

Original Research Article

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Study of Urea Treatment of Wheat Straw Fed as Complete Feed on Digestibility of Nutrient of Cross Bred Heifers under Loose Housing System

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Limited use of cereal straws in livestock feeding is due to their low voluntary intake, low protein contents and low digestibility. Nutritional value of these roughages can be improved through chemical or physical methods. Efficacy of treating straw with urea for improving its nutritive value is considered equivalent to anhydrous or aqueous ammonia. However, the adoption rate of urea treatment by farmers is low, maybe due to relatively tedious technology and higher requirement of labour. There is need to simplify urea treatment methods.

Introduction

In developing countries, livestock is usually fed high fibrous crop residues (wheat straw, rice straw, stovers, etc.) characterized by high indigestible fibre due to increased lignification of cellulose. Fermentable energy and protein deficiencies in crop residues coupled with their low digestibility impair intake, ruminal functions, and thus animal productivity. The situation strongly demands the improvement of the nutritive value of high fibrous crop residues through various

treatments, for the efficient utilization of existing feed resources. India have a large cattle population, it is very difficult to feed cattle to exploit fully her genetic potentials. Feeding balanced ration in required quantity is the key problem in the area of animal nutrition. Grazing land is negligible, the supply of green fodder is limited in some area. The only feed available for most of the animals in rural areas is poor quality roughages. Complete feed not only provides the required nutrients in proper proportion at a time. Efforts were made in the past to

improve the digestibility and protein through chemical treatment. In this connection sodium hydroxide was used (Dass and Kundu, 1994) which resulted in improving the digestibility, but its use remained limited due to a high cost of chemical and environmental pollution. The other compound used was anhydrous ammonia (Gotlib *et al.*, 1977) which improved the digestibility and increased the nitrogen contents of the treated straw (Yadav AND Yadav, 1989), but non-availability of ammonia gas in the common market and its transportation through specialized containers limited its use. Lately fertilizer grade urea has been used for this purpose (Ali *et al.*, 1992; Sarwar *et al.*, 2006). Urea is cheaper, easily available and assumed to be equivalent to anhydrous or aqueous ammonia for upgrading cereal straws in the warmer regions of the world. However, the adoption rate of this technique remained low. One reason may be the relatively tedious technology and high requirement of labour. There is a need for the method of treatment to be simplified, with minimum involvement of labour. O'Donovan *et al.*, (1997) reported that the urea treatment process would be popular if it is simple, practical and the material to be used in the treatment is available on the farm. In the present study an effort was made to simplify the conventional urea treatment method by using urease enzyme sources available at the farm, so that farmers could easily adopt this technology. Keeping the views present study was plan with the objective to find out the effect of complete feed "Sani" prepared out of untreated and urea treated wheat straw verses conventional feeding system under loose housing system.

Materials and Methods

Eighteen cross bred (1/2 Jersy + 1/4 Holstein friesian + 1/4 Gir) heifers between the age of 7-14 months were selected from the Livestock farm, Adhartal, Jabalpur. The average of the

three body weight was taken as the body weight of the animal, the heifers were distributed into three treatment groups as per their body weight. Each treatment group had six heifers, treatment Group I was the control, conventional feeding was followed in this group i.e wheat straw adlibitum and 1.5 kg concentrate mixture per heifers was fed separately. To treatment Group II untreated wheat straw and concentrate mixture in the ratio of 50:50 was fed as "Sani" complete feed and to treatment Group III urea treated wheat straw and concentrate mixture in the ratio of 50:50 was fed as "Sani" complete feed. The respective diets were fed to the heifers for 60 days inclusive of 7 days digestion trial at the end of experimental period.

Results and Discussion

Digestibility of nutrient – Digestibility of DM in the treatments Groups I, II and III was 49.53 plus minus 0.38, 56.23 plus minus 1.04 and 61.02 plus minus 0.64% respectively. And the difference is in between the groups were significant ($P<0.01$). Lowest digestibility was observed in the conventional feeding system (group I), when complete feed "Sani" (Group II) was used, digestibility was improved and there was further improvement in the digestibility when urea treated wheat straw was used in the complete feed "Sani" (Group III).

