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Analysis of existing dairy farming in Goa

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ABSTRACT

A study was envisaged to highlight the existing dairy farming practices and to analyze the constraints of the dairy farming in Goa. A total of 66 farmers were selected randomly from different talukas of Goa, which covered around 1,170 dairy animals. Only 8% farmers had dairying as the primary occupation and majority (74%) of the farmers had agriculture or horticulture as the primary occupation. Based on the number of milch animals 51.5, 27.3, 16.7 and 4.5, per cent farmers were marginal, small, medium and large, respectively. The wet average and herd average were 7.62 kg/day and 5.79 kg/day. Among the ingredients of the home-made concentrate feeds, ground maize and cotton seed cake were most preferred. Majority of the dairy farmers were using naturally grown karad grasses only during rainy season. Among the un-conventional feeds, spent brewers' grains were mostly used. It can be concluded that there is need of awareness programmes on scientific feeding practices and interventions are needed in the traditional feeding practices of the dairy animals to make the dairy farming a more profitable venture.

Key words: Animals, Dairy, Farmers, Feed, Livestock, Nutritive, Practices

The traditional feeding practices are mostly based on well established scientific rationality, and refinement of existing traditional feeding practices of locally available feeds and fodder is expected to support sustainable dairy farming in the country. In Goa, although dairy farming is an integral part of the livelihood of the people, it is facing major challenges due to shortage of feeds and fodder (Naik *et al.* 2012). Therefore, the present study was envisaged to highlight the feeding practices of the dairy animals and to analyze the various constraints of the dairy farming so that necessary scientific interventions can be made to improve the productive and reproductive performance of the animals.

MATERIALS AND METHODS

Farmers (66) were selected randomly from different talukas of Goa, who were rearing around dairy animals (1170). A comprehensive questionnaire was prepared and information was collected through personal visit to the dairy farmers during August 2010 to February 2011. The socio-economic status of the farmers was assessed by number of milch animals possessed and land holding size. Based on the number of milch animals, viz. less than 5, 5 to 10, 10 to 20 and 20 or above, the farmers were divided as marginal, small, medium and large dairy farmers, respectively (Mudgal *et al*. 2003). However, the farmers were also grouped as marginal, small, medium and large farmers based on the land holding size, viz. 0.01–1.00 ha, 1.01–2.00 ha, 2.01–4.00 ha and more than 4.00 ha, respectively (Vidyarthi *et al*. 2009). The wet average of the dairy herd was calculated as total milk production divided by the total number of milking animals; while the herd average of the dairy herd was calculated as total milk production divided by the total number of milking plus dry animals. During the visits, feed samples were collected and analyzed for proximate principles (AOAC 2000). The data were analyzed statistically to draw the inferences (Snedecor and Cochran 1994).

RESULTS AND DISCUSSION

Status of dairy farmers: The occupational pattern of the dairy farmers revealed that only 8% farmers had dairying as the primary occupation (Table 1). Majority of the farmers

Table 1. Primary occupation of dairy farmers of Goa

Occupational pattern	Percentage
Agriculture and/or horticulture + dairying	74
Business or service + dairying	18
Dairying	08

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Table 2. Status of dairy farmers

Parameters	Percentage
Division of dairy farmers based on number of milch animals	
Marginal	51.5
Small	27.3
Medium	16.7
Large	4.5
Division of dairy farmers based on land holding size	
Marginal	37.9
Small	18.2
Medium	16.7
Large	27.3
Farm Infrastructure	
Concrete housing	90.9
Mud housing	09.1
Chaff cutter	24.2
Milking machine	21.2
Generator set	4.6
Biogas plant	40.9

Table 3. Awareness on various nutritional technologies

Parameters	Percentage
Feed quality	84.8
Mineral mixture	83.3
Fodder	77.3
Common salt	54.5
Calf starter	33.3
Hay making	24.2
Total mixed ration	16.7
Urea molasses mineral block	15.2
Silage making	10.6
Complete feed block	04.5
Urea ammoniation of crop residues	04.5
Bypass protein	04.5
Bypass fat	03.0
Feeding based on milk production	47.0
Feeding based on lactational stage	25.8

had agriculture or horticulture as the primary occupation and only few farmers had service or business as main occupation apart from dairying. Similar occupational trend was observed by the earlier workers (Bhuyan *et al.* 2007) in other parts of the country. Both in terms of number of dairy animals or land holding size (Table 2), the number of marginal farmers was highest. Singh *et al.* (2009) observed that majority of the livestock keepers (50.31%) were marginal in terms of land holding (1–2 ha) in 24 linkage villages of Bareilly district of Uttar Pradesh. It indicated that up to the medium land holding size (4 ha), number of the milch animals increased with the land holding size of the farmers. Also, in Haridwar, Uttarakhand, livestock population was high with increased land holding as well as feed resources capacity of the farmers (Tiwary *et al*. 2007). However, large land holding size

