

ASSESSMENT OF THE DAIRY ANIMAL FEEDING SYSTEM OF WESTERN NEPAL: A SYNTHESIS OF FOCUS GROUP DISCUSSIONS

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ABSTRACT

Livestock, the dairy sector in particular, has traditionally contributed to the Nepalese economy and livelihoods even though vegetarian centered food habits predominate. Despite a long chain of observations, discussions, and interventions, this sector has not realized substantial improvement. An International Livestock Research Institute (ILRI) developed tool, Feed Assessment Tool (FEAST), has been deployed to precisely analyze the livestock feeding system in the Kapilvastu, Palpa and Arghakhachi districts of Nepal. A large proportion of the populations, especially the youth segment, have migrated, and as a result the area under agricultural production is ever decreasing. The typical crop production pattern does not reflect any dominance of fodder crops, which limits the availability of feed and poses a serious threat to the expansion of commercial dairy enterprises. Additional barriers to increased productivity include a limited supply of labor, competition for resources (i.e. labor, land) with rice production and the significant number of indigenous dairy animals in the national herd. Policy barriers that include unaffordable credit, limited access to inputs and inadequate government support further hinder potential growth of the dairy sector of this region. A dairy focused program to utilize the land and other resources to commercialize the dairy sector in order to tap the potential of this geography could be the only alternative to contribute toward meeting the national objective of making the country self-sufficient in milk and its products by 2020.

Keywords: Feed Assessment Tool; Feeding System; Animal Production; Market

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INTRODUCTION

A review of the statistics related to agricultural production and their trends over the decades reflect that livestock, ruminants in particular, is the fundamental component of agriculture system of Nepal. Indeed, more than one-third economic share of agriculture is occupied by livestock, and agriculture nearly contributes the same proportion of the national economy (MoALMC, 2018). Common species like cattle, buffalo, sheep and goats have traditionally complemented the crop farming community by supplying milk, meat, wool and to a certain extent farm power (Paudel, 2009). Over the years, the livestock sector, especially dairy production, has undergone its own transformation and acquired the status of commercial enterprise or agribusiness, in part due to greater efforts towards improvements, especially in feeding (Paudel, 2009). Comparative studies of the potential productivity of these ruminants, however, indicate that significant further improvement could result from a number of interventions in feeding, breeding and health, and thereby improve the overall productivity of ruminants. The productivity of dairy animals, especially under the forage-based systems, is perceived as being highly responsive to feeding interventions. Understanding the forage-based system to produce quality milk and meat, a variety of quality alternatives are also available within the ecological niches of each production system (Paudel et al., 2017) and therefore hold immense potential to help in the mission of making country self-reliant in milk and meat (MoALMC, 2018). However, selection of the right feeding interventions requires a comprehensive investigation of the existing livestock production systems along with their feeding pattern as well the potential of improvement. The established system of such assessment from those of African and Indian cases have been quite relevant and sensible considerations for this purpose (Amole and Ayantunde, 2016; Adegoke and Abioye, 2016; Wondatir and Damtew, 2015; Lukuyu et al., 2015; Wassena et al., 2015).

METHODOLOGY

Feed Assessment Tool (FEAST), a system developed by Duncan et al., (2012) was used in a total of six (6) locations in three (3) districts in Nepal, to assess the livestock production system, feeding system in particular (Fig. 1). The process involved in the data collection was conduct of Focus Group Discussion (FGD) in each location. The FGD accommodated between 8 and 12 farmers amongst the participants of the project implemented by Feed the Future Innovation Laboratory. The discussions focused on four major areas i) the farming system, ii) management of livestock species, iii) problems and their corresponding solutions and iv) the wealth/land distribution of community.