Crude protein digestibility was 49.34 plus minus 0.68, 57.93 plus minus 0.5, 58.28 plus minus 0.32% respectively. Significant ($P<0.01$) lower digestibility was observed in the conventional feeding system (Group I). Digestibility of CP in complete feed "Sani" group II and complete feed "Sani" using urea treated wheat straw (Group III) were superior to conventional feeding system but were at par amongst treatments.

Digestibility coefficient of EE was 46.60 plus minus 0.68, 64.76 plus minus 1.21 and 65.46 plus minus 1.13 in treatment Group I, II and III respectively.

The differences were significant ($P<0.01$). Lower digestibility was observed in the conventional feeding system compared to complete feed “Sani” using untreated and urea treated wheat straw, which was at par amongst themselves.

Digestibility of CF was 57.69 plus minus 0.369, 63.22 plus minus 0.69 and 66.12 plus minus 0.79% in groups I, II and III respectively. Conventional feeding system Group I showed significantly ($P<0.01$) lower CF digestibility which was improved when complete feed “Sani” (group II) was used, further improvement in CF digestibility was noted when complete feed “Sani” urea treated was used (Group III).

Nitrogen free extract digestibility percent was 54.12 plus minus 0.46, 57.43 plus minus 0.99 and 58.57 plus minus 0.30 in treatment Groups I, II and III respectively. Significantly lower ($P<0.01$) digestibility was observed in conventional feeding system (group I) then compare to complete feed “Sani” using untreated and urea treated wheat straw (Group

II and III) which were at par amongst themselves.

The data of digestibility of different nutrients in different groups indicated that in conventional feeding system, digestibility was appreciably lower than the complete feed “Sani” using untreated and urea treated wheat straw.

Processing of feed “sani” improved digestibility of the different nutrients and further improvement in digestibility of different nutrients were observed when urea treated wheat straw was used.

Feed conversion efficiency

The Feed conversion efficiencies of heifers fed different diets are presented in table 1. Dry matter required for 1kg live weight gain was 8.79, 8.64 and 8.28 kg for treatment Group I, II and III respectively. The cost per kg live weight gain for above diets was 26.28, 27.39 and 26.91 respectively. In the conventional feeding system for 1 kg of body weight gain, more DM was required when complete feed “Sani” using untreated and urea treated wheat straw was used there was a decrease in DM requirement for 1 kg gain in body weight.

Table.1 Mean digestibility coefficient (%) of organic nutrients of experimental diets

Nutrients	Group I	Group II	Group III	CD1%
Dry matter	49.53 plus minus 0.381	56.23 plus minus 1.04	61.02 plus minus 0.642	1.73
Crude protein	49.34 plus minus 0.687	57.93 plus minus 0.575	58.28 plus minus 0.324	1.82
Ether extract	46.60 plus minus 0.689	64.76 plus minus 1.2	65.46 plus minus 1.13	2.57
Crude fiber	57.69 plus minus 0.369	63.22 plus minus 0.696	66.12 plus minus 0.79	1.15
Nitrogen free extract	54.12 plus minus 0.469	57.43 plus minus 0.996	58.57 plus minus 0.301	1.56

Significant ($P<0.01$) increase in the digestibility of DM and CF in group II and III given complete feed "Sani" prepared out of untreated and urea treated wheat straw, over group I respectively were observed. The digestibility coefficient of DM and CF in group II and III were also differ significantly ($P<0.05$). Processing and blending increased digestibility in group II and it was further treatment of wheat straw improved digestibility of DM and CF but not of CP, EE and NFE over the complete feed fed to group II.

Increase in the digestibility of CP, EE and NFE in complete system has been observed earlier by many workers viz; Dien *et al.*, (1990), Jawala (1996), Chaturvedi and Tiwari (1997), Lal (1997) and Patle *et al.*, (1992) and attributed to compounding of roughage and concentrate. Preparation of complete feed "Sani" improved feed efficiency slightly and there was also slight improvement in feed efficiency due to urea treatment of straw.

Higher body weight gain and better feed efficiency have been reported earlier for straw treated with urea by Reddy and Reddy (1983) and Reddy and Reddy (1986). Significantly higher body weight gain in complete feed have also been reported by Sriramurthy *et al.*, (1992).

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