Indian Journal of Animal Sciences **78** (4): 416–418, April 2008

Effect of supplementation of graded levels of oat fodder to mustard straw in crossbred heifers

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Received: 8 August 2007; Accepted: 12 November 2007

Key words: Fodder, Heifers, Mustard, Nutrient utilization, Oat, Straw

India produced around 20% of world mustard (Kiresur, 1999), which is primarily grown for its high oil content. Large amount of straw is obtain from mustard alone (@14 million tonnes, (Mishra *et al.* 2000), which can be used for the feeding of ruminants, supplemented with good quality fodders like oat (*Avina sativa*). Oat is an important non-legume rabi crops extensively cultivated for delicious-and-productive type fodder. Keeping these facts in mind the study was planed to investigate the effect of graded level of oat fodder viz. 50 (T_1), 40 (T_2), 30(T_3) and 20 (T_4) per cent supplementation on DM intake and nutrient utilization of mustard-straw based diet in crossbred heifers. Crossbred heifers (16; Sahiwal×HF, weighing 43–130 kg) were randomly divided into 4 treatments of 4 animals each. Animals were kept in dry and *pucca* shed having arrangement for individual feeding. Preliminary feeding lasted for 21 days, thereafter digestibility trial of 7 days duration was conducted. Dry matter content was determined after keeping all the samples in hot air oven at 60±2°C. Crude protein, total ash and organic matter was estimated as per the procedure of AOAC (1995), while neutral detergent fiber (NDF), acid detergent fibre (ADF) and lignin contents were estimated (Goering and Van Soest 1970) instead of the total fibre content. Similarly hemicellulose and cellulose content were determined in samples by difference. The data thus obtained were subjected to statistical analysis as per Snedecor and Cochran (1970).

Chemical composition and DMI

Chemical composition of different dietary treatments has been presented in Table 1. As the level of oat fodder decreased from 50 % (T_1) to 20 % (T_4) per cent in mustard straw based ration, DM content of the diet increased significantly ($P<0.05$) and the difference between T_1 and T_4 treatments was of 16.38 units. The increase or decrease in DM content of various treatments was attributed to the amount of oat or mustard straw in the ration (Table 1). The results of the study were in agreement with the findings of Malik *et al.* (2007). Similar to the DM, ADF and NDF contents also increased as the level of mustard straw increased in the ration at the cost of oat fodder and the increase in both NDF and ADF contents certainly was due to the more fibrous nature of the mustard straw than oat fodder. Cellulose content of the various

Table 1. Chemical composition (% DM basis) of different dietary treatments

Attributes	Treatment			
	T_1	T_2	T_3	T_4
DM	55.44^{a}±0.21	61.50^{b}±0.40	66.78^{c}±0.19	72.82^{d}±0.31
OM	91.94±0.38	91.72±0.27	91.66±0.21	92.04±0.48
CP	8.76±0.22	8.39±0.27	8.77±0.21	8.39±0.10
NDF	67.30^{a}±0.28	67.49^{ab}±0.49	68.27^{ab}±0.68	69.22^{b}±0.33
ADF	46.55^{a}±0.43	48.31^{ab}±0.29	51.38^{b}±0.17	53.75^{bc}±0.25
Cellulose	38.27^{a}±0.52	40.43^{ab}±0.60	43.18^{bc}±0.39	45.48^{c}±0.43
Hemi-cellulose	15.47^{a}±058	16.89^{ab}±0.51	19.19^{b}±0.21	20.75^{c}±0.15
Lignin	8.28±0.09	7.88±0.32	8.20±0.22	8.28±0.18

Values bearing different superscripts in a row differ significantly ($P<0.05$).

