Int.J.Curr.Microbiol.App.Sci (2020) Special Issue-11: 190-195

EXCELLENT PUBLISHERS

International Journal of Current Microbiology and Applied Sciences
ISSN: 2319-7706 **Special Issue-11 pp. 190-195**
Journal homepage: http://www.ijcmas.com

Original Research Article

Evaluation of Effect of Hydrolyzed Molasses Treated Mustard Oil Cake on Daily Dry Matter Intake, Body Weight and Nutrient Digestibility of Sheep

Shamim Ali*, R.K. Sharma, Ankur Rastogi, Ankit Saithi, Sindhu Berian and Imran Ahmad Ganai

Division of Animal Nutrition (SKUAST Jammu)

**Corresponding author*

A B S T R A C T

The study was conducted on fifteen nondescript adult male sheep which was randomly divided into three treatment groups namely UT,FT and MT. The groups were subjected to three dietary treatments namely UT (Concentrate mix with untreated MOC+ Molasses+ *ad lib* wheat straw); FT (Concentrate mix with formaldehyde treated MOC+ Molasses+ *ad lib* wheat straw) and MT (Concentrate mix with hydrolyzed molasses treated MOC+ *ad lib* wheat straw). The observation was recorded for one month. The parameters observed during the study period were daily DMI, body weight changes and nutrient digestibility. The mean intake (g/d) of concentrate mixture was non significant (P>0.05) among the three different dietary groups. The body weight of the sheep did not vary significantly between the periods (P>0.05) and between different treated groups during feeding and metabolic trial. The digestibility (%) values of OM, CP, CF, EE, NFE, NDF, and ADF were non significant (P>0.05) between the different treated groups.

Keywords

Hydrolyzed molasses, Mustard oil cake, Dry matter intake, Body weight, Sheep

Introduction

The protein digestion in ruminants is dominated by microbial transformation in the fore-stomach. A varying proportion of feed protein is degraded into peptides, amino acids and ammonia, all of which can be used for the synthesis of microbial protein. The microbial protein synthesis is an energy dependent processes. Therefore, deficiency of dietary energy, especially during early part of lactation, results in correspondingly lower synthesis of bacterial protein in the rumen leading to reduced availability of protein for milk production. Therefore for sustaining higher level of milk yield and faster growth rate, ruminants need more dietary protein than the flora in the rumen can utilize.

However higher dietary protein intake especially rumen degradable protein (RDP) often results in increasing loss of ammonia from the rumen. Excess ammonia is converted into urea in the liver, the major part of which is excreted through urine resulting in the loss of dietary protein. The increased ammonia levels also leads to reduced fertility besides causing stress on liver. Adequate protein supply to high yielding cows without stress from excess ammonia can be ensured by decreasing the degradability of dietary proteins. In most of developing countries including India, agriculture by-products, crop residues and grazing along with some protein and energy supplements are the chief feed source for ruminant livestock. Common protein supplements for ruminants are oil seed cakes obtained as a by-product of the oil industry. Among them, mustard cake is the most commonly available protein supplement for livestock in northern parts of India (Kumar *et al.,* 2002 and Sirohi *et al.,* 2013). India is the second largest producer of rapeseed mustard in the world, contributing to one-fifth of the world's rapeseed mustard production (Kiresur, 1999). Mustard cake is one of the common used feed ingredient in ruminant diet and rich in many essential amino acids (e.g. methionine and lysine) but is known for high ruminal degradability of its protein content, thereby limiting its value as a ruminant feedstuff for high yielding dairy animals and fast growing meat animals (Chatterjee and Walli, 2003). The levels of rumen degradable protein (RDP) and rumen undegradable protein (RUP) in mustard oil cake is reported as 33% and 4% of DM, respectively, hence protection of mustard cake protein assumes significant importance. Molasses is a commonly used source of rapidly soluble carbohydrate that is used as a feed ingredient to increase energy density of diet and to aid the microbial protein formation when rapidly degradable nitrogen source is included in diet. The proposed research intends to employ aldehyde group of reducing sugar content of hydrolyzed molasses to protect the degradable protein of mustard oil cake.

Materials and Methods

The present study was conducted in the Division of Animal Nutrition of F.V.Sc & A.H., SKUAST-J, R.S.Pura, Jammu. Fifteen nondescript adult male sheep were taken as experimental animals. They were randomly divided into three treatment groups namely UT,FT and MT. The groups were subjected to three dietary treatments namely UT (Concentrate mix with untreated MOC+ Molasses+ *ad lib* wheat straw); FT (Concentrate mix with formaldehyde treated MOC+ Molasses+ *ad lib* wheat straw) and MT (Concentrate mix with hydrolyzed molasses treated MOC+ *ad lib* wheat straw). The composition of concentrate mixture (Maize-25%, wheat bran-35%, Mustard oil cake-37%, mineral mixture-2%, common salt-1%) was formulated to meet the nutrient requirements of the animals as per ICAR (2013). The feeding trial was conducted for a duration of one month. The body weight of the animals was taken at the start of the experiment and then at 10 days interval. The metabolic trial was conducted during the last week of the feeding trial. All the sheep were kept under uniform management conditions with the provision of individual housing in well ventilated cement floored shed.

