



## Feeding practices and availability of storage space for feed and fodder in Gaushalas of Haryana

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In India, the average milk production per animal is lower than the other countries due to poor genetic potential of animals, lack of adequate quantity and quality of feeds and fodders, and other management practices including health covers. The low productivity of the Indian cow can be attributed to several factors. However, inadequate nutrition is the single largest factor responsible for low productivity in Indian defined breeds. Several sources indicated that there is scarcity of green fodder, dry fodder and concentrates in the country due to which animals do not get adequate feeding for expression of their genetic potential for their productivity (NCA 1976, Ranjhan 1994, Biradar *et al.* 2007, Meena *et al.* 2014). Haryana is an advanced agricultural region in India. The state is known for its Hariana breed of cattle and Murrah breed of buffalo. There are 21.33 million cattle and 43.73 million buffaloes in Haryana (Livestock Census 2012). There are about 420 Gaushalas, most of these are primarily catering to the non-lactating, weak, unproductive and stray cattle. The aim was to conduct the gap of knowledge and possible future replication of such practices over more area with specific refinements. This study highlights the feeding practices of different categories of animals in Gaushalas and availability of storage space of feed and fodder.

The present study was conducted in Gaushalas of Haryana (India). As per 19<sup>th</sup> (2012) Livestock Census, the indigenous cattle population in Haryana is 8.12 lakhs, out of which 3.06 lakhs (37.70%) is present in 420 Gaushalas. Out of these 420 Gaushalas, only 30 Gaushalas were selected (by stratified random sampling) from 10 districts which represents 83% of the total Gaushalas present in Haryana and these were in Sirsa, Hisar, Fatehabad, Bhiwani, Jind, Sonapat, Kurukshetra, Karnal, Kaithal and

Panipat. These 30 Gaushalas were divided into three groups on the basis of number of animals present Gaushala having animals in the range of 100-500 were categorised as small size Gaushala (T1) (n=10); while those having 501-1000 animals and >1000 animals were categorised as medium (T2) (n=10), and large size Gaushala (T3) (n=10), respectively. The total number of animals in this study was 34,279 which belonged to small (3483), medium (7831) and large (22965) size Gaushalas, respectively. The data for the study were collected during April 2017 to February 2018 from the Gaushalas through interview using a structural questionnaire and on-site observation.

Actual observation on availability and physical quality of the feeds and fodders; Actual measurements of the green fodder/ silage and dry fodders and concentrate mixture offered to the various categories of the animals on the day of visit; and measure of the available storage space for storing the dry fodder and concentrate mixture at Gaushalas on day of visit, were recorded.

*Calculation of storage space for dry fodder and concentrate mixture:* Storage building in Gaushalas is a good asset for storage of dry fodders and concentrate mixture. Availability of straw / paddy straw is abundant during crop harvesting season, these need to be stored for further use throughout the year. Space requirement for dry fodder storage depends upon the manner in which the dry fodder is stored. Average consumption of dry fodder in case of adult cattle, heifer and calf is 5, 4 and 2 kg/day, respectively. On the basis of above average consumption of dry fodder per day, the average consumption of dry fodder per year for adult cattle, heifer and calf is 1825 (365×5), 1460 (365×4) and 730 (365×2) kg, respectively. Total storage space required for dry fodder (1 ton = 300 ft<sup>3</sup>) (Schroeder and Hellevang 2005) was calculated at each Gaushalas. Similarly, required storage space of concentrate mixture was calculated on the basis of per 0.2 m<sup>3</sup> required storage space per adult unit per year.

