

## RESEARCH ARTICLE

# Feed and Fodder Availability and Utilization Pattern in Urban-Peri-Urban Dairy Farms in and Around Navsari City of South Gujarat

AL Rathva<sup>1</sup>, LM Sorathiya<sup>2\*</sup>, DN Gadhvi<sup>1</sup>, NB Patel<sup>3</sup>

### ABSTRACT

This investigation was carried out to study the fodder resource management practices followed by selected 40 commercial dairy farmers in and around Navsari city of South Gujarat. The required information was collected through personal interview. Data analyzed revealed that buffalo consisted more than two third of total strength. Population of younger animals like calves and heifers were 33 and 9 % of total herd strength, respectively. The annual green and dry fodder availability calendar showed that 95 % farmers used sugarcane top during November to March. During April to July 100 % respondents fed whole sugarcane, whereas during August to October 34, 15 and 4 farms were using green grass, green sorghum and green maize, respectively. Among dry fodder, paddy straw was popular and used by 37 farms, whereas 10 farms were using sorghum straw. The quantity of fodder used by each farm revealed that sugarcane tops fulfilled average 39.27 % of ration requirement in 38 farms. Similarly, green sugarcane fulfilled average 23 % of ration requirement in all 40 farms. Green cut and carry grass fulfilled 13.15 % of ration in 34 farms. As far as dry fodder was concerned, paddy straw and sorghum straw were used to fulfill 41.49 and 31.70 % of their ration requirement in farms, where it was used. Among concentrates cotton seed cake, wheat bran and compound concentrate (Sumul Dan) were used by 38, 20 and 16 farms, respectively. They were using cotton seed cake at proportion of 33% in their ration. Analysis of demand and supply of feed and fodder resources revealed that all farms studied together required annually 10124, 2248 and 2248 tons of green fodder, dry fodder and concentrate as per thumb rule feeding of dry matter at 3 % of body weight. However, all feed resources were in shortfall by 21-51 %. Annual shortage of dry fodder was the highest, i.e., 51.33 % and shortage of concentrate was the lowest (14.64 %).

**Keywords:** Commercial dairy farm, Feed resources, North Gujarat, Peri-urban, Urban farms.

*Ind J of Vet Sci and Biotech* (2020): 10.21887/ijvsbt.15.3.9

### INTRODUCTION

Livestock production is a backbone of Indian Agriculture and source of employment in rural areas for centuries. Traditional livestock farming in rural India is based on feeding of crop residues and byproducts; grasses, weeds and tree leaves gathered from cultivated and uncultivated lands, and grazing on common lands and harvested fields. The role of fodder is very important to reduce cost of milk production. However, the supply of feed always remained short of normative requirement for limited land allocation for forage cultivation by farmers (Ramachandra *et al.*, 2007), which hardly exceeds 5 % of the gross cropped area (Gol, 2009). Successful livestock farming needs security of adequate feed and fodder availability round the year at reasonable price. According to Yadav *et al.* (2017) the green and dry fodder requirements in India is 883.95 and 583.66 Mt, against the estimated fodder production of 664.73 Mt and 355.93 Mt, respectively. The shortage of dry and green fodder was responsible for loss in milk yield up to 11.6 and 12.3 %, respectively, in India (Birtal and Jha, 2005). Livestock farming in India is well supported by the crop residues which are fulfilling 40-60 % of their dry matter requirements. However, the availability and nutritional profile of each residue is having great regional variation. All

<sup>1</sup>Department of Livestock Production and Management, Vanbandhu College of Veterinary Science and A. H., Navsari Agricultural University, Navsari, Gujarat, India

<sup>2</sup>Associate Professor & Incharge, PGIVER, Kamdhenu University, Himmatnagar, Gujarat, India

<sup>3</sup>Associate Professor & Incharge, Livestock Research Station, Vanbandhu College of Veterinary Science & AH, NAU, Navsari, Gujarat, India

**Corresponding Author:** LM Sorathiya, Associate Professor & Incharge, PGIVER, Kamdhenu University, Himmatnagar, Gujarat, India, e-mail: lalitchandra.sorathiya@gmail.com

**How to cite this article:** Rathva, A.L., Sorathiya, L.M., Gadhvi, D.N., and Patel, N.B. (2020). Feed and Fodder Availability and Utilization Pattern in Urban-Peri-Urban Dairy Farms in and Around Navsari City of South Gujarat. *Ind J Vet Sci and Biotech*, 15(3): 32-35.