Table 4. Status of dairy animals

Parameters	Percentage
Composition of dairy animals	
Total cows as percentage of total animals	52.5
Indigenous cows as percentage of total cows	03.9
Crossbred cows as percentage of total cows	96.1
She buffaloes as percentage of total animals	07.9
Total milch animals as percentage of total animals	43.9
Ratio of milch and dry animals	2.66: 1
Milk production status	
Wet average (lit./ day)	07.6
Herd average (lit./day)	05.8
Reproductive parameters	
Age at 1st calving of cows (months)	32.6
Calving interval of cows (months)	16.0
Age at 1st calving of buffaloes (months)	37.6
Calving interval of buffaloes (months)	19.0
Anoestrus (%)	04.0
Repeat breeders (%)	10.0

farmers (>4.0 ha) did not prefer to keep more dairy animals, which might be due to their first priority for their agricultural or horticultural activities. Majority of the dairy farmers had concrete housing and only few dairy farmers had mud housing for their dairy animals. This is due to the high per capita income of the people of Goa. The importance of feed quality and minerals on production and reproduction in dairy animals is well established. Only few dairy farmers were aware of the advanced technologies like bypass protein and bypass fat feeding (Table 3), which might be attributed to the less number of high producing dairy animals in the state. For economic dairy production, the dairy animals should be offered feeds based on their milk production and lactational stage. However, in the present study only 47% and 25.8% of the dairy farmers were feeding their dairy animals based on the milk production and lactational stage, respectively. The farmers were unaware of the nutrient requirements of the dairy animals and the animals were offered feed in group by their labourers approximately.

Status of dairy animals: The number of indigenous cows as percentage of total cows was very low as compared to the crossbred population (Table 4), which indicated that there is awareness among the dairy farmers to keep optimum number of good cows instead of more number of low producing non-descript animals. Very few dairy farmers were opted for female buffaloes, which might be attributed to the more number of marginal dairy farmers of the state (Vidyarthi *et al*. 2009), but in contrast to the increase in buffalo population at national level (Anonymous 2010). The ratio of milch and dry animals is lower than the optimum ratio prescribed for an ideal farm. The figure of wet average (7.6 litre/day) at Goa was higher than the national figures of indigenous cows, 2.14 kg/day, crossbred cows, 6.87 kg/day, and buffaloes, 4.57 kg/day (Anonymous 2010). The first calving age and calving

Table 5. Nutrient content of locally available feeds and fodder

Ingredient	On % DM basis					
	CP	EE	CF	NFE	TA	AIA
Concentrate feeds						
Purchased	17.3–20.8	1.4–4.8	8.1–12.1	53.2–62.8	9.2–14.2	1.4–2.9
Home-made	8.6–23.1	1.3–15.3	2.5–30.3	35.6–84.2	1.8–8.5	0.2–1.4
Green fodders						
Cultivated	6.7–19.6	1.3–4.3	21.1–41.4	35.6–67.5	7.8–19.9	0.1–6.7
Green karad	4.5–5.4	1.0–1.6	41.3–41.8	50.7–51.7	4.4–4.9	1.4–1.6
Mixed grass	6.0–9.4	1.1–3.7	27.1–35.1	48.3–58.7	7.7–11.7	1.9–4.9
Subabul leaves	26.0–26.6	7.7–9.5	16.3–17.0	66.6–67.2	6.6–6.8	0.7–1.2
Dry roughages						
Paddy straw	2.4–3.1	1.4–2.3	30.8–36.6	38.2–41.9	13.7–15.4	9.2–9.9
Dry *Karad*	2.4–3.1	0.8–1.0	42.7–46.3	48.2–50.0	3.4–4.5	1.1–2.0
Jowar straw	3.3–4.4	1.0–1.5	33.3–34.6	50.3–51.8	8.5–9.0	4.9–5.3
Maize stover	2.3–3.7	2.4–3.2	41.6–43.5	42.6–43.8	7.3–7.4	4.0–4.2
Guar stover	1.3–2.5	0.5–1.0	34.7–36.8	46.7–48.2	9.9–10.0	5.6–6.1
Un–conventional feeds						
Brewers' grains	17.8–25.2	2.6–5.7	18.1–19.4	48.3–51.0	3.2–9.2	1.3–1.8
Arecanut stalk	1.7–5.3	0.2–1.2	33.8–43.0	46.2–55.5	7.0–8.1	1.8–2.4
Banana leaves	16.6–20.1	1.9–5.8	17.1–26.9	55.7–67.6	10.5–12.0	1.1–2.2
Banana stem	3.1–4.8	1.9–2.1	25.6–32.0	49.7–56.9	12.2–13.0	3.3–3.4

intervals of the dairy animals were similar to the reports of the earlier workers (Tiwary *et al.* 2007). The reproductive problems like anoestrus and repeat breeders may be attributed to the imbalanced ration in terms of energy, protein and minerals.

