



SHORT COMMUNICATION

Effect of Protein Supplements on Feed and Water Intake in Gir Cows

Lekhu Kumar^{1*}, R.P. Jat², Budharam³ and Priyanka Kayath¹

¹Department of Livestock Production Management, SKNAU, Jobner, Rajasthan, INDIA

²Department of Livestock Production Management and Dean of COA, Navgaon, Alwar, Rajasthan, INDIA

³Department of Livestock Production Management, RCA, MPUAT, Udaipur, Rajasthan, INDIA

*Corresponding author: L Kumar; E-mail: lekhuchangil31121995@gmail.com

Received: 25 Jan., 2021

Revised: 02 May, 2021

Accepted : 20 May, 2021

ABSTRACT

A study was conducted on 16 lactating Gir cows, which were divided into four groups on the basis of body weight and average milk yield/day at Dairy farm (LPM Deptt.) S.K.N. College of agriculture, Jobner (Rajasthan) and subjected to four dietary treatments i.e. Wheat straw *ad-lib.* + Green Lucerne (5 kg) + Concentrate (T₁), T₁ + Urea 75 g/cow (T₂), T₁ + Mustard oil cake 614 g/cow (T₃) and T₁ + Guar meal 505 g/cow (T₄). The studied for their feed intake and water intake in Gir cows. Daily in kg DMI was significantly (P<0.05) higher in T₄ (11.87) than T₃ (11.76) T₂ (9.83) and T₁ (10.76). The Mean DMI/100 kg body weight was also higher (P<0.05) in T₄ cows as compared to other groups. VWI (litre/animal) was significantly (P<0.05) higher in T₄ (32.80) than T₃ (31.42), T₂ (31.35) and T₁ (29.91).

HIGHLIGHTS

- We studied effect of protein supplements on feed and water intake in Gir cows.
- Guar meal increased dry matter intake and water intake in Gir cows as compared to Urea and Mustard oil cake.
- Guar meal may be increased voluntary water intake in Gir cows due to higher feed intake.

Keywords: Dry matter intake, feed intake, protein supplements, voluntry water intake

Livestock is an integral part of agriculture and plays an important role in contributing to national economy. India is the world's largest milk producer, with 21 per cent global production. Rajasthan is ranked 2nd in India and produces 23.6 million tonnes of milk every year. Total cattle population in the India was 192.49 M (GOI, 2019). Gir is a most important milch cattle breed of India. The distribution of this breed is Gir hills and forest of Kathiawar, Junagadh, Bhavnagar, Rajkot and Amreli districts of Gujarat and also in some parts of Maharashtra and Rajasthan. Body of Gir animals is well proportioned. Cattle of this breed are most important for their tolerance to stress conditions and resistant to various tropical diseases. Gir animals are considered with low overall mortality (3.63 per cent). Livestock should be fed differently to meet body requirement based on their species, age and purpose of production. The recommendations only serve

as guidelines used for choosing dietary nutrient (energy, protein, essential amino acids, essential fatty acids, minerals, vitamins) concentrations in practical diets. Nutrition plays crucial role in growth, reproduction and production of animals but the biomass resources are very limited and there is shortage of feed and fodder. There is a serious shortage of conventional feed resources. Hence, it is necessary to look for protein rich, nonconventional feed resources. Feeding is one of the most important determinants of profit in the livestock farming. These feed resources are very poor in nutrient contents which are even not able to supply the nutrients required for maintaining the animals. Urea is non-protein nitrogen compound.

How to cite this article: Kumar, L., Jat, R.P., Budharam and Kayath, P. (2021). Effect of protein supplements on feed and water intake in Gir cows. *J. Anim. Res.*, **11**(3): 563-566.

Source of Support: None; **Conflict of Interest:** None



Supplementation of urea increase feed intake and milk yield of the cows. The crude protein equivalent value of urea is about 287 per cent crude protein. Urea when used for treatment of straw boost the nutritional quality of straw in terms of increased nitrogen content, enhanced the palatability and digestibility. The composition of mustard cake (MC) varies with the variety, growing conditions and processing methods. The crude protein content varies from 33-40 per cent in mustard cake. Mustard cakes have D.C.P. and T.D.N. values 27 per cent and 74 per cent respectively. Guar meal is a relatively inexpensive high protein meal produced as a by-product of guar gum manufacture which is obtains after the mechanical separation of endosperm from both hulls and germs of guar seed. Guar gum recovery is around 29 per cent of total guar seed, whereas churi and korma accounts for 30 per cent and 37 per cent respectively and others 4 per cent. Guar meal have about 65 per cent T.D.N.. Being a rich source of proteins, nutrients and fibres with high digestibility, it is being used as feed after processing for animals. In dairy cattle, Guar meal is a highest protein containing animal feed in its group. Mustard cake and Guar meal is relatively very rich in energy and protein contents than other feed ingredients.