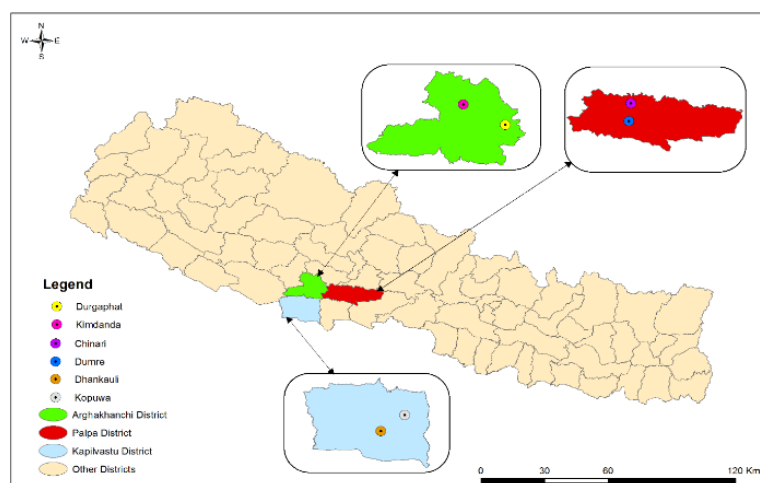


Figure 1. GIS map of study area

The following table presents the information on the estimated number of households (HH) living in each study location along with their typical family size and the proportion of that population that had migrated inland or international for different reasons, and thus unavailable for contribution to the agricultural enterprise. Likewise, the table also indicates the number of participants disaggregated gender-wise in each discussion.

Table 1. Demographic characters of the study locations and respective Focus Groups for the feed assessment tool FEAST discussions in Nepal.

Location	HHs in the area	Family Size per HH	% Migrated	FGD Participants		Total
				Male	Female	
Kopuwa	300	6	33	9	6	15
Dhankauli	400	8	19	14	4	18
Dumre	1458	5	40	9	3	12
Chinari	52	5	20	5	11	16
Durgaphat	180	8	25	9	3	12
Kimdanda	500	6	38	6	8	14

Source: FGD Survey (2016)

RESULTS AND DISCUSSION

Household Information and farm size

The diversity of number of HHs ranged between 52 HHs in Chinari of Palpa and 1458 in Dumre of the same district with an average size of 5 to 8 people per HH.

Likewise, the average proportion of members migrating out of the family ranged from 19% in Dhankauli to 40% in Dumre. The highest number of HHs in the area with the highest percentage of the members migrating out of the town could perhaps be due to the awareness of the members about opportunities outside the village/town for jobs and education.

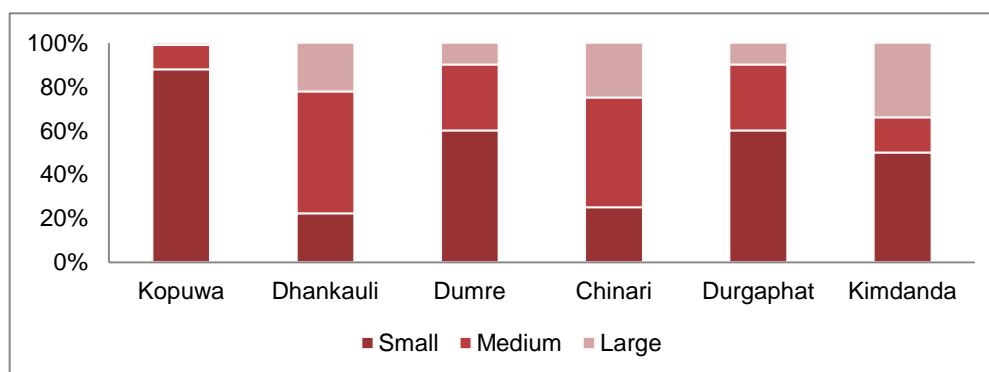


Figure 1. Stack chart showing percentage of small, medium and large farm HHs

Similar diversity existed in the size of the land holdings reportedly ranging from 0.67 ropani (where 1 ha=20 ropanis) to 266 ropanis. However, the proportion of HHs with large holdings is significantly less. This is indicative of expansion of existing dairy farms to large ones that operate on forage-based feeding. The proportion of farmers representing each group viz; small, medium and large are presented in a stack chart (Fig. 2) below which indicate that on an average the proportion of small farmers in respective contexts dominate the distribution of land followed by the medium farmers and large farmers.

