

Performance of lactating crossbred cows fed on forage based total mixed ration

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Abstract

A study was conducted to evaluate the forage based total mixed ration (TMR) in crossbred lactating cows on milk production and nutrient digestibility. TMR was prepared by mixing wheat straw, chapped green forages (sorghum and rice bean in experiment I and oat and berseem in experiment II) and concentrate feed having 17 percent dietary CP. Two feeding experiments for the period of 60 days duration each during rainy (experiment I) and winter seasons (experiment II) were conducted in first lactating crossbred cows. In both the experiment six first lactating cows were taken and divided into 2 groups. Group 1 (T1) was fed TMR and in Group 2 (T2) ingredients were fed separately. The total daily dry matter intake (DMI) in cows fed TMR increased significantly ($p < 0.01$) by 15.92 percent in experiment I, when multi cut sorghum and rice bean used as green fodder. However, the differences were negligible in experiment II, when oat and berseem used as green fodder. The dry matter (DM) and crude protein (CP) digestibility as well as digestible energy (DE) value of ration were increased significantly ($p < 0.01$) in cows fed on TMR based on berseem and oat as green fodder in experiment II. However, differences were non-significant in experiment I, when multi cut sorghum and rice bean used as green fodder in TMR. The overall increase in milk production was recorded by 16.96 and 19.49 percent in cows fed TMR during experiment I and II, respectively. Similarly, an increase in milk production in cows fed different feeds separately was also recorded 10.74 and 6.41 percent, respectively during experiment I and II. Thus, it is concluded that feeding of TMR is beneficial for proportionate intake of all feed ingredients, overall feed intake and better digestibility of nutrients resulting into higher milk production.

Keywords: Forage, total mix ration, feeding, milk yield, nutrient digestibility.

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Introduction

Eastern region of India comprises of seven states (Eastern UP, Bihar, Jharkhand, Chhattisgarh, Orissa, West Bengal and Assam) of the country and spreads over five agro-ecological regions namely eastern Himalayan, lower and middle Gangetic plains, eastern plateau and hills and east coast plains and hills region. The region has highest density of cattle population, 22.67 per 100 human against the national average of 19.25 (Anon, 2003). This region is also having large numbers of livestock population comprises of cattle 75.90, buffalo 21.13 and sheep and goat 54.45 million. Large numbers of low productive animals, shortage of quality feed and fodder resources, restricted spreading of crossbred cattle population, low

land holding, negligible area under cultivated fodder and poor adoption of scientific husbandry practices are considered to be the main reasons for less production in the region (Dey and Kaushal, 2006; Ramachandra *et al.*, 2007). The commercial dairy farmers of Bihar feed to their cattle with dry roughages, green fodder and concentrate feed at 5.3, 2.2 and 1.7 kg/day/head, respectively without any supplementation of mineral mixtures which leads imbalance feeding in terms of total dry matter and nutrients intake (Wright, 2010). Therefore, a comprehensive study was made on fodder production and there evaluation in total mixed ration (TMR) in crossbred lactating cows in respect of feed intake, nutrient digestibility and milk production.

Materials and Methods

Annual cereal and legume fodders were grown during Kharif and Rabi season under subtropical hot and humid climate in alluvial-clay soil having neutral pH under irrigated system at ICAR Research Complex for Eastern Region Patna farm. Multi cut sorghum as cereal and rice bean as legume were grown during rainy season. Whereas, oat as cereal and berseem as legume fodder were grown during winter season on the same land on relay system.

Two feeding experiments for the period of 60 days duration each during rainy and winter seasons were conducted on total mixed ration (TMR) in crossbred cows having in 1st lactation to study the effect on milk production and nutrient digestibility. In experiment-I, total six cows were taken and distributed into two groups. TMR was prepared by mixing wheat straw 2 kg, chapped green fodders (multi cut sorghum 25 kg and rice bean 2 kg) 27 kg and concentrate feed (17 percent dietary CP) 5 kg. The half of the quantity of above mixed ration was offered to one cow in the morning and remaining half in the evening after mixing all the ingredients thoroughly with water to make *sanni* to the cows of group T1. The cows of group T2 were fed the same quantity of above feed ingredients separately. First wheat straw and concentrate feed was offered after mixing with water and then a gap of 1-2 hours un-chapped green fodders were offered. Total 10.68 kg DM per day per head was provided to both the groups. Similarly, experiment-II was conducted during winter season in six cows following previous feeding and management schedule, however, TMR was prepared by mixing wheat straw 2 kg, chapped green fodders (oat 15kg and berseem 16 kg) and concentrate feed (16.5% dietary CP) 4.5 kg. Total 11.28 kg DM per day per head was provided to both the groups. Digestion trial for 5 days duration was conducted in both the experiments at the end of the trial. Feed offered, residues and faeces were collected daily for DM and CP estimation (AOAC, 1980). The dry matter intake (DMI) per 100 kg body weight was calculated. The gross energy (GE) was determined in pooled dry samples. The digestibilities of DM and CP

digestible energy (DE) values were calculated and analyzed statistically (Snedecor and Cochran, 1980).