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Table 2. Effect of different levels of oat fodder supplementation on nutrient utilization in crossbred heifers

Attributes	Treatment				
	T_1	T_2	T_3	T_4	SEM
Mean b. wt. (kg)	79.25±20.05	79.50±17.10	79.0±12.43	79.50±8.92	6.81^{NS}
DM Intake					
kg/d	3.13^{b}±0.62	2.58^{ab}±0.48	1.88^{ab}±0.19	1.66^{a}±0.07	0.24
Kg/100kg BW	4.13^{b}±0.26	3.68^{b}±0.14	2.45^{ab}±0.19	2.13^{a}±0.15	0.23
Digestibility (%)					
DM	62.37^{a}±1.39	55.25^{b}±0.55	46.17^{c}±0.96	42.09^{d}±0.35	2.08
OM	70.19^{a}±0.80	66.36^{b}±1.82	54.62^{c}±0.83	47.95^{d}±0.60	2.36
CP	57.97^{a}±1.07	52.78^{b}±0.75	44.30^{c}±0.57	41.21^{d}±0.54	1.75
NDF	58.61^{a}±0.79	47.99^{b}±1.18	43.81^{c}±1.36	40.25^{d}±0.54	1.84
ADF	47.98^{a}±0.93	43.99^{b}±0.80	41.94^{b}±0.38	37.70^{c}±0.47	1.00
Hemicellulose	66.96^{a}±0.56	61.05^{b}±0.75	57.42^{c}±0.77	55.33^{d}±0.37	1.17
Cellulose	53.61^{a}±0.33	49.75^{b}±0.48	47.43^{c}±0.40	46.11^{d}±0.46	0.76

Values bearing different superscripts in a row differ significantly (P<0.05), NS- non significant.

treatments differed between 38.27±0.52 and 45.48±0.43 % and was reported highest in treatment having more amount of mustard straw (T_4). Similar trend was reported for the hemicellulose content, which reflected that mustard straw has more fibre than oat fodder. Similar results were reported by Malik (2000), who used mustard fodder and paddy straw in crossbred heifers. Crude protein and organic matter content of the various treatments did not vary, however, CP of the treatment having maximum oat fodder was numerically higher than that having minimum amount. Lignin content in the study was reported within the range of 7.88±0.32 to 8.28±0.18 % and the variation between different dietary treatments was not significant (P>0.05). As far as the DM intake was concern, it was found maximum in treatment T_1 (3.13 kg/d) and minimum in treatment T_4 (1.66 kg/d, Table 2), thus as the amount of oat fodder in the ration increased from 20 to 50 % in the ration, DMI in crossbred heifers also increased significantly (P<0.05), which was probably due to the more palatability and deliciousness of oat fodder over mustard straw. When DMI was expressed on uniform body weight basis (kg/100 kg BW), it was significantly higher (P<0.05) in treatment T_1 than treatment T_4 (Table 2) and the variations between these two treatments were of 2.0 units. Results of the study are in good agreement with the findings of Sohane and Singh (2001).

Nutrient Digestibility

The large amount of good quality fodder had a significant effect on nutrient digestibility (Table 2). Results revealed that DMD in treatment T_1 was significantly higher (P<0.05) than other treatments due to the large amount of oat fodder and its more soluble carbohydrates content, which influenced fibre digestion kinetics by stimulating rumen microorganisms for colonization of plant material in treatment T_1. Similarly, OMD also increased with increasing of oat fodder in the ration, and minimum OMD was reported in T_4 treatment having maximum amount of mustard straw (Table 2). Das and Singh (1999) also reported increase in IVDMD and IVOMD of wheat straw based diet supplemented with graded level of berseem fodder. Significant and linear decrease (P<0.05) was noticed in CP digestibility with the decrease in oat fodder from 50 to 20 % in the ration (Table 2). The decrease in CP digestibility might be attributed to more of lignification of plant materials. Likewise the digestibility of ADF, NDF, cellulose and hemicellulose also decreased as the amount of oat fodder in the mustard straw based ration decreased attributed to the amount of structural carbohydrates and also differences in the nature of carbohydrates of oat fodder and mustard straw. Similar to the study, Dutta *et al* (1999) and Sohane and Singh (2001) also reported significant increase in digestibility due to the green fodder supplementation in straw based diets.

SUMMARY

The study was conducted to investigate the effect of different levels of oat fodder supplementation on dry matter intake and nutrient digestibility of mustard straw in crossbred heifers. From the data it can be observed that the graded level of oat fodder supplementation to the mustard straw based diet, can increase DM intake as well as nutrient digestibility in crossbred heifers. Thus, the oat fodder can be useful as a supplementing source to the mustard straw based diet in the ration of ruminants.

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