The experiment was carried out at Dairy farm, Department of Livestock Production Management, S.K.N. College of Agriculture, Jobner (Jaipur). Sixteen lactating Gir cows were selected for the experiment. They were randomly divided into four groups of four in each group on basis of nearness in their production and body weight of cows and four dietary treatments were formulated i.e. Wheat straw *ad lib.* + 5.0 kg Lucerne + Concentrate palleted feed (T_1), T_1 + Urea @75 g per cow per day (T_2), T_1 + Mustard cake @614 g per cow per day (T_3) and T_1 + Guar meal @505 g per cow per day (T_4) and the studied for their feed intake and water intake in Gir cows.

Animal were stall fed individually *ad libitum* of dry fodder and weighed quantities of rations were offered twice in a day. The animals were fed four different treatment wise diets satisfying the requirement of NRC, 2001. The concentrate used palleted prepared feed from RCDF which contain 18 per cent crude protein and 75 per cent DCP and Lucerne (*medicago sativa*) green fodder and Wheat straw dry fodder were used as roughages. The animals were fed in the morning and evening as per their requirement the feeding schedule of gir cows is given in table 1. To

formulate the ration value given by NRC, 2001 were taken before the actual analysis of the sample.

Table 1: Feeding schedule of Gir cows

Sl. No.	Feed and Fodders	Quantity of feed and fodders
1	Concentrate pelleted feed	Maintenance ration production ratio 2 kg/animal and production ratio given to animal 1 kg/ 2.5 liter milk yield
2	Protein Supplements	Urea 75 g, Mustard cake 614 g and Guar meal 505 g per cow treatment wise.
3	Lucerne green	5.0 kg per cow
4	Dry fodder (Wheat straw)	Ad libitum

Dry fodder, green fodder and concentrate ration were offered daily in the morning and evening Feed intake data was recorded on two consecutive days at fortnightly interval weighing the refusal before next feeding. A representative sample of Mustard cake, Gaur meal, Dry fodder (Wheat straw) and concentrate palleted offered to the animals and refused left in each treatment was taken fortnight for estimating the dry matter and crude protein contents. The DM content each feed stuff was determined by keeping the samples in hot air oven at 105°C over night to a constant weight. Dried sample were bulked, ground and kept for chemical analysis. The data of dry matter content was used for calculating dry matter intake during entire experimental period. Samples of feeds were subjected to protein and other quality evaluation in the laboratory.

The data of water intake was recorded for two consecutive days at fortnightly intervals. The measured quantity of clean and fresh water was offered to individual animals during morning and evening in a graduated bucket and refusal of water, if any was also measured to know the actual voluntary water consumption.

The experiment planned with subject to analysis of variance (ANOVA) for randomized block design (RBD) and the means were tested by least significance difference. Different statistical tools such as mean, standard deviation (SD), standard error (SE) were worked out to compare the group.

The supplies of different nutrients were related to DMI in animals. Generally wide variation in DM content of the breeds is noticed which has direct influence on DMI of animals. It is therefore, necessary to know the DMI of cows through feeding different feeds on fresh basis. With this view the DMI of cow under different treatment was worked out. The average daily dry matter intake (DMI) of Gir cows in different treatments is presented in Table 2. The average daily total dry matter intake (TDMI) in T₁, T₂, T₃ and T₄ groups were 10.76±0.02, 9.83±0.05, 11.76±0.02 and 11.87±0.009 kg/cow, respectively. The average TDMI by cows were significant (P<0.05) more in T₃ & T₄ as compared to T₁, T₂. This increase intake of the nutrients can be explained by the fact that addition of Guar meal & Mustard cake makes the straw soft by breaking down the lignin & increase palatability. The DMI through concentrate in T₁, T₂, T₃ and T₄ were 4.28±0.001, 3.38±1.762, 3.38±1.762 and 3.38±1.762 kg, respectively. The DMI through in wheat straw T₁, T₂, T₃ and T₄ was 5.25±0.034, 5.22±0.042, 6.59±0.028 and 6.79±0.022 kg, respectively. The DMI through green fodder in all groups were similar 1.23 kg and DMI through protein supplements in T₁, T₂, T₃, T₄ was 0, 0, 0.56±6.49, 0.47±3.543. The average DMI on 100 kg body weight bases were 2.48±0.010, 2.26±0.04, 2.70±0.01, and 2.73±0.01 kg in T₁, T₂, T₃ and T₄ groups respectively. The analysis of variance of data on daily dry matter consumption is presented in Table 2, which indicated that daily DMI, DMI/100 kg body

