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Analysis of feeding systems under urban and peri-urban livestock production of Deccan plateau

NAGARATNA BIRADAR[1], K SRIDHAR[2], P PUSHPA[3] and S N HANCHINAL[4]

Indian Grassland and Fodder Research Institute, PB road, Dharwad, Karnataka 580 005 India

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ABSTRACT

A study of 140 resource-poor urban peri-urban livestock keepers was carried out in 2007 in three tier-II cities, viz. Hubli-Dharwad, Belgaum and Bagalkote of Karnataka. In a randomized block design, their daily livestock feeding pattern was analysed by measuring actual quantities of feed and fodder fed to the livestock for 1 week in 15 households. Distance of the households from the centre of the city was used to separate blocks as 'core' (< 2 km), 'fringe' (2–4 km) and 'more rural' (4–8 km). Dependence on dry fodder was to the extent of 72% and it varied significantly across 3 groups. There was a significant difference in the quantity of dry fodder purchased by the livestock holders of three groups. Wheat bran and/or rice bran were the most sought after feed type as they were purchased in more quantity. The feeding system followed in non lactating livestock, that differed significantly, adequately met TDN but not DCP requirement. In lactating livestock it was deficit both in TDN and DCP. Highly significant difference was found both for meeting TDN and DCP requirement by the feeding system followed by the livestock holders of three categories. However, livestock husbandry still continues to be the main livelihood source for 'core' (40.75%) and 'fringe' (48.05%) groups. It is important to augment this livelihood source through technical and extension back-up on simple tools like cost-effective balanced feeding, enrichment of dry fodder with urea and salt treatment and use of compact feed blocks.

Key words: Urban peri-urban livestock system, Feed composition, Fodder composition, Livestock income

The urbanization of India is taking place at a faster pace than in the rest of the world, and as per the UNFPA (2007) 40.76% of India's population will be living in urban areas by 2030 compared to about 28.4% of present. As the urban population is growing so is urban poverty. The urban poor rely on several income sources to meet their basic requirements. Some of them continue to keep livestock, as one of the livelihood source, to cope with poverty. These people manage their livestock differently from their rural counterparts. Shrinking of open areas to graze, space to house livestock, store fodder and dump farmyard manure, lack of availability of crop residues, high cost of feeds etc are some of the challenges today the urban livestock keepers face. These challenges make urban livestock production system entirely different from their rural counterparts. In view of this, a study was undertaken to analyse the fodder and feed management followed by them and how is it contributing in meeting nutritional requirements of the livestock

Present address: [1,2]Senior Scientist, IGFRI Regional Research Station (nagaratna123@gmail.com igfri.rrs.d@gmail.com).

[3]Ph.D. Scholar, Department of Agricultural Extension Education, University of Agricultural Sciences, Bengaluru, India.

[4]Associate Director of Extension, Krishi Vigyan Kendra, Gulbarga, Karnataka, India.

MATERIALS AND METHODS

The present study was conducted in Karnataka which has urbanization rate of 34% as against national average of 28%. Three Tier-II cities of the state; Hubli-Dharwad, Belgaum and Bagalkote, of varied size, located in the northern part of the state and recognized for their fast urbanization were selected. Randomized block design was used for the study. Distance from the centre of the city was used to separate blocks. Three blocks with a distance of less than 2 km, 2–4 km and 4–8 km from the city centre, named as 'core', 'fringe' and 'more rural' respectively were considered for the study. Households keeping any kind of livestock, small and large ruminants, but not 'backyard poultry only' were considered for the study. Commercial dairy and poultry keepers, numbering a few, were excluded as the intensive-input-output livestock production system they follow do not truly represent the system followed by the majority of the resource-poor livestock keepers of UPA.

Information about specific location of the households with livestock in the selected cities was elicited through reconnaissance undertaken between August-October 2007. This guided the study to proportionate the sample size with appropriate representation from all categories. Based on the proportion of the households located close to the city centre,

only 20 households were selected under 'core' group. In 'fringe' and 'more rural' 60 households each were selected. The study, in all, covered 140 households. The data was collected through pre-tested standardized interview schedule. The study basically intended to analyze daily feeding pattern followed by these livestock holders. Assuming that the animals are able to fully meet their requirements during rainy season (June to Sept) when the monsoon grasses are available in abundance, it was desired to evaluate actual feeding of livestock during end of December 2007. In this technique the details of actual feeding of the animals as followed by the households, 5 each in 3 blocks, in all 15 households, were recorded for a period of 1 week. This included particulars of the animals fed and feed stuffs used in the stalls and their exact quantities of the fodder and feed stuffs were ascertained by using balance for weighing. The items measured for a week were then averaged and converted in terms of digestible crude protein (DCP) and total digestible nutrients (TDN) by multiplying with the factors as suggested by Ranjhan (1991). The DCP and TDN were compared with the recommended doses and computed %ages. The data were analysed using simple mean,%ages and one-way analysis of variance with the help of Statistical Package for Social Sciences (SPSS version 11).