Statistical analysis

The data generated was analyzed as described by Snedcor and Cochran (1994).

Results and Discussions

The feed intake of the experimental sheep fed untreated/formaldehyde treated or hydrolyzed molasses treated mustard oil cake containing concentrate mixture during the trial is given in Table 1. The mean concentrate intake, straw intake and total feed intake on (DMB) was 404±3.0, 929±7.2 and 1333±6.9 g/d respectively. The mean intake (g/d) of concentrate mixture was non significant ($P>0.05$) among the three different dietary groups. The mean straw intake and total feed intake g/d DMB) was significantly ($P<0.05$) higher in the FT group as compared to UT and MT group. However there was no significant ($P>0.05$) effect was observed between UT and MT group with respect to straw intake and total feed intake. The Periodic live weight (kg) of experimental sheep during feeding-cum-metabolism trial in presented in table 2. The overall mean body weight of the experimental animal was

46.25±1.25 kg, with mean body weight of animals in different groups (UT, FT and MT) groups as 45.69±1.78, 47.08±2.56 and 45.99±2.18 respectively. The body weight of the sheep did not vary significantly between the periods (P>0.05) and between different treated groups during feeding and metabolic trial.

The nutrient intake (DMB; g/d) of experimental sheep fed untreated/formaldehyde treated or hydrolyzed molasses treated mustard oil cake containing concentrate mixture is presented in Table 3. The DM intake (g/d, % L.Wt, g/kg $W^{0.75}$) ranged from 1327 to 1431, 76.94 to 80.77, 2.98 to 3.12 respectively between the different dietary groups which does not different significantly (P>0.05) among different treated groups. Similarly, OM intake and CP intake (g/d, % L. Wt, The nutrient digestibility (%) in experimental sheep fed untreated, formaldehyde treated and hydrolyzed molasses treated mustard oil cake containing concentrate mixture is presented in Table 4.

Table.1 Chemical composition (%) of the concentrate mixtures and wheat straw used in feeding-cum-metabolism trial

Attributes^	**Concentrate mixtures as per Treatments***					**Wheat straw**
	UT	**FT**	**MT**	**SEM**	**P value**	
Dry Matter	92.42	91.49	92.65	0.23	0.078	91.37±0.06
Organic matter	92.63	91.62	91.51	0.24	0.077	92.98±0.04
Crude Protein	23.37	23.64	24.57	0.24	0.076	4.24±0.05
Ether extract	7.53	7.39	6.34	0.24	0.067	1.76±0.02
Crude fibre	4.50	5.34	4.34	0.22	0.131	38.54±0.11
Nitrogen free extract	57.23	55.26	56.26	0.66	0.533	48.91±0.09
Neutral detergent fibre	44.36	43.46	44.52	0.22	0.094	76.72±0.38
Acid detergent fibre	12.41	12.44	12.95	0.15	0.292	54.37±0.42
Calcium	0.94	0.93	0.93	0.001	0.348	0.51±0.01
Phosphorous	0.52	0.54	0.55	0.01	0.517	0.24±0.01

Table.2 Periodic live weight (kg) of experimental sheep during feeding-cum metabolism trial

Attributes/ Treatments	Days from onset of trial				Treatment Mean ± SEM	P value		
	0th day	10th day	20th day	30th day		T	P	T x P
UT	45.36	45.15	45.75	46.50	45.69±1.78			
FT	45.92	45.65	47.50	49.25	47.08±2.56			
MT	45.29	45.03	45.63	48.00	45.99±2.18			
Period mean ± SEM	45.52±2.57	45.28±2.58	46.29±2.57	47.92±2.51	46.25±1.25	0.914	0.910	1.000

Table.3 Periodic nutrient intake (Kg/d; dry matter basis) of dairy cattle fed untreated/ formaldehyde treated or hydrolyzed molasses treated mustard oil cake containing concentrate mixture

Treatments*/ Attributes	Fortnights since onset of feeding trial					Treatment Mean ± SEM	P values		
	I	II	III	IV	V		T	P	T x P
Dry MatterIntake									
UT	9.57±0.10	10.03±0.10	10.07±0.07	10.48±0.09	10.50±0.14	10.13±0.09^A			
FT	9.73±0.07	10.21±0.07	10.18±0.09	10.73±0.06	10.87±0.07	10.34±0.10^B			
MT	9.65±0.06	10.08±0.07	10.06±0.06	10.70±0.04	10.55±0.05	10.21±0.09^A			
Period mean ± SEM	9.65±0.05^a	10.10±0.05^b	10.10±0.04^b	10.64±0.05^c	10.64±0.07^c	10.23±0.05	0.001	0.000	0.653
Organic MatterIntake									
UT	9.30±0.09	9.73±0.09	9.78±0.07	10.16±0.09	10.18±0.13	9.83±0.08^A			
FT	9.46±0.07	9.90±0.07	9.87±0.09	10.39±0.06	10.52±0.07	10.03±0.09^B			
MT	9.34±0.06	9.74±0.06	973±0.05	10.33±0.04	10.19±0.05	9.87±0.08^A			
Period mean ± SEM	9.37±0.04^a	9.79±0.04^b	9.79±0.04^b	10.29±0.05^c	10.30±0.07^c	9.91±0.05	0.000	0.000	0.655
Crude Protein Intake									
UT	1.21±0.001	1.23±0.001	1.24±0.001	1.26±0.001	1.26±0.01	1.24±0.001^B			
FT	1.22±0.001	1.24±0.001	1.24±0.001	1.27±0.001	1.28±0.001	1.25±0.001^C			
MT	1.18±0.001	1.20±0.001	1.20±0.001	1.23±0.001	1.22±0.001	1.20±0.001^A			
Period mean ± SEM	1.20±0.01^a	1.23±0.01^b	1.23±0.01^b	1.25±0.01^c	1.25±0.01^c	1.23±0.001	0.000	0.000	0.654

