# FEEDING SYSTEM OF LARGE RUMINANTS IN RURAL BANGLADESH

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## Summary

In order to explore feeding practices of large ruminants and methods followed in the rural areas, an exploratory survey was made during the period from January 1988 to January 1989 in eight different agro-ecological areas of Bangladesh in relation to the existing seasons and farmers' categories. The study shows that feeding practices varied ($p < 0.01$) from area to area and season to season but not with the farmers' category. Considering the overall picture of feeding practices existing in the country, it can be observed that bigger proportion of farmers practiced stall feeding and tethering ($38.4 + 35.1$) followed by stall fed ($34.3 \pm 35.2$) and grazing or tethering ($17.3 \pm 26.7$). The figure with wider deviations indicates that farmers in the rural areas did not follow a smooth feeding practice, the system is rather a complex, heterogenous and a mere consequence of existing land use system. The results of feeding methods of by-product concentrates indicate that it also varied ($p < 0.01$) from area to area but however, not with seasons and farmers' category. It is observed that bigger proportion of farmers fed concentrates to their animals mixed with water ($74.1 \pm 30.3$) followed by mixed with roughage and water ($10.3 \pm 13.3$) or fed alone ($5.6 \pm 14.2$). The method like feeding practice is also complex and heterogenous in the rural areas of Bangladesh.

Hence, it is needed to develop a strategic feeding system and method identifying the problems associated with those.

(**Key Words**: Identification, Feeding System, Large Ruminants, Rural Bangladesh)

## Introduction

On the small farms in Bangladesh animals mostly large ruminants (cattle and buffaloes) complement and support crop production, since they are the most potential for crop-livestock integration in the subsistence type of rice based agricultural production system (Hermans, 1985). The country is generally described as a deltaic flood plain but the physiography represents considerable regional variations with different topographies and soil groups. The country experiences floods each year and is subjected to frequent cyclones and local depressions with thunder storms, surge and heavy showers having marked effect on agriculture, livestock and human lives (Hossain et al., 1987; University of Dhaka, 1981).

The native cattle is a zebu type, dwarf size and slow growing animal originated from Indian sub-continent but extremely adapted to varying subtropical climates. Buffaloes are swamp type and crosses with riverain types found sporadically in the country (Voigtlaender and Krischke, 1980). Animal nutrition is commonly considered the major constraint to animal production and development. There are indications that the proliferation of unthrifty and emaciated animals are the result of poor and inadequate nutrition and also the feed situation is the primary cause of low productivity in the existing livestock population (Dickey, 1985; Lumanta et al., 1990). Farmers knowledge about scientific and systematic feeding system of livestock in the rural areas are poor. Actually no study has been carried out in this aspect. In order to develop a scientific feeding system, however, it needs to focus on the actual feeding system of large animals existing in the country.

The study was thus undertaken to know the actual feeding system of large ruminants in different areas of the country in relation to the existing season and farmers' category to make a standard in order to develop a strategic feeding system to improve livestock production as a whole, suitable to socio-economic and climatic condition of the country.

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## Materials and Methods

In order to get a detailed insight in the traditional feeding systems of large ruminants (cattle and buffaloes) existing in the country an inventory survey was carried out using standard questionnaire in eight different agro-ecological zones from January 1988 to January 1989. The zones were classified according to soil type, temperature regimes, annual rainfall, natural vegetation types and cropping practices. The zones thus classified were :

i) The elevated dry Madhupur tract (Savar);
ii) Milk shed area with pasture land (Serajgonj);
iii) Intensive milk pocket area (Manikgonj);
iv) Riverain area (Faridpur);
v) The high terraced barind tract (Naogaon);
vi) The old flat alluvial basin (Kaunia);
vii) The tea plantation area (Srimangal) and
viii) The hilly area (Naikhongchari).

The criteria for above classification are given in table 1.