Cropping season and water availability

The crop calendar in Figure 3 depicts the classical annual cropping pattern that existed across the locations studied showing wheat dominating during winter with some records of potato, mustard and oat being grown, though in small areas. Wheat production is preferred in areas where farmers can provision for at least one irrigation during flowering which is the most critical stage for economically relevant harvest of the crop (Singh, et. al., 2018).

Location	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Kopuwa						Rice						
	Potato								Potato			
	Sunflower											
Dhankauli						Rice						
	Wheat											Wheat
Dumre						Rice						
	Wheat/Oat									Wheat/Oat		
	Maize/Teosenti											
Chinari			Maize									
	Siltung (Legume)											
										Mustard		
Durgaphant						Rice						
	Wheat											Wheat
	Maize											
Kimdanda				Maize								
	Wheat										Wheat	
										Mustard		

Figure 3. Cropping pattern of studied area

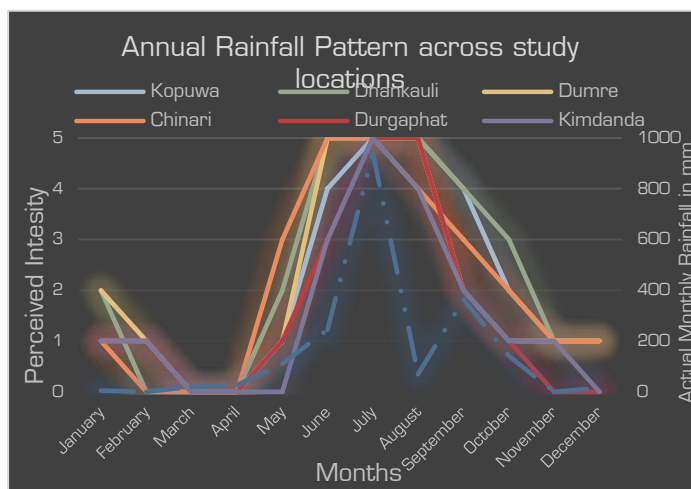


Figure 4. Annual Rainfall pattern in study area

The farmers were asked to evaluate the intensity of rainfall across months on a 5-point scale (Fig. 4) which demonstrates that the new monsoon is extended from June to September. In the meantime, the FGD participants across almost all locations indicated that March, April, November and December are the driest months in a calendar year. This information is indicative of further expansion of fodder during high water availability and preservation of these fodder/forage for the use during the driest months (Paudel, 2009) and at the same time indicating the need for water management strategies to cater the need for forage/fodder during drier months. The variation for availability of water existed across locations; Kopuwa being the most advantageous while the plight of Chinari and Kimdanda farmers offers considerably less opportunity to plan for fodder/forage production. The collected information was matched from the nearby agriculture center (plotted on the chart on secondary vertical axis). The comparison indicates that farmers' perception also matches with the actual precipitation recorded except for the fact that contrary to farmers' perception, the month of August received no precipitation at all in the area.

Labor requirement

The migration (internal and international) trend over the years especially triggered by the armed conflict during the 1990s and thereafter has created a vacuum in the labor force (KC, 1998) that would otherwise be abundantly available for agriculture-based operations. Despite a degree of mechanization and customization to agriculture practices, some periods observe higher labor requirements that have been addressed by either exchange of labor service, barter the service for some other goods or pay for such services. The respondents revealed during the FGDSs that June and July are earmarked for the maximum labor demands largely attributable to the cultivation (nursery management, land preparation, puddling, seed pulling and transplanting) of the staple crop.