**Source of support:** Nil

**Conflict of interest:** None.

**Submitted:** 23/12/2019 **Accepted:** 30/12/2019 **Published:** 10/03/2020

the byproducts have their peak and lean seasons depending on the geographical region and irrigation facility. Similarly grazing resource and availability of cut and carry grass having also seasonality (Sorathiya *et al.*, 2016). The urban and peri-urban dairy farming system mainly depends on purchase of the fodder or crop residues for want of their own cultivable land. Further, due to shortage of land and infrastructure,

they cannot store much dry fodder which leads to fodder scarcity mostly in lean season. Therefore, an attempt was made to study seasonal availability and utilization pattern of feed and fodder in urban and peri-urban dairy farms around Navsari city of Gujarat.

## MATERIALS AND METHODS

The seasonal availability and utilization pattern of feed and fodder was studied on 40 urban and periurban dairy farms around Navsari city of south Gujarat. The area fall in 16 km radius to Navsari was considered as urban and peri-urban area and was marked for the study. A list of all the commercial dairy farms from marked area having herd strength more than 20 adult units of cattle, buffalo or both was prepared. Forty dairy farms from marked area were selected randomly. The required information about availability, purchase and utilization of feed and fodder were collected from dairy farm owners by questionnaire. The information of herd strength at the time of interview was also recorded. Herd strengths were converted to adult units by multiplying factors 1, 0.67, 0.50 and 0.33 to adults, stock more than 2 years, between 1-2 years and less than 1 year, respectively. The ration requirement of dairy farms were calculated by assuming 3.0% dry matter requirement of body weight (Average 400 Kg). Annual green, dry fodder and concentrate requirement was calculated based on thumb rule of feeding means all ration was divided into three equal parts i.e. concentrate, green and dry fodder. Feed and fodder requirement was calculated by assuming moisture content 75, 7.5 and 7.5 for green, dry and concentrate, respectively. Based on information of purchase and utilization of feed and fodder whole year was divided

into three seasons, *i.e.*, November-March (Winter), April-July (Summer) and August to October (Monsoon). During each season feed fodder purchased was compared with requirement as per thumb rule to derive per cent fulfillment of requirement. Each feed fodder ingredient used by farms were divided by 365 days and further, divided by number of adult unit in particular farm to derive feed ingredient offered. Feed ingredients offered were divided by daily ration requirement to derive % of fulfilling ration requirement by particular ingredients. The data were scrutinized and tabulated into frequency, percentages; arithmetic mean, standard error and analysis of variance following the methods suggested by Snedecor and Cochran (1994).

## RESULTS AND DISCUSSION

### Herd Composition

The herd composition of selected farms is depicted in Table 1. It shows that total herd strengths of buffalo and cattle were  $37.76 \pm 6.57$  and  $14.48 \pm 8.37$ , respectively, *i.e.*, two third of their herds was consisting of buffalo. Population of replacer stock was very less, *i.e.*, only  $1.62 \pm 0.27$  and  $3.30 \pm 0.67$  cattle and buffalo heifers, respectively, which was only 9.07% of total stock. Further, average population of calves was about 18, which was about 33 % of total herd strength.

### Availability of Fodder Round the Year

The data in Table 2 showed that 95 % farmers used sugarcane top during November to March. During April to July 100 % respondents were feeding whole sugarcane. It means during November-April farms they were using either sugarcane top or whole sugarcane as sole green fodder. August to October

**Table 1:** Herd composition of urban and peri-urban dairy farms around Navsari city

Class of animal	Cattle	Buffalo	Total	Herd composition %
Adult	$8.03 \pm 0.9$	$21.46 \pm 3.05$	29.49	54.37
Heifers	$1.62 \pm 0.27$	$3.30 \pm 0.67$	4.92	9.07
Calves	$4.83 \pm 0.58$	$13.00 \pm 2.08$	17.83	32.87
Bull	$1.00 \pm 0.00$	$1.00 \pm 0.00$	2.00	3.69
Total	$14.48 \pm 8.37$	$37.76 \pm 6.57$	54.24	100

**Table 2:** Distribution of dairy farms according to use of fodder resources in various seasons

Name of fodder resource	Season			
	Nov to March	April to July	August to October	Round the year
Sugarcane top	38 (95%)	0	0	0
Green sugarcane	0	40 (100%)	0	0
Hybrid Napier grass	2 (5%)	0	0	0
Green sorghum	0	0	15 (37.5%)	
Green Maize	0	0	4 (10%)	0
Green Grass	0	0	34 (85%)	0
Paddy straw	0	0	0	37 (92.5%)
Jowar straw	0	0	0	10 (25%)
Pigeon pea gotar	0	0	1 (2.5%)	0
Total of farms	40	40	40	40

Figures in parenthesis represent % of farms used particular fodder resources.