From each of the zones a village had been selected as a study area. A complete survey of total village households regarding size and tenurial status of farms, bovine number and distribution, cropping pattern and livestock management had been done with a standard questionnaire. After compilation of questionnaires 12 households were stratified at random in four different categories of farmers with three replications from each stratum. The stratification made was as follows:

i) Large farmers : above 5.0 acres of cultivable

TABLE 1. ZONES ACCORDING TO AGRO-CLIMATIC CRITERIA

| Zones | Bovine population (no's) | Soil type | Temp (℃) | | Annual rainfall (mm) |
|---|---|---|---|---|---|
| | | | Max | Min | |
| Manikgonj (Saturia) | 46936 | Flood plain and piedmont soil (calcarious dark grey and brown flood plain soils). | 38 | 10 | 2032 |
| Dhaka (Savar) | 59567 | Piedmont soil (Grey terrace soils). | 38 | 10 | 2953 |
| Sirajgonj (Sahjadpur) | 84549 | Flood plain and piedmont soil (Calcarious dark grey and brown flood plain soil) | 38 | 7 | 1179 |
| Faridpur (Bhanga) | 39560 | Flood plain soil (calcarious dark grey and brown flood plain soil). | 38 | 8 | 1489 |
| Bandarban (Naikhongchari) | 12032 | Hill soil (Brown hill soil) | 37 | 10 | 2794 |
| Maulavi bazar (Srimangal) | 44514 | Flood plain and piedmont soil (Non-calcarious dark grey and brown flood plain soil and acid basin clays) | 37 | 9 | 4017 |
| Rangpur (Kaunia) | 33848 | Terrace and red piedmont soil (Red brown and grey terrace soil) | 37 | 9 | 4017 |
| Naogaon (Patnitala) | 72026 | Grey terrace soil | 38 | 12 | 2032 |

Source : Bangladesh Bureau of Statistics (1986), The Bangladesh Census of Agriculture and Livestock (1983-84), Statistical Year Book (1986).

land owned and above 10 heads of cattle/buffaloes.

ii) Medium farmers: from 2.5-5.0 acres and above 5 heads of cattle/buffaloes.

iii) Small farmers: from 1.5 2.5 acres and 3-5 heads of cattle/buffaloes.

iv) Marginal farmers: up to 1.5 acre and 1-3 heads of cattle/buffaloes.

In order to draw a complete picture about feeding systems and methods, data on the respective cases were collected by visiting each household in there consecutive days of each month through the study period. Thus the months were cumulated to give seasonal pictures in the following manner: January-April (dry and hot; *Aus*) May-August (hot and wet; *Aman*), and September-December (cool and dry; *Rabi*). Data on the feeding system of each area representing respective farmers category and seasons were collected and compiled. Data on the respective cases were primarily presented in percentages of observation and, since the ranges were higher (ranges above 0 70 percent) the data on percentage values were finally converted to angular transformation (arc-sin transformation) (Snedecor and Cochran, 1989). The transformed data were then analyzed by a computer using SPSS packages. The following parameters were collected in order to determine the existing feeding system of large ruminants:

**A. Feeding practices:**

i) Stall feeding
- Individual
- Group

ii) Grazing/tethering
- road side/embankment
- grazing land

iii) Stall feeding and grazing

**B. Feeding method**

a) Straw/roughage:

i) Chopped

ii) Unchopped

iii) Mixed with water

iv) Treated with urea.

b) By-product concentrates:

i) Sole

ii) Mixed with water

iii) Mixed with roughage and water.

## Results and Discussion

The results showed that farmer's feed practices to large ruminants (cattle and buffaloes) distinctly differs ($p < 0.01$) in the study areas and in different seasons irrespective of farmers' categories. The table shows (table 2a) that the farmers of Naogaon and Serajgonj areas fed their animals mostly in stall where group feeding was a common phenomenon. On the other hand, the far-

TABLE 2a. FEEDING PRACTICES (MEAN ± SD) OF CATTLE AND BUFFALOES IN THE AREAS (SIN-ARC TRANSFORMED FROM PERCENTAGE VALUES)