weight basis were influenced (P<0.05) in T₄ group cows as compared to T₃, T₂ and T₁ Gir cows. Daily DMI of was significantly (P<0.05) higher in T₄ cows as compared to T₃, T₂ and T₁ cows which might be due to improved dry matter intake by balance ration with additional protein of Guar meal, high DMI due to high protein in diet. Intake increased with protein content in dairy cattle diet was also reported by Hamed *et al.* (2001). Similar higher voluntary consumption of roughage total dry matter was observed by Sampath *et al.* (2005), Brito *et al.* (2007) reported that Intake was significantly improved by protein supplements. Jelantik *et al.* (2010) reported that DMI was significantly increased (P<0.01) by supplementation of graded amount of protein source. Shankhpal *et al.* (2016) indicated that protein supplements in cows diet will have a positive effect on feed intake. This indicates the use of high protein sources in diet of animal increased dry matter.

The average daily voluntary water intake (VWI) of Gir cows in different treatments is presented in Table 3. The average daily voluntary water intake (litre) in T₁, T₂, T₃ and T₄ groups were 29.91±0.10, 31.35±0.16, 31.42±0.18 and 32.80±0.15 respectively. VWI was lower (P<0.05) in T₁ group as compared to other groups. The lower water intake in T₁ group may be as described to lower feed intake but the higher voluntary water intake in T₄ due to higher feed intake may be increased by protein supplementation. The TVWI per kg DMI in T₁, T₂, T₃ and T₄ was 2.78±0.04,

Table 2: Average daily dry matter intake (Kg) of per cow under different treatment during winter season

Parameters	T ₁	T ₂	T ₃	T ₄
Lucerne	1.23 ± 1.460	1.23 ± 1.460	1.23 ± 1.460	1.23 ± 1.460
Wheat straw	5.25 ^c ± 0.034	5.22 ^d ± 0.042	6.59 ^b ± 0.028	6.79 ^a ± 0.022
Concentrate	4.28 ± 0.00	3.38 ± 1.762	3.38 ± 1.762	3.38 ± 1.762
Protein source (Mustard cake, Guar meal)	—	—	0.56 ± 6.49	0.47 ± 3.543
Total DMI	10.76 ^c ± 0.02	9.83 ^d ± 0.05	11.76 ^b ± 0.02	11.87 ^a ± 0.009
DMI kg /100 kg BW	2.48 ^c ± 0.10	2.26 ^d ± 0.04	2.70 ^b ± 0.01	2.73 ^a ± 0.01

Means having different superscripts differ significantly (P<0.05).

Table 3: Average voluntary water intake (liter) of Gir cows under different treatments during winter season

Parameters	T ₁	T ₂	T ₃	T ₄
Morning	13.10 ^{dc} ± 0.10	14.10 ^a ± 0.10	13.72 ^{cd} ± 0.10	13.92 ^b ± 0.16
Evening	16.81 ^d ± 0.11	17.25 ^c ± 0.12	17.70 ^b ± 0.14	18.88 ^a ± 0.11
24 hours	29.91 ^d ± 0.10	31.35 ^{cb} ± 0.16	31.42 ^{bc} ± 0.18	32.80 ^a ± 0.15
VWI/kg DMI	2.78 ^{bc} ± 0.04	3.20 ^a ± 0.08	2.67 ^d ± 0.05	2.76 ^c ± 0.09

Means having different superscripts differ significantly (P<0.05).