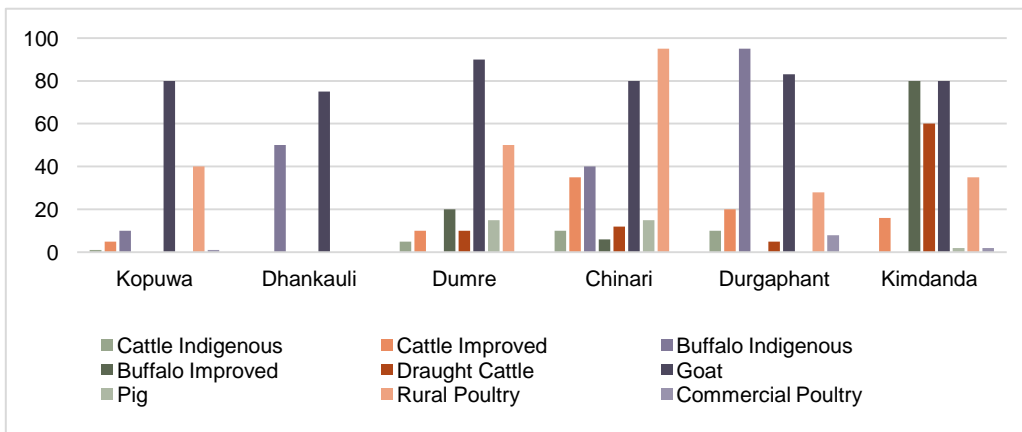


Figure 5. Percentile distribution of farmers rearing different livestock species

The percentage of farmers rearing goats is above 80% and the (fig. 5) strongly supports the common claim that goats constitute the integral component of the hill and rural farming system of Nepal (Paudel et al., 2012). Among dairy animals, the proportion of improved cattle exceeds local breeds; less than 10% of local breed cattle and buffaloes have been maintained which indicate that the performance of local breeds against their crossbred counterparts are inferior (Pokharel et al., 2012) and cannot address the local and national demand for milk (CLDP, 2011). This growing affinity of farmers towards improved breeds of dairy animals indicates the growing commercialization of dairy sector in the study locations.

Sources of credit

Owing to growing herd size, especially of dairy farms, the investment influx to support the ever-growing sector through simultaneously growing different financial institutions is needed. However, significant work is required to support the much needed commercialization of the livestock sector in general (IBN, 2017). Figure 6 illustrates the proportion of farmers receiving loans from two major categories³ of financial institutions viz; formal and informal. Except of Kimdanda, there appears to be a general trend of accessible areas getting better access to formal sector credit. Areas remote from market centers are deprived of such formal credit access and are therefore dependent on the informal sector, resulting in being forced to pay unaffordable interest rates. However, the informal sector provides the flexibility and comfort of pursuing loans locally, and avoid the formality and paperwork requirements that are often cumbersome for the farmers in pursuit of small volume loans for agricultural purposes including dairy.

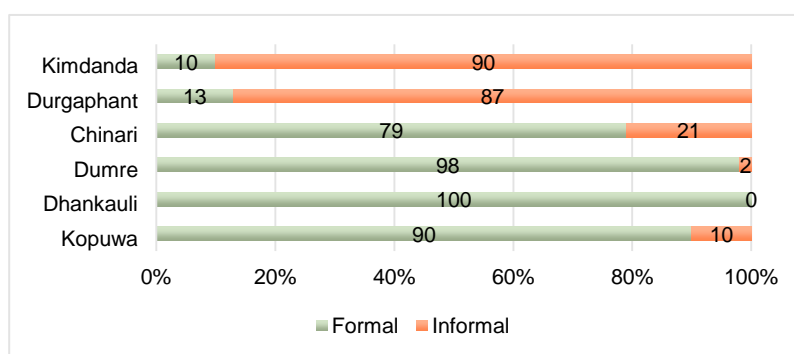


Figure 6: Proportion of farmers taking loans from different sector

³Nepal Rastra Bank (NRB), the central bank, has broadly categorized the financial institutions as formal and informal. Formal sources are those registered formally under the umbrella policy of the NRB to a clearly defined boundary of financial transactions. These are further classified as Class A, B, C and D on the basis of the amount of capital been managed by these institutions and the area of coverage. Informal sector are those institutions providing casual loans to the needy farmers usually for unforeseeable instances in the family. These institutions are usually groups registered in district level line agencies or individuals offering loans to farmers usually on higher interest rates than the formal sector.

Area under cultivation

The overall impression of the study revealed that there could be more land available for cultivation if additional inputs are available for agricultural operations. In cases where farmers need to lease in or out land for cultivation, the cost of leasing (in and out) varies from Rs. 1,750 in Dhankauli to Rs. 4,000 per ropani per year in Durgaphant and Kimdanda. Because the status of irrigation for crop cultivation in Chinari is extremely daunting and with no possibility of potential growth of agribusiness in the areas, there exists no possibility of leasing in- or out.