*UT: concentrate mix with untreated MOC + molasses; FT: concentrate mix with formaldehyde treated MOC + molasses; MT: concentrate mix with hydrolyzed molasses treated MOC

^ABC Means bearing different superscripts within the column differ significantly

^abc Means bearing different superscripts within the row differ significantly

Table.4 Nutrient digestibility (%) in experimental sheep fed untreated/formaldehyde treated or hydrolyzed molasses treated mustard oil cake containing concentrate mixture

Attributes	**Treatments**			**SEM**	**P value**
	UT	**FT**	**MT**		
Dry matter	64.10	65.83	70.29	1.24	0.097
Organic matter	67.03	68.37	72.50	1.13	0.112
Crude protein	63.34	66.39	65.55	1.59	0.759
Ether extract	77.69	73.36	70.60	1.29	0.060
Crude fibre	45.18	51.81	45.69	1.65	0.197
Nitrogen free extract	78.78	77.68	78.34	0.36	0.498
Neutral detergent fibre	59.06	61.05	62.28	0.93	0.397
Acid detergent fibre	50.25	53.66	56.51	1.21	0.094

*UT: concentrate mix with untreated MOC + molasses;
FT: concentrate mix with formaldehyde treated MOC + molasses;
MT: concentrate mix with hydrolyzed molasses treated MOC

The DM digestibility (%) among the different treated (UT, FT and MT) groups was 64.10, 65.83 and 70.29 respectively and the values were statistically similar. The digestibility (%) values of OM, CP, CF, EE, NFE, NDF, and ADF were non significant (P>0.05) between the different treated groups. The DM intake (DMI) (g/d, %L. Wt., g/kg W 0.75) ranged from 1327 to 1431, 76.94to 80.77 and 2.98 to 3.12, respectively, whereas, CP intake (CPI) (g/d, %L. Wt., g/kgW $^{0.75}$) ranged from 140.72 to 148.05, 8.04 to 8.36 and 0.31 to 0.32, respectively between the different dietary groups. There was no significant difference (P> 0.05) among animals of UT, FT and MT groups with respect to DM, OM and CP intake during metabolism trial which is similar with the agreements of Garg *et al.*, (2002) and Sahoo (2002) who reported that the digestibility of nutrients such as DM, OM, CP, EE, NDF and CHO had non-significant variation among the groups of lactating goats fed untreated Mustard cake and Formaldehyde treated mustard cake.

It may be concluded that treated Acid hydrolyzed molasses can be used to treat mustard oil cake to increase bypass protein content. Hydrolyzed molasses treated MOC can be incorporated in ruminant ration to improve nutrient assimilation without affecting the nutrient utilization.

Acknowledgement

The facilities provided by the Division of Animal Nutrition, F.V.Sc & A.H, SKUAST-J are acknowledged.

References

Chatterjee, A. and Walli T.K. 2003. Effect of formaldehyde treatment on effective protein degradability and *in vitro* post ruminal digestibility of mustard cake. *Indian Journal of Animal Nutrition.* 20(2) 143-148.

Garg, M.R., Sherasia, P.L., Bhanderi, B.M., Gulati, S.K. and Scott, T.W, 2002. Effect of feeding rumen protected nutrients on milk production in crossbred cows. *Indian Journal of Animal Nutrition.* 19: 191-198.

Kiresur, V. R. 1999. The Yellow revolution, Employment News. 31 July to 6 August, pp. 1-2.

Kumar, A., Panwar, G.K., Yadav, K.R. and Sihag, S. 2002. Mustard cake as a source of dietary protein for growing lambs. *Small Ruminant Research.,* 44: 47-51.

Sahoo, B. 2002. Productive performance of crossbred goats fed on low and high bypass protein supplemented with molasses as energy source. Ph.D Thesis submitted to National Dairy Research Institute, Karnal.

Sirohi, S. K., Walli, T.K. Garg, M.R and Kumar, B. 2013. Effect of formaldehyde treated mustard cake on nutrient utilization and milk production performance in crossbred cows fed wheat straw based diet. *Indian Journal of Animal Nutrition.* 30(1):5-11.

Snedecor, G., Cochran, W. and Cox, D. 1994. *Statistical Methods*, (8^{th} addition). The Iowa State University Press.