Availability of green fodders during rainy season were mainly cereal green fodder i.e. sorghum and maize; during winter season leguminous green fodder i.e. berseem and cereal fodder, oats; and during summer season, maize and jowar. Availability of dry roughages was mostly wheat straw and some amount of paddy straw. Some of the large

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Table 1. Availability of feed stuffs for milch cows in different categories of Gaushalas

| Feed stuffs                               | Size of Gaushalas |                          |             |                          |            |                          | Overall<br>Mean±SE |
|-------------------------------------------|-------------------|--------------------------|-------------|--------------------------|------------|--------------------------|--------------------|
|                                           | Small (T1)        |                          | Medium (T2) |                          | Large (T3) |                          |                    |
|                                           | N                 | Mean±SE                  | N           | Mean±SE                  | N          | Mean±SE                  |                    |
| Green fodders<br>(kg/milch cow/day)       | 5                 | 11.50 <sup>c</sup> ±0.65 | 9           | 13.88 <sup>b</sup> ±0.74 | 10         | 17.11 <sup>a</sup> ±1.18 | 14.16±0.86         |
| Dry fodders<br>(kg/milch cow/day)         | 5                 | 5.20 <sup>c</sup> ±0.17  | 9           | 4.80 <sup>b</sup> ±0.12  | 10         | 4.46 <sup>a</sup> ±0.11  | 4.82±0.13          |
| Concentrate mixture<br>(kg/milch cow/day) | 5                 | 0.70 <sup>c</sup> ±0.12  | 7           | 1.29 <sup>b</sup> ±0.10  | 10         | 1.65 <sup>a</sup> ±0.11  | 1.21±0.11          |

Means bearing different superscript in a row differ significantly (P<0.05).

Gaushalas prepared concentrate mixture by using locally available feed ingredients like cotton seed cake and mustard cake as protein source; broken wheat, wheat bran and gram husk as energy source. Similar findings were reported by Mahipal and Kherde (1991) who reported that the extent of adoption of feeding practices increased with the size of landholdings of the respondents. Contrary to this study, Agarwal and Sharma (1986) and Shinde *et al.* (1994) reported inadequate supply of feeds and fodders, lack of irrigation facilities, and non-availability of land for fodder production. The overall availability of green fodders, dry fodders and concentrate mixture for milch cows in different size of Gaushalas were 14.16±0.86, 4.82±0.13 and 1.21±0.11 kg/day, respectively (Table 1).

The mean values of availability of green fodder, dry fodders and concentrate mixture in T1, T2 and T3 Gaushalas were 11.50±0.65, 13.88±0.74 and 17.11±1.18; 5.20±0.17, 4.80±0.12 and 4.46±0.11; and 0.70±0.12, 1.29±0.10 and 1.65±0.11 kg/day, respectively. The mean value of availability of green fodders and concentrate mixture were significantly (P<0.05) higher in T3 Gaushalas as compared to T1 and T2 Gaushalas. It was also significantly (P<0.05) higher in T2 Gaushalas than the T1 Gaushalas. Although the mean value of availability of dry fodder was significantly (P<0.05) higher in T1 than the T2 and T3 Gaushalas, and also significantly (P<0.05) higher in T2 Gaushalas than the T3 Gaushalas.

In the present study, the availability of green fodder and concentrate mixture per milch cow were higher and availability of dry fodder per milch cow was lower than that reported by Yadav and Singh (2005).

The overall availability of green fodder and dry fodders for calve, heifer, bulls and bullocks and unproductive cows in different size of Gaushalas were 2.14±0.20 and 1.85±0.11; 3.78±0.26 and 3.83±0.14; 5.96±0.44 and 5.08±0.15 kg/day, respectively (Table 2). The mean values of availability of green fodder and dry fodder in T3 Gaushalas were significantly (P<0.05) higher than the mean values of availability of green fodder and dry fodder in T1 Gaushalas and, there was no significant (P<0.05) difference between the mean values of availability of green and dry fodder in T1 and T2 Gaushalas as well as T2 and T3 Gaushalas.

The present findings of the availability of green and dry fodder for calf were higher than those reported by Yadav and Singh (2005) in Gaushalas. Although the availability of green fodder for heifers was lower and dry fodder was higher than that reported by Yadav and Singh (2005) It is reported that choice between paddy and wheat straw varies within as well as between regions. Rangnekar (1993) reported that choice between paddy and wheat straw varies from herd to herd.