Figure 7 illustrates the dominance of area under cash cereal crops except in Dumre and Kimdanda wherein the dominance of fodder crops was evident attributable largely to the economic reliance on livestock farming, especially of dairy for livelihood and income generation.

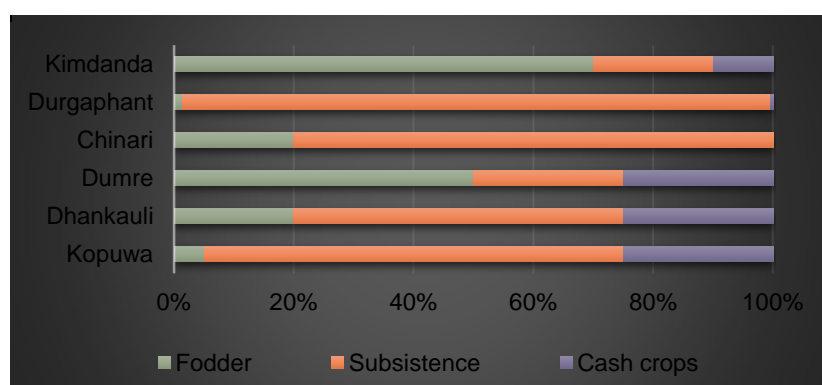


Figure 2. Land Use Pattern of Cultivated Land for Fodder, Cash and Subsistence Crops across Study Locations

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a. Market

Distance and/or cost involved in travelling to nearby market have been considered in defining the accessibility of market around each focus group. The range of distance differed from 3 kilometers (km) in both Kimdanda and Dumre to 13 km in Dhankauli. However, some interesting situations exist in Dhankauli wherein farmers relied on a market beyond the border rather than on a nearby market. In Durgaphant, farmers pursued local Village Animal Health Worker (VAHW) service to cope with the distant markets in Palpa for inputs required for animal production. The average cost of travel to the nearby market for all locations ranged from Rs. 30 to 50, largely governed by distance and condition of the road. Agrovets are the significantly

dominating source of input supply (implements, fertilizers, seed, drugs, semen for AI and vaccines) in almost all study locations, making many livestock enterprises less efficient in these situations. As a token to have complemented to public service, the government needs to offer more support services (both technical and financial) to these grassroot enterprises (IBN, 2017).

Management of livestock

b. Housing system

The farmers in the study area tended to house animals based on broad categories of ruminants vs non-ruminants owing largely to their feed requirements. The degree of commercialization further separated large from small ruminants. Within this system, the hills housing system was marked by stall fed system characterized by no allocated grazing area and risks associated to topography for grazing their ruminants. These structures were mostly marked by the provision of a feeding trough that provides space for the hay/straw and green fodder with either removable metallic or cement watering trough. Seasonality in provisioning bedding material to the animals is evident wherein winter requires bedding for insulation from the chilling floor with the exception of Kimdanda where farmers believed that the floor invariably remains dry throughout. The requirement for insulation during winter is provided by these leftover roughages without additional inputs (Paudel and Perrera, 2009).

c. Feeding

Farmers tend to manage their feeding with the objective to meet the nutritional demand of the animals by both season and the stage of production. The animals during winter got high energy feed that provided additional energy to keep their body warm. Lactating animals often got more feed and balanced diet as compared to other classes of animals to cope with the additional demands of milk production during lactation.