| | Feeding practices | | |
|---|---|---|---|
| Area | Stall fed | Grazing/Tethering | Stall fed and tethering |
| Faridpur | $52.2 \pm 40.7^{b}$ | $0.0 \pm 0.0^{e}$ | $37.8 \pm 40.0^{d}$ |
| Savar | $25.3 \pm 12.5^{d}$ | $2.7 \pm 9.2^{d}$ | $62.0 \pm 13.9^{b}$ |
| Noagaon | $58.0 \pm 43.4^{a}$ | $15.9 \pm 20.8^{b}$ | $16.1 \pm 24.3^{f}$ |
| Naikhongchari | $9.1 + 16.5^{e}$ | $61.3 \pm 39.5^{a}$ | $19.6 \pm 36.5^{f}$ |
| Sirajgonj | $58.0 \pm 34.4^{a}$ | $15.9 \pm 20.8^{b}$ | $16.1 \pm 24.3^{f}$ |
| Srimangal | $2.3 \pm 8.1^{f}$ | $14.7 \pm 19.1^{b}$ | $74.0 \pm 20.2^{a}$ |
| Manikgonj | $44.3 \pm 11.9^{c}$ | $19.6 \pm 16.1^{b}$ | $33.2 \pm 13.5^{e}$ |
| Kaunia | $24.2 \pm 32.2^{d}$ | $8.8 + 15.8^{c}$ | $57.1 \pm 43.3^{c}$ |
| Over all | $34.3 \pm 35.2$ | $17.3 \pm 26.7$ | $38.4 \pm 35.1$ |

Dissimilar superscripts in the same column differs significantly ($p < 0.01$).

mers of Naikhongchari mostly grazed their animals throughout the year. Farmers in Naikhongchari used to cultivate only one crop, mainly *Aus* or *Aman* during the rainy season starting from May to August on the plain land which remains fallow throughout the rest of the year and hence they can graze their animals exclusively on natural growth of weeds. Furthermore, the farmers in hilly areas are reluctant to stall feeding because during the harvest period, crops are collected only with upper portion (rachis) leaving stubbles on the field and the animals graze on stubbles along with regrowth weeds. In Savar and Kaunia land is scarce and a very less opportunity is being left during the cropping seasons to graze the cattle. Grazing or tethering practice was quite absent in Faridpur, because it is a low lying riverain area that prone to flood and with an average of two crops per year thus land is scarce for any type of grazing even tethering in that area. Both of the practices (stall feeding and tethering) was also observed in the studied areas. Farmers in Srimangal followed this practice largely through grazing during the day and feed their animals once or twice in stall before and after grazing at every morning and evening. Farmers in Naogaon and Serajgonj used to feed their animals very rarely both in stall and tethering.

Seasons exerted marked effect ($p < 0.01$) on feeding practices (table 2b). It can be seen from the table that during the periods of May to August and September to December farmers practice stall feeding mostly. During these period farmers cultivate *Aus, Aman* and *Boro* paddy and hence land is also scarce to tethering or grazing. On the other hand, grazing and/or tethering is comparatively higher during the period of January to April, because land becomes fallow after harvesting *Boro* crop until the next rain and some farmers also cultivate pulses during this period and thus a greater proportion of farmers used to feed their animals both in stall and tethering. However, farmers category did not imply distinct feed practices in respect to feeding large animals (table 2c).

However, the overall feeding practices adopted by the rural farmers indicated that higher proportion ($38.4 \pm 35.1$) of farmers practice tethering in addition to stall feeding followed by stall fed only ($34.3 \pm 35.2$) and grazing ($17.3 \pm 26.7$). Considering the farmers of different areas, seasons and their categories, it can be observed (from the mean values and their deviation of respective practices) that the farmers of rural areas did not practice a homogeneous feeding practice, rather the practice is a complex and heterogeneous.

The heterogeneity was observed in different areas, seasons and in farmers' category or even within the same areas or season or a farmers' category. Thus, it is observed that farmers' feeding practices widely varied in the rural areas of Bangladesh considering the factors associated with the study.

Feeding methods of animals are also described in table 3a, 3b and 3c. Feeding method of a particular practice implies the methods of feeding animals in that practice. Roughage mostly straw, natural green grass, weeds, water hyacinth, sugarcane tops and some other legumes offered to the animals during the study period. Mostly unchopped straw were served to the animals from straw heap and assigned in group in larger cases.