The mean values of availability of green and dry fodder for bulls and bullocks and unproductive cows in T1, T2 and T3 Gaushalas were 4.90±0.34, 5.93±0.51 and 7.05±0.48 and; 5.28±0.17, 5.13±0.16 and 4.84±0.13 kg/day respectively. However it was significantly (P<0.05) higher than the mean value of availability of green fodder in T3 Gaushalas than T1 Gaushalas whereas dry fodder were significantly higher in T1 Gaushalas than the T3 size Gaushalas, and there was no significant (P<0.05) difference of the mean values of availability of green fodder and dry fodder between T1 and T2 Gaushalas as well as T2 and T3 Gaushalas.

Table 2. Availability of feedstuffs for calves, heifers, bulls and bullocks and unproductive cows in different categories of Gaushalas

| Category of animals                                              | Feedstuffs   | Size of Gaushalas |                         |             |                          |            |                         |           |
|------------------------------------------------------------------|--------------|-------------------|-------------------------|-------------|--------------------------|------------|-------------------------|-----------|
|                                                                  |              | Small (T1)        |                         | Medium (T2) |                          | Large (T3) |                         | Overall   |
|                                                                  |              | N                 | Mean±SE                 | N           | Mean±SE                  | N          | Mean±SE                 |           |
| Calves<br>(kg/calves/day)                                        | Green fodder | 4                 | 1.60 <sup>a</sup> ±0.23 | 5           | 2.12 <sup>ab</sup> ±0.14 | 5          | 2.70 <sup>a</sup> ±0.24 | 2.14±0.20 |
|                                                                  | Dry fodder   | 6                 | 1.68 <sup>b</sup> ±0.09 | 9           | 1.84 <sup>ab</sup> ±0.12 | 10         | 2.02 <sup>a</sup> ±0.12 | 1.85±0.11 |
| Heifers<br>(kg/heifers /day)                                     | Green fodder | 4                 | 3.18 <sup>b</sup> ±0.26 | 5           | 3.70 <sup>ab</sup> ±0.24 | 5          | 4.45 <sup>a</sup> ±0.29 | 3.78±0.26 |
|                                                                  | Dry fodder   | 4                 | 3.63 <sup>b</sup> ±0.14 | 7           | 3.79 <sup>ab</sup> ±0.16 | 10         | 4.08 <sup>a</sup> ±0.12 | 3.83±0.14 |
| Bulls and bullocks and<br>unproductive cows<br>(kg/animals /day) | Green fodder | 4                 | 4.90 <sup>b</sup> ±0.34 | 5           | 5.93 <sup>ab</sup> ±0.51 | 5          | 7.05 <sup>a</sup> ±0.48 | 5.96±0.44 |
|                                                                  | Dry fodder   | 10                | 5.28 <sup>b</sup> ±0.1  | 10          | 5.13 <sup>ab</sup> ±0.1  | 10         | 4.84 <sup>a</sup> ±0.1  | 5.08±0.15 |

Means bearing different superscript in a row differ significantly P<0.05.

Table 3. Storage space of dry fodders and concentrate mixture in different categories of Gaushalas

| Storage space for dry fodder and concentrate mixture | Size of Gaushalas |                   |             |                   |            |                  |
|------------------------------------------------------|-------------------|-------------------|-------------|-------------------|------------|------------------|
|                                                      | Small (T1)        |                   | Medium (T2) |                   | Large (T3) |                  |
|                                                      | N                 | Mean±SE           | N           | Mean±SE           | N          | Mean±SE          |
| <i>Dry fodder</i>                                    |                   |                   |             |                   |            |                  |
| Available storage space (ft <sup>3</sup> )           | 10                | 62712±11875.65    | 10          | 177400±33212.49   | 10         | 657988±83893.32  |
| Required storage space (ft <sup>3</sup> )            | 10                | 163067.4±16875.48 | 10          | 368423.7±27963.16 | 10         | 1083590±170291   |
| Short fall (%)                                       | 10                | -57.29            | 10          | -50.21            | 10         | -37.79           |
| <i>Concentrate mixture</i>                           |                   |                   |             |                   |            |                  |
| Available storage space (ft <sup>3</sup> )           | 5                 | 2749.00±653.47    | 6           | 4420.00±332.87    | 10         | 9533.33±1347.01  |
| Required storage space (ft <sup>3</sup> )            | 5                 | 2056.40±339.53    | 6           | 5368.39±286.40    | 10         | 13995.37±2342.84 |
| Excess/shortfall (%)                                 |                   | 46.39             |             | -16.90            |            | -30.61           |