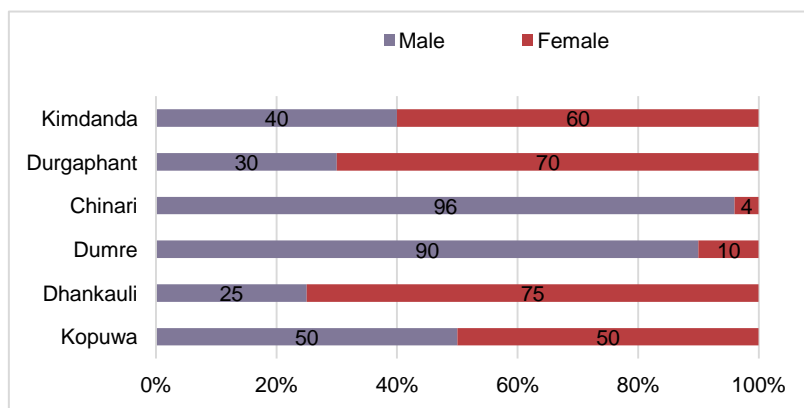


Figure 3. Distribution of feed processing roles between males and females

All farmers were involved in one or other form of feed processing like chaffing, boiling, mixing, soaking etc. Mostly these processing techniques were applied during winter in a bid to help the animals cope with the cold stress (Paudel and Perrera, 2009), in addition to improving the digestibility of nutrients. Gender wise, these tasks did not exhibit any pattern across the locations. The involvement of females in feed processing in all sites except in Chinari and Dumre was above 50%. However, extreme examples were observed in Chinari and Dumre of Palpaw here in the involvement of females was well below that of males (less than 10%).

The proportion of farmers using concentrates for their animals was very high, indicating the instinct for commercial dairy production and an understanding that quality feeding was a major contributing factor for satisfactory milk production.

d. Animal Health services

Many farmers reported that they sought veterinarians or technicians for higher degree complications (usually mastitis and milk fever) while managing minor issues by themselves. However, the reach of public sector practitioners is limited. Only three out of six locations have received both private (usually operated by agrovets) and public animal health services. The cost of accessing such services by the farmers varied, with private sector provisioning services at a higher cost (Table 2).

Table 2. Distance and Price for procuring private and public animal health services across FGD locations

Locations	Distance (km)	Average cost of each service(Rupees)	
		Private	Public
Kopuwa	-	100	N/A
Dhankauli	-	300	N/A
Dumre	-	400	400
Chinari	7	2500	Free
Durgaphant	-	700	300
Kimdanda	3	N/A	300

Interestingly, the Livestock Service Center (LSC) in Chinari has been offering free services which if pursued through private sector can cost as much as Rs. 2500 a visit. Some indigenous practices (e.g. a paste of rapeseed oil and turmeric powder, cannabis, egg and oil, and a wooden/bamboo frame around the fractured bone) have long been used and remain in use (Paudyal, 1998).

e. Reproduction/Breeding

Cattle across study locations were invariably artificially inseminated (AI) and were served both by public and private sector technicians, whereas buffaloes, with some

exception, were mostly bred using natural service. The limitation to adoption of AI technique in buffalo breeding was largely attributed to significantly lower conception rates in buffalo inseminated artificially (NLBC, 2014). The overall picture of the use of AI versus natural breeding shows the dominance of AI over natural breeding. This is largely because of the dominance of the cattle population over that of buffaloes.

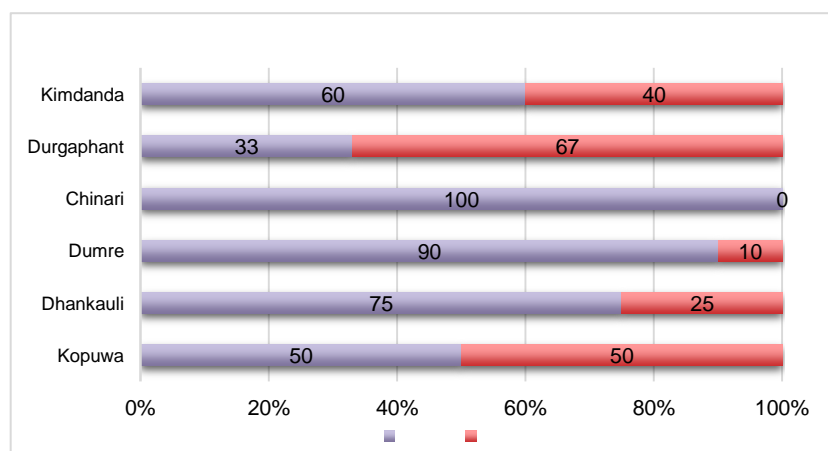


Figure 4. Proportion of farmers using different breeding techniques

The remoteness of Durgaphant in securing the AI service and the unavailability of AI technician in the area has surged the proportion of natural service over AI. Table 3 catalogs the availability of these services scored on a 5-point scale, the price of receiving such services and quality of service measured in terms of rate of repeat cases from different service providers.