TABLE 2b. FEEDING PRACTICES (MEAN ± SD) OF CATTLE AND BUFFALOES IN DIFFERENT SEASONS (SIN ARC TRANSFORMED FROM PERCENTAGE VALUES)

| | Feeding practices | | |
|---|---|---|---|
| Seasons | Stall fed | Grazing/Tethering | Stall fed and tethering |
| January-April | $8.1 \pm 15.0^{b}$ | $26.0 + 15.1^{a}$ | $55.9 + 30.1^{a}$ |
| May-August | $45.8 \pm 37.6^{a}$ | $5.5 \pm 17.6^{c}$ | $39.7 \pm 36.5^{b}$ |
| September-December | $50.1 + 33.2^{a}$ | $20.7 \pm 26.5^{b}$ | $21.3 \pm 29.6^{c}$ |
| Over all | $34.3 \pm 35.2$ | $17.3 \pm 26.7$ | $38.4 + 35.1$ |

Dissimilar superscripts in the same column differs significantly ($p < 0.01$).

TABLE 2c. FEEDING PRACTICES (MEAN ± SD) OF CATTLE AND BUFFALOES IN RELATION TO FARMERS CATEGORY (SIN-ARC TRANSFORMED FROM PERCENTAGE VALUES)

| | Feeding practices* | | |
|---|---|---|---|
| Farmers category | Stall fed | Grazing/Tethering | Stall fed and tethering |
| Large | 34.2 ± 34.2 | 14.3 ± 24.1 | 42.5 ± 36.5 |
| Medium | 34.5 ± 35.1 | 17.5 ± 27.5 | 38.0 ± 36.0 |
| Small | 33.3 + 36.3 | 20.2 + 28.8 | 36.6 + 34.0 |
| Marginal | 34.1 ± 37.5 | 16.9 ± 27.7 | 39.0 ± 36.2 |
| Over all | 34.3 ± 35.2 | 17.3 ± 26.7 | 38.4 ± 35.1 |

* Not significant.

TABLE 3a. FEEDNG METHOD (MEAN ± SD) OF BY-PRODUCT CONCENTRATES (SIN-ARC TRANSFORMED FROM PERCENTAGE OF OBSERVATION)

| | Feeding method | | |
|---|---|---|---|
| Area | With roughages and water | With water | Fed alone |
| Faridpur | 0.0 ± 0.0 | 90.0 ± 0.0$^{a}$ | 0.0 ± 0.0 |
| Savar | 15.0 ± 10.5$^{ab}$ | 44.6 ± 24.2$^{b}$ | 30.4 ± 18.9$^{a}$ |
| Noagaon | 0.0 ± 0.0 | 90.0 ± 0.0$^{a}$ | 0.0 ± 0.0 |
| Naikhongchari | 30.0 ± 21.4$^{a}$ | 50.4 ± 40.5$^{ab}$ | 9.6 ± 17.5$^{b}$ |
| Sirajgonj | 0.0 + 0.0 | 90.0 + 0.0$^{a}$ | 0.0 ± 0.0 |
| Srimangal | 7.5 ± 5.7$^{b}$ | 82.5 ⊥ 26.0$^{a}$ | 0.0 ± 0.0 |
| Manikgonj | 0.0 ± 0.0 | 90.0 ± 0.0$^{a}$ | 0.0 ± 0.0 |
| Kaunia | 30.0 ± 19.5$^{a}$ | 55.4 ± 43.8$^{ab}$ | 4.6 + 15.9$^{c}$ |
| Over all | 10.3 ± 13.2 | 74.1 ± 30.3 | 5.6 ± 14.3 |

Dissimilar superscripts in each column differs significantly ($p < 0.01$).

TABLE 3b. FEEDING METHOD (MEAN ± SD) OF BY-PRODUCT CONCENTRATES TO THE CATTLE AND BUFFALOES IN DIFFERENT SEASONS SIN-ARC TRANSFORMED FORM PERCENTAGE VALUES

| | Feeding method* | | |
|---|---|---|---|
| Season | With roughages and water | With water | Fed alone |
| January-April | 14.0 ± 19.4 | 72.3 + 33.6 | 3.7 + 11.4 |
| May-August | 11.2 ± 15.4 | 74.8 ± 31.2 | 4.0 ± 12.4 |
| September-December | 5.5 ± 9.6 | 75.2 ± 26.5 | 9.2 ± 18.0 |
| Over all | 10.3 ± 13.2 | 74.1 + 30.3 | 5.6 ± 14.3 |

* Not significant.