Results and Discussion

The fodders bio-mass yield and protein content of different fodder crops used in the experiment are presented in Table 1. The production potential of cereal crop was higher than the leguminous crop in *rainy* season whereas opposite trend was observed in *Rabi* season. Number of cuts of fodder actually made the difference of biomass yield. The values on fodder yield corroborate with the findings of Pandey and Roy (2011). The dry matter content of fodders varied from 11.65 to 17.19 percent. Crude protein content of different fodder varied from 8.72 to 11.14 percent for cereal fodder and 15.30 to 15.83 percent in legume fodder. The dry matter and protein content of cereal (sorghum and oat) and leguminous (berseem and rice bean) fodder are almost similar to the finding of Banerjee (2000). The slight variations in compositions are due to variety, soil quality, number of cut and management practices adopted.

Feeding of TMR resulted in higher DMI (kg/100kg body weight) by 15.92 and 2.41 percent, respectively in T1 group in both the experiment I and II in comparison to group T2 where feeds were provided separately (Table 2). Significantly higher ($p < 0.01$) DMI was observed in T1 (TMR fed) during experiment-I (Rainy season) when multicut sorghum was used in TMR. However, total DMI did not differ significantly between groups in experiment II (Rabi season). This may be attributed to succulent form of forage oat and berseem which included in the ration as TMR or separate feeding system. Higher intake of DM, CP and DE was also observed by Khan *et al.* (2010) in crossbred cows fed densified complete feed.

The digestibility of DM, CP and DE values of ration are presented in Table 2. The DM and CP digestibility as well as DE value of ration were increased significantly ($p < 0.01$) in cows fed on TMR based on berseem and oat as green fodder in experiment II.

Table 1: Season-wise production potential of various fodders

Particulars	Total fodder yield (t/ha)	Average DM (%)	Average CP (g/100g DM)
Kharif Season			
Sudan in 3 cuts at 60, 105 and 145d	74.78±2.92	14.48	8.72
Rice bean at 90d	35.67±1.52	17.19	15.30
Rabi season			
Berseem in 4 cuts at 50, 85, 115 and 145d	67.84±1.22	11.65	15.83
Oat in 2 cuts at 50 and 105d	28.23±0.64	14.18	11.14

Table 2: Performance of cow fed on TMR

Particulars	Expt. I		Expt. II	
	T1	T2	T1	T2
Age from date of calving (d)	98±28.50	84±31.50	246±19.50	222±2.50
Av. Body Wt. (kg)	362±20.50	385±19.00	354±42	360±32
Av. DMI (kg/100kg body Wt.)	3.14±0.06*	2.64±0.03*	4.14±0.28	4.04±0.23
Nutrient Digestibility				
DMD (%)	68.44±1.83	68.17±0.62	67.54±0.23*	60.07±0.01*
CPD (%)	47.84±1.48	43.51±1.16	44.70±0.53*	31.42±1.57*
DE (Kcal/kg)	2754±34	2687±13	2542±16*	2288±08*
Average Milk yield (kg/d/head)				
Before Expt.	6.13±0.16	6.24±0.39	5.13±0.06	6.55±0.44
During Expt.	7.17±0.12	6.91±0.28	6.13±0.24	6.97±0.09

*Values differ significantly ($P<0.01$) within experiment

However, differences were non-significant in experiment I, when multi cut sorghum and rice bean were used as green fodder in TMR. Higher digestibility of DM, CP and DE were also observed by Khan *et al.* (2010) in crossbred cows fed densified complete feed.

The overall increase in milk production was recorded by 16.96 and 19.49 percent in cows fed TMR during experiment I and II, respectively. Similarly, an increase in milk production in cows fed different feeds separately was also recorded 10.74 and 6.41 percent, respectively during experiment I and II. Feeding of balanced ration either in mixed form or individually

had increased milk production but impact was greater when fed with TMR. This might be due to higher DMI and nutrients digestibility. This is in close agreement with the findings of Khan *et al.* (2010) in crossbred cows fed densified complete feed.

Conclusion

It is concluded that feeding of TMR is beneficial for proportionate intake of all feed ingredients, overall feed intake and better digestibility of nutrients resulting into higher milk production.

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