Feeding practices of dairy animals: In the present study, the feeding traditions practiced by the dairy farmers were either stall feeding or grazing or both. Exclusive stall feeding was practiced by 68.2% of dairy farmers, while other allowed their animals to graze for 5–8 h/day. Similarly, the animals were sent for grazing for 5–8 h daily in scarce rainfall zone of Andhra Pradesh (Sreedhar 2011). The concentrate feeds were either purchased (ready-made) or home-made. Only 24.2% of dairy farmers were using exclusively purchased concentrate feed, which were in pellet form and 1.5% of the dairy farmers were using exclusively home-made concentrate feeds. The physical composition of home-made concentrate feeds varied among the dairy farmers, which was generally 1–3 ingredients based. The home made concentrate feed consisted of either exclusive ground maize or ground maize + rice bran/wheat bran or ground maize + cottonseed cake or rice bran/wheat bran + cottonseed cake or ground maize + cottonseed cake + rice bran/wheat bran; in approximately equal ratio. However, majority of dairy farmers (74.3%) were using both purchased and home-made concentrate feeds mixed in the ratio of 1:1–4:1. Among the ingredients of home-made concentrate feeds, ground maize and cottonseed cake were most preferred for supplementation with the purchased concentrate pellets. There was an impression among the farmers that supplementation of home-made concentrate feeds along with the purchased concentrate feeds maintains the milk yield of the animals. The major reasons behind this were inadequate quantity and quality of the purchased concentrate feeds offered to the dairy animals. Farmers of Goa preferred to feed cottonseed cake to dairy animals with the perception that it was nutritionally better than the other cakes. It is a well established fact that cotton seed cake is good source of by-pass protein, which is not degraded in the rumen, but is digested in the lower part of the digestive tract and improves the quality and quantity of milk production (Sampath *et al*. 2005). However, as the protein content of cotton seed cake is lower than the other cakes like ground nut cake or soybean meal, scientific feed formulation is necessary to achieve the optimum result. Some farmers soaked the home-made concentrate feed for few hours (4–8 hours) before feeding to dairy animals with the impression that it would increase the palatability and digestibility and reduces the dustiness of the feed, which has also sufficient scientific validity (Biradar *et al*. 2007). The type and level of roughage in the diet have significant effect on the productivity of the dairy animals, as they modify the rumen microbial population responsible for digestibility of nutrients. Adequate feeding of green fodders decreases the dependence on concentrate feeds, keeps dairy animals healthy and reduces the cost of milk production. In the present study, only 47% of the dairy farmers were cultivating green fodders for feeding of dairy animals round the year, while 53% of the dairy farmers were feeding only naturally grown grasses during rainy season. Similar to Northern Karnataka (Biradar *et al*. 2003), naturally grown green grasses were abundantly available in the fallow land, pasture land and forest area of Goa during July- November. During rainy season, the