period was dominated by usage of green cut and carry grass which was used by 34 farms. However, during said months they were also using either green sorghum (37.5 % farms) or green maize (10 % farms) along with cut and carry grass. Pigeon pea gotar was used by only 2.5 % farmers during August to October. In south Gujarat sugarcane is cultivated by farmers, hence it is easily available and cheaper in this area. The environment also favors sugarcane cultivation; therefore, utilization of sugarcane based fodder was more. Farmers also use sorghum, maize and green cut and carry grass as a green fodder. The irrigation facility in the south Gujarat is good so the production of fodder remains all around the year. Paddy straw was used round the year by 92.5 % dairy farmers. The paddy straw availability in south Gujarat region was abundant as compared to other crops as the rice cultivation is major in this region. During the period when green fodder was not available in adequate amount, the farmers fed dry fodder only. The present observations were in accordance with Kumar (2009) and Kumar *et al.*, (2017), who reported that the farmers fed their animals according to availability of fodder.

### Fodder Utilization Pattern

The mean feed and fodder ingredients used against ration requirement by farms are depicted in Table 3. Green sugarcane and sugarcane tops were main green fodder source for 38 and 40 farms, respectively. Sugarcane tops were fulfilling about 39 % of ration requirement in 95 % farms which is slightly higher than specified in thumb rule (33%). It was used by farms in abundance as it is cheapest fodder. Green sugarcane was used by all farms but it fulfilled

little less green fodder requirement than sugarcane tops (23%). All 40 farms were using green sugarcane, however, they were providing 23% ration requirement against 33%, means, during April to July farms were not fulfilling 100% green fodder requirement. Hybrid Napier grass was fulfilling nearly half of green fodder requirement but it was in 5 % farms only. Green cut and carry grass was also major green fodder resource used by 85 % farms and it fulfilled about 13 % of their green fodder requirement. Green sorghum and green maize were used by 15 and 4 farms, respectively. Both these important fodder fulfilled 16 % of ration requirement. The study showed that the dairy farms were mostly relied on locally available sugarcane tops and whole sugarcane crop. Both are not considered as good fodder resource. Sabapara *et al.* (2016) revealed that 96 % and 90 % of peri-urban dairy farms near Surat region were also using sugarcane tops and green cut and carry grass as green fodder, respectively. The paddy straw was most important dry fodder resource used by 37 farms to cover 41.5 % of their ration requirement. Other dry fodder resources include jowar straw and pigeon pea gotar used by 10 and 1 farms, respectively. Sabapara *et al.* (2016) observed that 92 % peri-urban dairy farms around Surat fed their animals only paddy straw as dry fodder and rest fed paddy straw + jowar (10 %). Majority of farmers were feeding paddy straw to their animals as byproduct of paddy crop (*Oriza sativa* L.), which is the main crop in south Gujarat. The environmental conditions prevailed in south Gujarat favour the cultivation of paddy crop than jowar (*Sorghum bicolor* L.) and maize (*Zea mays* L.). Most of the farms were having preference to mix more than one ingredients of concentrate. Among them cotton seed cake was most popular feed

**Table 3:** Utilization pattern of green and dry fodder resources by dairy farms in Navsari

Name of green fodder	Max. permissible limit as per feeding thumb rule	Mean % of ration requirement	Number of farms	% of farms
<i>Green fodder</i>				
Sugar cane top		39.27±1.66	38	95.0
Green sugar cane		22.93±0.90	40	100.0
Hybrid Napier grass	33%	44.75±24.62	2	5.0
Green sorghum		16.02±1.31	15	37.5
Green maize		16.31±1.93	4	10.0
Green grass		13.15±0.67	34	85.0
<i>Dry fodder</i>				
Paddy straw		41.49±2.35	37	92.5
Jowar straw	33%	31.7±6.15	10	25.0
Pigeon pea gotar		32.00±00	1	2.5
<i>Concentrate</i>				
Sumul dan		33.59±3.41	16	40.0
Mix dan		36.41±10.44	3	7.5
Rice bran		38.04±5.42	6	15.0
Wheat bran	33%	37.75±4.38	20	50.0
Cotton seed cake		33.09±1.91	38	95.0
Maize bharda		35.02±5.17	9	22.5
Pigeon pea chuni		28.02±5.91	11	27.5



resource used by 38 farms to fulfill about one third of their ration requirement. The wheat bran, maize bharda and rice bran were cheap ingredients with good energy value used by 20, 9 and 6 farms, respectively. These ingredients were used at extent of 35-38% of ration in farms where it was used. Sumul dan is reliable locally available compound concentrate mixture manufactured by Sumul dairy, Surat; however, it was not popular on these farms. Only 40 % farms were using it to fulfill about one third of ration requirement. Sabapara *et al.* (2016) revealed that majority of the peri-urban dairy farms fed to their buffaloes home produced ingredients along with compound cattle feed (66 %) followed by compound cattle feed (32 %) and only home produced ingredients (2 %) as concentrates.