The mean values of available storage space and required storage space (ft<sup>3</sup>) for dry fodder in T1, T2 and T3 Gaushalas were 62712±11875.65, 177400±33212.49 and 657988±83893.32 ft<sup>3</sup> and, 163067.4±16875.48, 368423.7±27963.16 and 1083590±170291 ft<sup>3</sup> respectively, whereas the overall available storage space and required storage space for dry fodder was 299366.7±42993.82 ft<sup>3</sup> and 538360.4±71709.87 ft<sup>3</sup> respectively (Table 3). The differences between the available storage space (ft<sup>3</sup>) and required storage space (ft<sup>3</sup>) indicate the excess/shortfall of the storage space for dry fodder. The results indicated that the percentage of shortfall of storage space for dry fodders was lowest in large Gaushalas (37.79%) followed by medium (50.21%) and T1 Gaushalas (57.29%). Rangnekar (1993) reported that choice between paddy and wheat straw varies from herd to herd.

The mean values of available storage space (ft<sup>3</sup>) for concentrate mixture in T1, T2 and T3 Gaushalas are presented in Table 3. The mean values of available storage space and required storage space (ft<sup>3</sup>) for concentrate mixture in T1, T2 and T3 Gaushalas were 2749.00±653.47, 4420.00±332.87 and 9533.33±1347.01 ft<sup>3</sup> and, 2056.40±339.53, 5368.39±286.40 and 13995.37±2342.84 ft<sup>3</sup> respectively, whereas the overall available storage space and required storage space for concentrate mixture in Gaushalas was 5567.44±777.78 ft<sup>3</sup> and 7140.06±989.59 ft<sup>3</sup> respectively.

The differences between the available storage space (ft<sup>3</sup>) and required storage space (ft<sup>3</sup>) were the excess / shortfall of the storage space for concentrate mixture. The excess or shortfall of the storage space for concentrate mixture in T1, T2 and T3 Gaushalas was 46.39% (excess), -16.90% (shortfall) and -30.61% (shortfall), respectively, whereas the overall shortfall of the storage space for dry fodder was -0.37%. The results indicate that the percentage of shortfall of storage space for concentrate mixture was highest in T3 Gaushalas (-30.61%) followed by T2 (-16.90%) and excess storage space for concentrate mixture in T1 Gaushalas 46.39%. Feeding of green fodder and concentrate mixture were better in T3 Gaushalas, while feeding of dry fodder were better in T1 Gaushalas. Percentage of shortfall of storage space for dry fodders was lowest in T3 Gaushalas (37.79%) and highest in T1 Gaushalas (57.29%), whereas percentage of shortfall of storage space for concentrate

mixture was highest in T3 Gaushalas (-30.61%), lowest in T2 Gaushalas (-16.90%) and no shortfall in T1 Gaushalas.

### SUMMARY

The present investigation was carried out to study the existing feeding practices and its storage space in Gaushalas. The data collected from 30 Gaushalas were divided into three categories: small (T1), medium (T2) and large size (T3) Gaushalas. The obtained finding showed that the availability of green fodders was significantly ( $P<0.05$ ) higher in T3 Gaushalas as compared to T1 Gaushalas. The concentrate mixture was offered to milch cow was significantly ( $P<0.05$ ) higher in T3 Gaushalas (1.65±0.11 kg/cow) as compared to T2 and T1 Gaushalas (1.29±0.10 and 0.70±0.12). Percentage of shortfall of storage space for dry fodders was highest in T1 Gaushala (-57.29%) while percentage of shortfall of storage space for concentrate mixture was higher in T3 Gaushalas (-30.61%) than T2 Gaushalas (-16.90%). It could be concluded that the better feeding practices and also better availability of storage facilities (dry fodder) is present in T3 Gaushalas.

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