Evaluation of Grass Bales Stored under Cover and Plinth System of Storage

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Introduction

The feed and fodder requirement for dairy animals is primarily met by roughages, green fodder and homemade concentrate mixtures. Roughages are high in crude fibrous material which essentially consists of cellulose, hemi-cellulose and to some extent lignin. Livestock production is backbone of Indian Agriculture and source of employment in rural areas for centuries. To meet the demand of feeding these huge livestock population an adequate supply of feed throughout the year is the prerequisite for successful animal production programmes.

A huge gap between demand and supply of feed and fodder exists in our country. This huge gap between requirement and availability of livestock feeds like dry fodders, green fodders could however be bridged by proper post harvest management of all kind of forage resources and search for alternate source of protein rich forage supplement. The most common livestock feed resources are crop reduces (straw, stover, haulms etc). All of these fodder resources are highly voluminous and having lower density varying from 40-70 kg/m^3 due to which there transportation, storage and handling are very cumbersome and expensive and therefore cannot be utilized up to a maximum extent. Storage is a repeated phase during transit of agricultural produce and the product needs to be stored from one harvest to next thus, demanding additional carry over as safe guard, against speculation in price and market demand or against shortage and famine.

Materials and Methods

Grasses and legumes grown in central research farm were harvested dried and baled by densifying machine for storage study. Sun dried grasses and legumes (mixed herb) were densified with the help of high density forage baling machine developed by Indian Grassland and Fodder Research Institute (IGFRI), Jhansi, India. The machine is equipped with crank-piston drive mechanism and has a rectangular piston cross- section. It is operated by a 3 phase, electric motor with V-belt and pinion-gear power transmission system. Density of the bales can be adjusted with the help of a spring tension mechanism provided at the outlet point of the machine. A force feed mechanism has been provided for the pre compression of the loose herbage in the hopper, which, in turn, increases the hay input inside the compression chamber. Feeding mechanism and tying of bales is manual. The capacity of machine is 200 to 600 kg/h depending upon material.
These bales were stacked under cover and plinth (CAP) storage system on three storage platform and covered with polythene sheet in the month of May 2010 for one year to asses its nutritional quality. Representative samples were drawn regularly at an interval of one month for its nutritional quality analysis. Samples were analyzed for proximate principles (AOAC, 2000) and cell wall constituents (Van Soest *et al.*, 1991).

Results and Discussion

Prepared grass bales had average size of 30 x 30 x 61 cm, average weight 13 kg and density 236 kg/m^3. The bales initially had average moisture content of 6.57%, CP 4.22% and NDF 71.03% at the time of storage (Table 1). Moisture of bales was increased up to September 2010 at the higher level of 9.68% and then reduced up to 5.66% in April 2011. CP content of stored bales were gradually decreased and remained 3.90% in April 2011 and NDF content was gradually increased up to 73.20% in similar time. But the values did not differ significantly during the storage period.

Table 1: Changes in grass bales during storage

Months	Moisture%	Crude Protein %	Neutral Detergent Fibre %
Initial (May)	6.57±0.11	4.22±0.04	71.03±1.04
June	4.28±0.09	4.20±0.05	71.03±1.17
July	7.90±0.13	4.16±0.04	71.06±1.21
August	8.41±0.14	4.12±0.03	71.27±1.22

September	9.68±0.14	4.01±0.03	72.32±1.19
October	9.12±0.12	3.95±0.05	73.01±1.27
November	7.20±0.10	3.92±0.04	73.05±1.24
December	7.33±0.09	3.92±0.02	73.06±1.16
January	7.14±0.06	3.91±0.03	73.08±1.12
February	6.53±0.04	3.91±0.02	73.08±1.03
March	5.76±0.02	3.90±0.03	73.09±1.07
April	5.66±0.02	3.90±0.02	73.20±1.02

Mamun *et al*. (2002) built improved store houses of gable type tin shed with raised slate about 1½ ft height from the ground and reported quality and quantity of rice straw as affected by traditional and improved storage systems in Bangladesh. Dried Leucaena leaf meal can be stored in gunny bags up to one year without significant deterioration in its nutritional quality (Dwivedi and Pathak 2010). A cover and plinth storage structure (CAP storage) for storing these grass bales under present study was made at IGFRI, Jhansi, which includes three platforms of size 9X3 m with 0.76 m height from ground and polythene sheet of 1000 gauge for covering the stored bales costing Indian Rs. 35630. Each platform had storage capacity of 1500 bales weighing about 18 ton per storage platform up to a height of 3 m.

Conclusion

Densification of grasses increased the density of grasses about four times and reduced the storage space. Cover and plingth system of storage provided safe storage to the baled grasses without significant deterioration in nutritional quality. Hence, this storage system can be recommended for the safe storage of grass bales up to one year. Further this storage system can be adopted for development of a crop residues based fodder bank to utilize the feed resources during off season and natural calamities.

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