naturally grown grasses fed to the dairy animals are green *karad grass* and mixed grasses, which include road side grasses, tree leaves and edible weeds. The cultivated fodders were mostly non-leguminous (Hybrid Bajra Napier). However, seasonal non-leguminous crops like maize and jowar were occasionally grown by some selected farmers (Naik *et al.* 2011) for grain consumption and after harvesting the crop residues were used for animal feeding as dry roughages. Very few farmers were using subabul tree leaves for animal feeding, grown on the bonds of their fodder plots. The traditional feeding of dairy animals was dependent upon the cropping pattern of the particular area. As rice is the staple food of Goans, paddy cultivation is very common and after harvesting the crop residues (straw) is used for the animal feeding. Besides, *karad* grasses are naturally grown during monsoon, which gradually become dry after rainy season and became available as dry roughages during the month of December- February. The dry roughages used for feeding of the dairy animals were paddy straw, dry *karad* grass and jowar straw. The paddy straw and dry *karad* grass were stacked outside in a dome shape, keeping a bamboo in the middle as a support. However, some farmers were storing paddy straw and dry *karad* grass under polythene cover or under roof. One of the interesting finding was that although jowar is not grown here, farmers purchase jowar straw from the neighbouring state (Karnataka) and prefer to feed their animals. The dry roughages were fed either exclusively or in combination of two. Paddy straw, dry *karad* grass and jowar straw were fed exclusively by 25.8%, 22.7%, and 21.2% dairy farmers, respectively. Similar to feeding of mixed dry fodders in the northern part of Karnataka (Biradar *et al*. 2007), 13.6%, 10.6% and 6.1% of the dairy farmers fed their dairy animals dry *karad* grass + jowar straw, paddy straw + jowar straw and dry *karad* grass + paddy straw, respectively. Some farmers claimed that the animals did not prefer paddy straw, still they had no choice as it was grown by themselves (Biradar *et al*. 2007). Further, due to the use of mechanical thrasher, paddy straw was not relished by the animals. Very few dairy farmers were feeding their dairy animals maize stover and guar stovers, which were grown in their own fields. Uses of un-conventional feeds are a part of the traditional feeding system to reduce the cost of production. In the present study, 16.7% of the dairy farmers were feeding un-conventional feeds to their dairy animals. Among farmers using un-conventional feeds, viz. spent brewers' grain, arecanut sheath (stalk), banana leaves and banana stems. Maximum farmers (63.6%) were using spent brewers' grain (fresh or dry) and the rest farmers (36.4%) were using arecanut sheath (stalk) or banana leaves or both. The most probable reason behind this was that Goa has many distilleries units for the preparation of cereal malt beverages and the spent brewers' grains; the by-product obtained during the preparation of cereal malt beverages is generally discarded. The dairy farmers had their own feeding schedule for the dairy animals based on the traditional knowledge. In morning, during milking the dairy animals were provided with concentrate feeds followed by grazing or green fodder and dry roughages. Similarly in afternoon, concentrate feed was offered during milking followed by green fodder and then dry roughages. Similar feeding schedule for dairy animals was also observed in other parts of the country (Sreedhar 2011). The feeds offered to the milking animals were higher than the dry animals. The concentrate feed offered varied from 2–8 kg/animal/day for milch animals and 0–2 kg/animal/day for dry animals. Dairy farmers were adjusting the supply of green fodders as per the seasonal availability. The quantity of green fodder offered to the dairy animals was more during rainy season as compared to other seasons, which might be due to the abundant availability of green fodder during the rainy season (Tiwary *et al*. 2007). During rainy season, both milch and dry animals were offered 5–20 kg green *karad* grass or mixed grass/animal/day. Less quantity of dry fodder and more green fodder was offered to the dairy animals during rainy season due to surplus availability of green fodder. Other than rainy season, the amount of cultivated green fodder offered varied from 0–10 kg/milch animal/day and 0–5 kg/dry animal/day. During scarcity period, the first preference of feeding fodders was the milking animals only. The dry roughages (paddy straw, dry *karad* grass or jowar straw) available to both the milch and dry animals varied from 2–10 kg/animal/day. Paddy straw contains high silica and oxalates and should be chaffed and soaked in water before feeding to increase the palatability and digestibility. However, the paddy straw and dry *karad* grass were not chaffed and soaked in water by the dairy farmers before offering to their animals, which need immediate interventions. Few farmers were offering spent brewers' grain, areca nut sheath (stalk) and banana leaves 2–10 kg, 0.5–1.0 kg and 0.5–2.0 kg per animal per day, respectively.

Nutrient content of locally available feeds and fodder

In the present study, the CP content of the purchased concentrate feeds were lower than the BIS specifications (20–22%), however, the other parameters, viz. EE, CF and AIA were towards close proximity to the BIS specifications (Table 5). The composition of home-made concentrate feeds was highly variable, imbalanced and was not fulfilling the BIS specifications because of lacking in scientific blending in proper proportions with all type of feed ingredients. However, similar to the findings of the earlier workers (Bakshi and Wadhwa 2011), the TA contents of the commercial feeds were higher than the home-made concentrate feeds resulting in low organic matter content in the former than the later. The variation in the CP and CF contents of cultivated green fodder might be due to the differences in varieties, harvesting stage and soil characteristics. The nutritive values of the dry roughages are very poor (low CP and high CF) and provide

only bulk to the dairy animals. Among the dry roughages, the CP% of the guar stover was lowest. However, among the predominantly used dry roughages, jowar straw contained highest CP and lowest CF than the paddy straw and dry *karad* grass, which might be the reason of its good palatability to the animals as claimed by the farmers.

It can be concluded that scientific interventions are needed in the traditional feeding of the dairy animals to make the dairy farming more profitable venture. In the present situation enhancement of green fodder production, feeding strategies for high yielding dairy animals including bypass protein and bypass fat feeding technologies and development of complete feed block using locally available roughages should be emphasized. Besides, the farmers should be made aware of scientific feeding practices of their animals to improve the productive and reproductive performance of their animals.

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