the work of cattle herding is mostly done by women (50%). The dairy producers in this study area rarely use their children and hired farm labourer in dairy farming activities.

In this study, the contribution of children in dairy farming is very less and contradicts to the findings of Phangchung et al. (2002) who mentioned that children also play a critical role in dairy farming especially for cattle fodder collection, feeding and herding during off-hour from the school. This could be attributed to an increasing number of children being enrolled in schools for education orthe children prefer staying away from home in search of temporary jobs during off-hours and they cannot make household labour contribution to dairy farming. A similar conclusion was reached by Tshering (2018) who reported that most youths stay away from home seeking better opportunities in the

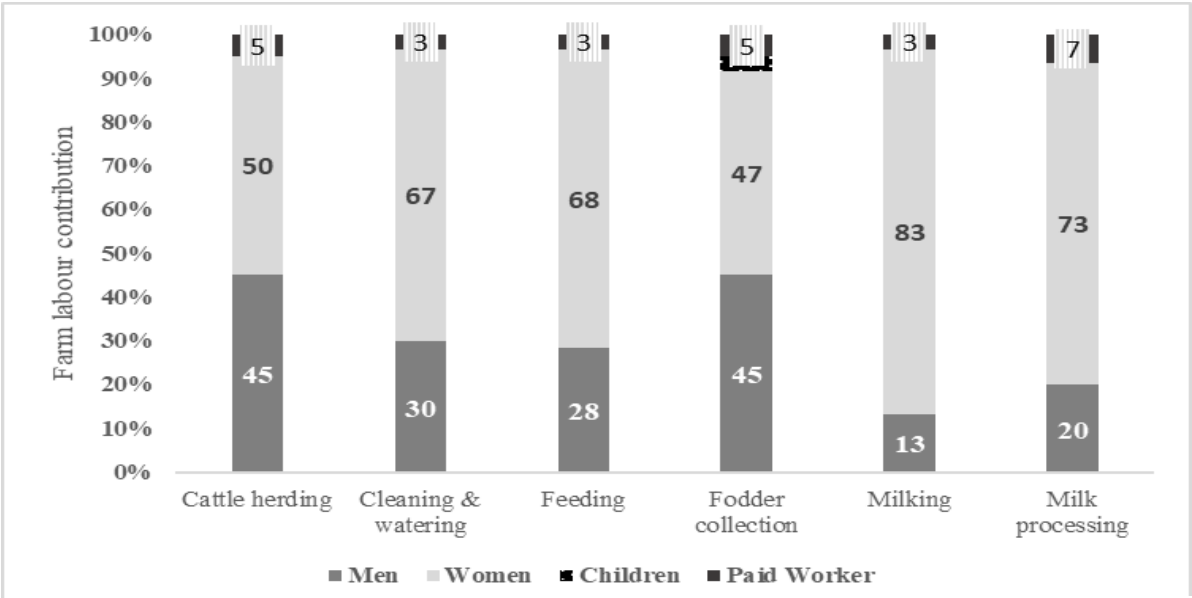


Figure 2: Farm labour contribution of family members

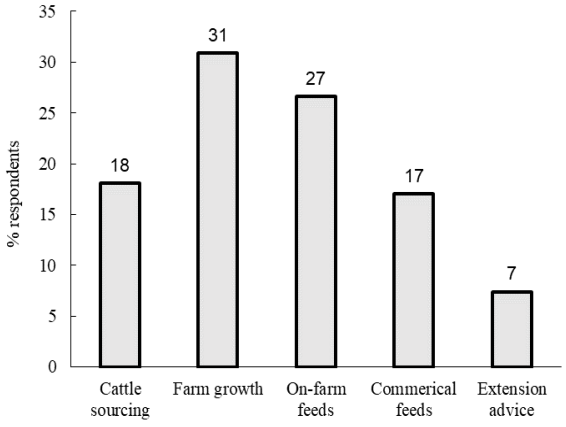


Figure 3: The proportion of respondents' plan towards increasing milk

urban areas and they cannot extend help to their parents in dairy farming.

3.6 The readiness of dairy producers towards increased milk production

The study looked into the readiness of dairy producers in increasing their production capacity. It was found that 85% of the respondents were ready to increase their milk production capacity through one or more of the dairy farming activities; sourcing of good quality dairy cows, growth from within farm through breed improvement program, production of more on-farm animal feeds, purchase of commercial feeds, dependency on extension advice(Figure 3). By proportion, the maximum outcome of 31% will rely on on-farm growth of high yielding dairy cattle and the minimum (7%) through timely extension advice and supports.

4. CONCLUSION

This study highlights the constraints and opportunities of dairy farming in Punakha district. The milk production performance in the district implies that milk production per household is attributed to the difference in the type of dairy cattle owned, feeding and management system. The major share in the total cost of milk production was of variable cost and is important to recognise that the cost of milk production should be taken into consideration as a benchmark upon which to base their milk pricing decisions. Remarkably, DFGs are ahead of Non-DFGs in terms of milk production and overall dairy management system. This is one way of linking smallholder dairy farmers to modern dairy value chains and will be a special feature in encouraging Non-DFGs to form the groups to increase their milk production and supply. There is good scope for dairy value chain and achieve milk self-sufficiency in the District by taking advantage of revised land lease rules and regulation formulated in 2018 as it allows to develop pasture in the state reserved forest land under lease against the limiting factor of limited land holding of farmers for dairy commercialization.

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