TABLE 3c. FEEDING METHOD (MEAN ± SD) OF BY-PRODUCT CONCENTRATES TO THE CATTLE AND BUFFALOES TO RELATION OF FARMERS CATEGORY (SIN-ARC TRANSFORMED FROM PERCENTAGE VALUES)

| | Feeding method* | | |
|---|---|---|---|
| *Farmers category* | With roughages and water | With water | Fed alone |
| Large | 15.1 ± 16.6 | 71.3 ± 34.9 | 3.8 ± 12.7 |
| Medium | 7.5 ± 6.5 | 75.4 ± 28.3 | 7.1 ± 16.3 |
| Small | 7.5 ± 5.8 | 79.2 ± 26.9 | 3.3 ± 11.4 |
| Marginal | 11.2 ± 9.2 | 70.6 ± 31.8 | 8.1 ± 16.9 |
| Over all | 10.3 ± 13.3 | 74.1 ± 30.3 | 5.6 ± 14.3 |

* Not significant.

Allowing chopped straw to the animals was not observed in the studied areas. By-product concentrates, mostly rice and wheat bran, oil cakes etc were being fed as sole, mixed with water in the manger, or with the admixture of water and roughage (mostly straw). Feeding urea treated straw was completely absent in the studied areas. The results showed that feeding methods of by product concentrates to the animals differed distinctly ($p < 0.01$) in the areas studied, but not in relation to different seasons and farmers' category. From the table 2a it can be revealed that the farmers in Savar, Naikhongchari and Kaunia fed concentrates to their animals mostly with the admixture of roughage and water while the concentrates fed alone was also higher in Savar followed by Naikhongchari and Kaunia, and this practice was not observed in other places. On the other hand, concentrate feeding mixed with water was observed elsewhere of the studied areas while the practice was observed mostly in Faridpur, Naoganon and Manikgonj. When concentrates were offered with water only or with the roughage and water, it was observed that farmers mixed some salt to make it tasty as a whole in most cases.

However, it can be observed from the table 3b and table 3c that seasons or farmers' category did not exert any effect on the feeding methods of animals.

Considering the overall phenomena of feeding methods it was observed that bigger proportion of farmers in the studied areas fed by-product concentrates to their animals with water (74.1 ± 30.3) followed by mixed with water and roughage (10.3 ± 3.2) or concentrate fed alone (5.6 ± 14.3). From the figures it can also be noted that like feeding practices method is also heterogeneous and complex, The heterogeneity varied widely between and among the factors and parameters studied in this study.

## Conclusion

This study was undertaken to collate traditional feeding practices and methods of large ruminants in selected rural zones. The objective of the study was to find out either any innovational change or any evolving improved traditional practice in feeding ruminants *per se* that have been introduced to rural farmers either by institutional extension mechanism or by themselves in order to improve their comparative and consistently lower productivity. The findings have indicated clearly the knowledge-gap of systematic and scientific ruminant production by the greater proportion of rural farmers. Ruminants (cattle and buffaloes in particular) in rural Bangladesh are very much neglected, although more than 98 percent of farm power are derived from them for crop production and rural haulage. They have to survive on crop residues, wastes from post-harvest processing and natural grass and weed vegetation which are strongly seasonal. The bulk of their diet consists of straw alone that can not maintain a cattle because of its low digestibility, low crude protein, unpalatability, low energy and low level of dietary intake. Improvement in the

utilization of straw as ruminant feed can be increased by physical, chemical and bio-chemical treatments and strategic supplementation of straw diet with by-pass protein and energy sources as well as increasing intake through admixing with more palatable natural grass and weeds from cut and carry system. Simplest way of higher ruminant productivity can be derived from chopping of straw that can either be enriched with NPN (urea) by soaking in water over night in a manger or admixed with natural grass, weeds and tree leaves. Both the ways can enhance feed intake, i. e. increasing DM for animal. Adding cane molasses to soaked straw overnight with fertilizer grade urea will further give both nitrogen and energy for microbial digestion of cellulytic roughage in the rumen. The incorporation of tree leaves on the other hand can balance in addition with necessary minerals. Urea-Molasses Block is another way for mineral-protein and energy supplement. None of the said improvement pathways were followed by farmers in the present study, though the feed resources are available at rural level.

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