### Demand and Supply of Feed and Fodder Resources

The demand of green and dry fodder was calculated based on thumb rule feeding for number of adult units kept by the farmers. Supply of same in three seasons by farms was calculated. It revealed that annual demand of all farms for green, dry and concentrate was 10124, 2248 and 2248 tons, respectively. The supply of green fodder was the highest in November to March (Winter) followed by April to July (Summer). Both these seasons were having availability of green in flush. The August to October (heavy Monsoon) was typically lean season in which only about 19 % green fodder was fed to their animals. This observed seasonality in fodder availability in south Gujarat region was in agreement with Sorathiya *et al.* (2016). All farms together had fed 8047 tons green fodder against requirement of 10124 tons that means all farms were 20.52 % deficit in green fodder supply. Similarly, all farms were more than 50 % deficit in supply of dry fodder to their animals. Particularly during November to March they were using dry fodder in very meager quantity. It may be due to availability of sugarcane tops which is cheap and available in plenty during this season. There was short fall of concentrate up to 14.64 %. During survey it was observed that farmers were feeding concentrate to their lactating animals only, thus, they were using less quantity of concentrate. The shortage of feed and fodder is a big constraint for productivity of livestock in India. Recent estimates for the feed balance, *i.e.*, feed availability vis-a-vis the requirements for the period 2009-10 have shown that resource wise the shortage of crop residues, greens and concentrates was worked out to be 32, 25 and 47 %, respectively (Anon, 2013). Based on feed production and feed requirement calculated as above, India falls short by 219.2 Mt of green fodder and 226.73 Mt of dry fodder (Yadav *et al.*, 2017). As per Vision

Physiology Bangalore the deficit by 2025 would be 21.3, 40.0 and 38.1 % for green, dry and concentrate, respectively.

### CONCLUSION

The fodder availability calendar of urban-peri-urban farms showed that most of commercial farms used sugarcane/ sugarcane top during November to April. Paddy straw was chief dry fodder used by most of the farms round the year when green fodder remains unavailable. The commercial dairy farms in area studied were using sugarcane and paddy straw based ration to their animals. Both resources are of poor quality and rich in oxalate. Further, feed resources were in shortfall by 21-51%. Therefore, fodder resources in area needs to be intervened to improve farm performance.

### ACKNOWLEDGEMENTS

Authors thank the Dean of Veterinary College and University authorities of NAU, Navsari for the facilities provided for this research work.

### REFERENCES

- Anonymous (2013). *Vision-2050*. National Institute of Animal Nutrition and Physiology Bangalore - 560 030, www.nianip.res.in pp 25.
- Birthal, P.S. and Jha, A.K. (2005). Economic losses due to various constraints in dairy production in India. *Indian J. Anim. Sci.*, **75**: 1476-1480.
- Gol (2009). Year-wise area under crops - All India. Available at: <http://dacnet.nic.in/eands/LUS-2006-07/Summary/tb3.13.pdf>.
- Kumar, S. (2009). Profitability and optimal size of commercial dairy farms in Eastern zone of Haryana. Doctoral dissertation, National Dairy Research Institute, Karnal, Haryana, India.
- Kumar, S., Subash, S. and Jangir, R. (2017). Feeding and milking management practices adopted by indigenous cattle farmers in Thar desert of Rajasthan. *J. Anim. Health Prod.*, **5**(1): 14-18.
- Ramachandra, K.S., Taneja, V.K., Sampath, K.T., Anandan, S. and Angadi, U.B. (2007). Livestock feed resources in different agro-ecosystems of India: Availability, requirement and their management. National Institute of Animal Nutrition and Physiology, Bangalore.
- Sabapara, G.P., Padheriya, Y.D. and Kharadi, V.B. (2016). A field survey of feeding and breeding practices at peri-urban buffalo farms of Surat city of Gujarat. *J. Anim. Res.*, **6**(5): 933-939.
- Snedecor, G.W. and Cochran, W.G. (1994). *Statistical Methods*, 6<sup>th</sup> edn. Oxford and IBH Publishing Co., New Delhi, India.
- Sorathiya, L.M., Fulsoumar, A.B., Tyagi, K.K. and Patel, M.D. (2016). Seasonality in feed availability and nutritional status in goats of south Gujarat heavy rainfall region. *Indian J. Anim. Sci.*, **86**(4): 468-471.
- Yadav, Mutturaj E., Jagadeeswary, V., Satyanarayan, K., Kiran, M. and Mohankumar, S. (2017). Fodder resource management in India- A critical analysis. *Intl. J. Livestock Res.*, **7**(7): 14-22.