3.20±0.08, 2.67±0.05 and 2.76±0.09 liter, respectively. The differences between treatments were significant ($P<0.05$). The amount of water require to a cow for drinking purpose depends on her body size and milk production, quantity of dry matter consumed, temperature and relative humidity of the environment, temperature of the water, quality and availability of the water, and amount of moisture present in feed and fodder. Water is an especially important nutrient during periods of heat stress. The TVWI was significantly ($P<0.05$) higher in (Guar meal fed) group T_4 (32.80±0.15) in Gir cows. The evening VWI was higher as compared to morning in all groups due to low cold stress and higher ambient temperature. Similar finding were reported by Singh (2000) and Sharma *et al.* (2014). Appuhamy *et al.* (2016) reported that water intake increased with increased of DMI in dairy cattle. Ahlberg *et al.* (2019) agree with higher DMI was associated with higher water intake. The evening VWI was higher as compared to morning in all groups due to low cold stress and higher ambient temperature.

CONCLUSION

Therefore, It can be concluded that feeding of Guar meal (T_4) increased dry matter intake and water intake as compared to Urea and Mustard oil cake feeding in Gir cows as well as increased palatability and utility of poor quality roughage (Wheat straw) during winter season.

ACKNOWLEDGEMENTS

It is a great pleasure for me to express sincere and deepest sense of gratitude and indebtedness to Dr. R.P. Jat, Professor, Department of Livestock Production Management and Dean of COA, Navgaon, Alwar, for his valuable inspiring guidance and encouragement during the research work and preparation of the manuscript.

REFERENCES

- Ahlberg, C.M., Allwardt, K., Broocks, A., Bruno, K., Taylor, A. and Krehbiel, C. 2019. Characterization of water intake and water efficiency in beef cattle. *J. Anim. Sci.*, **97**(12): 4770-4782.
- Appuhamy, J.A.D.R.N., Judy, J.V., Kebreab, E. and Kononoff, P. J. 2016. Prediction of drinking water intake by dairy cows. *J. Dairy Sci.*, **99**(9): 7191-7205.
- Brito, A.F. and Broderick, G.A. 2007. Effects of Different Protein Supplements on Milk Production and Nutrient Utilization in Lactating Dairy Cows. *J. Dairy Sci.*, **90**(4): 1816-1827.
- Hamed, M.D., Faverdin, P. and Verite, R. 2001. Effects of the level and source of dietary protein on intake and milk yield in dairy cows. *J. Anim. Res.*, **50**(3): 205-211.
- Jelantik, I.G.N., Penu, C.L. and Weisberjg, M.R. 2010. Effects of fishmeal or urea supplementation on ruminal fibre digestion and passage kinetics in bali cows. *J. Anim. Prod.*, **12**(2): 74-81.
- Kumar, R., Nayak, S., Baghel, R.P.S., Malpure, Chandrashekhar, D., Patil, A.K. and Kumar, A. 2017. Effect of prill fat and rumen protected choline supplementation on feed intake, body weight changes and economics of lactating murrha buffaloes. *J. Anim. Res.*, **7**(2): 355-359.
- Sampath, K.T., Chandrusekhanaiah, M. and Praveen, U.S. 2005. Effect of bypass protein on milk production of crossbred cows-A field study. *Ind. J. Anim. Nutri.*, **22**: 41-43.
- Shankhpal, S., Gupta, R.S., Parnerkar, S. and Dhami, A.J. 2016. Effect of feeding bypass fat and unprotected oil on feed intake, digestibility and production performance in lactating crossbred cows. *Indian J. Anim. Nutri.*, **33**(3): 266-272.
- Sharma, M., Singh, H. and Keshava, N. 2014. Feeding of UMMB licks to dairy animals: A farmers' reactive study. *J. Krish Vig.*, **2**(2): 39-43.
- Singh, Y. 2000. Effect of certain managerial practices on buffalo heifers Ph.D. (LPM) Thesis, CCS Haryana Agricultural University, Hisar, India.
- Thomas, C.K., Tripathi, V.N., Sastry, N.S.R., Yadav, R.S., Gupta, L.R., Singh, K. and Pal, R.N. 1978. Loose housing was versus conventional tie-barn for lactating crossbred and buffalo cows during winter under two levels of feeding. *Indian J. Dairy Sci.*, **31**(6): 128-134.