RESULTS AND DISCUSSIONS

Feed types in the daily feeding of lactating livestock: Dry fodder was composed of 71.98% to the total diet of the lactating livestock across all the categories, and there was a significant difference ($P < 0.01\%$, F value 64.98) in proportion of dry fodder fed between the groups. Fringe and 'more rural' households utilized dry fodder to the extent of 72% and 81%, respectively, in their daily livestock feeding and core households 64%. Green fodder is utilized more by core (12%) and fringe (9%) categories. However 'more rural' utilized maximum dry fodder and utilization of green fodder is substantially less (3%), perhaps because of their location and better access to crop residues. There was highly significant difference in utilization of all the feed types across 3 blocks/ categories ($P < 0.01$). Comparatively higher portion of green fodder in the daily feed composition reflects greater importance given to dairy as a livelihood (Brook *et al.*2003) by these 2 categories.

Table 1. Accessibility and purchase of dry and green fodders

Particulars	Core	Fringe	More rural	F-value
Dry fodder				
Quantity (tonnes/year)	3.8	4.93	9.00	4.571*
Distance (kg/trip)	13.25	12.65	5.7	4.671**
Total cost (INR)	9581	9591	4733	0.932
Green fodder				
Quantity (tonnes/year)	10.5	6.87	2.8	2.738
Distance (kg/trip)	6.5	5	4.64	3.413*
Total cost (INR)	19780	11009	3374	3.075*

Purchase of dry and green fodders: Households of 'more rural' purchased more quantity of dry fodder (9 tonnes/year) as compared to core (3.8 tonnes/year) and fringe (4.93 t/year). There was a significant difference in the quantity of dry fodder purchased across 3 blocks at 5% level of probability. Similarly, more rural respondents have better accessibility (5.7 km) defined in terms of distance to be covered to purchase, for dry fodder as compared to other 2 groups. Accessibility for dry fodder among groups differed significantly at 1% level of probability. However there was no significant difference in total cost that includes both the cost of fodder and transportation (Table 1).

Contrary to dry fodder, households of core and fringe groups purchased more quantity of green fodder (10.5 tonnes/year and 6.87 tonnes/year) as compared to 'more rural' category (2.8 tonnes/year). Like dry fodder 'more rural' respondents had better accessibility to green fodder as well (4.64 km). There was significant difference in distance traveled to purchase green fodder and its total cost between 3 groups ($P < 0.01$) (Table 1).

Purchase of feed types: Wheat-bran and/or rice-bran was the most sought after feed types as was purchased in more quantity. This was followed by oilcakes of cotton and/or groundnut and quantity purchased when compared among the groups was more by core (0.168 tonnes/yr). Broken grains were purchased more by core (0.233 tonnes/yr) as compared to other 2 categories. Hotel waste was purchased more by fringe (1.557 tonnes/yr), (Table 2).

Contribution of daily feeding system to livestock nutrients requirements: In non lactating livestock the feeding system followed by the respondents of all the 3 groups adequately met TDN requirement and the significant difference existed among the groups at 1% level of probability. The requirement of DCP was however not met by 3 groups (core, - 32.63%; fringe, -36.17%; more rural, - 21.99%).