Table 3. Accessibility, cost and quality of AI service provided by different service providers

Locations	Availability score (out of 5)		Price		Rate of repeat (%)
	Private	Public	Private	Public	
Kopuwa	4	1	300	450	80
Dhankauli	1	5	150	500	35
Dumre	4	5	600	600	40
Chinari	2	4	700	50	33
Durgaphant	N/A	4	N/A	500	30
Kimdanda	N/A	4	N/A	500	40

Buffaloes are mostly bred naturally, by either Murrah or its crosses, and maintained by a small group of farmers. The price of such service is between Rs. 700 and Rs. 1000, with the availability score of 3 on a 5-point scale.

Answers to prioritized problems with livestock production

A brief assessment of major problems relating to dairy animal production along with their potential solutions from the perspective of participating farmers was made and ranked by survey participants themselves. The broader category of problems indicate that the growth of the sector is constrained by the factors like production related problems, pricing and marketing of milk, poor financial services and poor infrastructure to support the growth of dairy sectors aspired to in the region.

A reliable source of water has been identified as the most prominent bottleneck to livestock production. The farmers aspired to get GoN support in installing deep-tube wells and gravity flow pumps to ensure adequate water supply to further expand the existing scale of dairy operations to overcome this limitation. Marketing related issues score second compounded by the irrational pricing of milk, lack of milk collection centers with spontaneous milk holidays exacerbating the plight. Farmers opined that the provision of milk collection with processing centers paired with government facilitated rational pricing policy can provide relief to this problem. In addition, the farmers have limited access to financial services to support their growing dairy enterprise. Major problems in accessing these financial services are either high interest rates of up to 18% per annum or the cumbersome procedure to secure loans from the formal sector. Possible government intervention to render loans in the agriculture sector at a maximum interest rate of 6% per annum dedicated financial institution could ameliorate the current crisis in expanding financial services towards the growth of the dairy sector in the region. The most prominent constraint related to production is the availability of fodder species that require less water yet have high nutritive value. Farmers are left with no option to continue feeding their dairy animals on fodder grown traditionally on marginal land, which are of poor nutritive value, or to rely on expensive concentrate-based system. In the meantime, the accessibility and support in fetching processing equipment like chaff cutters for both small and medium holder farmers can somewhat improve the palatability of roughages currently in use.

The other importantly and frequently raised issue in milk production was the incidence of diseases that compromise milk yield substantially, primarily mastitis and milk fever. The complexity in managing animals and environment to reduce these ailments is critical due to the loss of production and in severe cases the animals become permanently unproductive. Farmers opine that these conditions could be avoided first by building the capacity of farmers themselves in aspects of feeding and housing management and simultaneously providing technicians to treat these conditions. Farmers' training and practical learning approaches like Farmer Field Schools (FFS) seemed to have become obsolete, but in fact FFS's were instrumental

in building the capacity of the farmers in a number of production aspects. So, efforts to multiply the number of such events focused on dairy farmers would add value to the entire dairy production industry of the region.

CONCLUSION

The locations studied varied in regard to the degree of commercialization of the dairy sector they harbor. Based on the results obtained in terms of the information collected and in also based on the subjective evaluation, Dumre stays at the top of commercialization ladder whereas Dhankauli apparently is at the bottom. The degree of commercialization, however, is apparently affected by the availability of land thereby affecting the herd size, capacity to supply nutrient rich feed resources, access to credit and affordability of inputs among others. Some supportive state mechanisms remain consistently unreliable except in the case of Chinari. Nevertheless, the aspiration of farmers is supported in some measure through technical and financial means by the government directly or indirectly and are yet to cease, but should be increased. Some prominent issues in livestock, especially dairy production are prevalence of mastitis and milk fever, which highlights the need for interventions of management of dairy animals against these two diseases. Likewise, the national objective to reduce the cost involved in milk production on a per liter basis can be enhanced by a strong fodder research and development program with emphasis on promotion of forages with high nutritive value and preferably perennial in nature along with sustainable strategy to improve the productivity of native grass species would be an imperative agenda.

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