The inadequate feed supply was more prominent in the feeding of lactating livestock. The highest deficiency was observed for DCP. Lactating livestock of 'more rural' category suffered most (-49%). This was followed by the 'core' (–41.99%) and the fringe (–28.07%). The TDN requirement of lactating livestock is met only to the extent of 74% by core, 83% 'more rural' and 86% by the fringe respondents. Highly significant difference was observed at 1% level of probability to meet the TDN ($P < 0.01\%$, F value 9.323) and DCP ($P < 0.01\%$, F value 25.06) requirements in the daily feeding system of lactating livestock followed by 3 groups. The deficit

Table 2. Purchase of feed types by households (tonnes/year)

Particulars	Core	Fringe	More rural
Bran	0.436	0.640	0.250
Oil cakes	0.168	0.145	0.137
Broken grains	0.233	0.104	0.075
Hotel waste	0.200	1.557	00

Table 3. Proportion of annual income from various sources

Sources	Core	Fringe	More rural	F-value
Crop husbandry	0.45	0.27	65.80	42.349**
Livestock husbandry	40.75	48.05	12.15	5.849**
Labour	5.63	23.05	14.82	4.468**
Service	8.80	22.18	1.13	5.481**
Others*	16.70	5.00	6.09	4.842**

*Others, Petty shop keeping, tailoring, tractor driver, video cameraman, painter, auto driver etc.

of DCP and TDN in the Indian livestock is due to feeding of less amount of concentrates and green to the animals and also due to use of crop residues as the major source of roughage, which contain nearly no DCP and very less TDN (Madke *et al.* 2008). Our results confirm the findings reported earlier by Gill *et al.* (1970), Singh *et al.* (1998) and Madke *et al.* (2008). Raut and Amble (1969) reported that the standard of daily ration for non-descript milch cows of suburban area fed with 1.67, 4.44 and 0.78 kg green, dry and concentrate, respectively.

Proportion of annual income by sources: Livestock husbandry forms the major source of income in core (40.75%) and fringe (48.05%) groups. In 'more rural' category income is derived mainly from crop husbandry (65.80%). Households in core group, due to the advantage of their location derived income from varied occupations that contributed to the extent of 16.70% next only to livestock husbandry. Labor (23.05%) and service (22.18%) together contributed equivalent to livestock husbandry in 'fringe' category. In 'more rural' category labor forms the second important income source. Statistically significant differences were noticed ($P < 0.01$) for all the income sources across three categories (Table 3).

Livestock production system: There is no significant difference between the herd size maintained by all the 3 categories. The average herd size was 9.9 ACU in total. On the contrary, the milk yield obtained by each household daily differed significantly ($P< 0.01$) across 3 categories. Overall the average per litre selling price of the milk was Rs 7.26 and it varied significantly ($P < 0.01\%$) in all the categories. The average yield of FYM was 3.13 tonnes/year and in respect of this all the 3 groups varied significantly ($P < 1\%$). The highest quantity (3.13 tonnes/year) of FYM was obtained by 'more rural' households (Table 4).

Table 4. Livestock production system

Variables	Core	Fringe	More rural	Total	F value
Herd size (ACU)	8.34	7.84	8.52	9.9	0.082
Milk yield by household (litres/day)	9.03	9.04	5.60	9.4	17.93**
Cow milk yield (litre/cow/day)	2.00	2.33	3.04	1.90	1.87
Buffalo milk yield (litre/buffalo/day)	4.83	5.08	3.8	4.1	3.81*
Milk price (Rs)	8.6	9.81	7.5	7.26	15.62**
FYM (tonnes/year)	1.2	3.03	5.17	3.13	11.76**

Productivity of livestock in terms of milk yield is better in 'core' and 'fringe' categories as compared to 'more rural'. The average milk yield (3.1 litres/livestock/day) however points at 'low productivity subsistence oriented livestock farming' in confirmation with the results of Vijaylakshmi *et al.* (1995). Madke *et al.* (2008) reported that 61.02% of non-descript livestock produce on an average of 1.1–2 kg of milk every day. Despite the low viability status, it is shown that milk production generates reliable incomes (Somda *et al.* 2005).

Our results revealed clearly three findings: (i) the resource poor livestock holders in UPA continue to derive much of their income (40–48%) from the livestock husbandry. This indicated the significance of livestock in the livelihoods of the people who continue to rear them braving many odds. (ii) the analyses have provided enough evidence that the present feeding system is not meeting the nutritional requirement of the livestock for complex reasons. They are pressed to purchase whatever available in the market that may or may not conform to their nutritional/feed requirement. (iii) the study highlighted that the productivity of livestock owned by these farmers is less and needs to be improved to enable them to move out of poverty. Balanced feed alone has a vast potential to augment the production of livestock and the nutritional status. Providing information on cost-effective balanced feeding,enriching the dry fodder with urea and salt treatment, and use of compact feed blocks should also be encouraged. There is a crucial role for extension services also in making these households aware of potentially available cheaper sources of feeds and advantages of feeding balanced feeds.

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