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Effect of different protein sources and temperature on dry matter intake in Gir cows

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Abstract
Present experiment was carried out between 18 February 2018 to 18 may 2018 (90 days) under RKVY project at Dairy farm, Department of Livestock Production Management, S.K.N. College of Agriculture, Jobner (Jaipur). The average daily total dry matter intake (TDMI) in T_1, T_2, T_3 and T_4 groups were 10.317±0.587, 11.318±0.687, 11.232±0.345 and 11.200±0.691 kg/cow, respectively. Daily DMI, DMI/100kg body weight basis were influenced (P<0.05) in T_2 group cows as compared to T_1, T_3 and T_4 Gir cows. Similarly significantly higher in T_2 comparison T_1, T_3 and T_4 Gir cows which consequently improved dry matter intake by balance ration with additional protein through GNC which is having highly protien and palatable. The DMI in T_1, T_2, T_3, and T_4 was 10.732±0.154, 12.1570±0.212, 11.719±0.142 and 11.524±0.310 kg, respectively in spring season. DMI was 09.902±0.175, 10.479±0.402, 10.744±0.124 and 11.176±0.547 kg. in T_1, T_2, T_3 and T_4 in summer season, respectively.

Keywords: protein sources, temperature, dry matter intake, Gir cow

Introduction
India's livestock sector is one of the largest in the world which plays an important role in the national economy and also in the socio-economic development of millions of rural households. In India, annual milk production is 155.5 million tonnes. India ranks first in the world and contributes about 16% to the world milk production. The per capita availability of milk in India has increased from 130 g per day in 1950-51 to 337 g per day in 2015-16, which is more than the recommendation of ICMR i.e. 285 g. However per day per capita availability of milk is maximum in Punjab (1032 g) followed by Haryana (877 g) and Rajasthan (704 g). Rajasthan stands at 2nd rank in the country with annual milk production of 18.50 million tonnes and contributes 11.93 per cent in India's milk production (GOI, 2015-16). Dairy animals are generally given energy and protein, concentrate supplements to increase milk production and stoking rates (Gracia *et al.*, 2000) [2]. Supplementation also helps to correct changes in the amount and quality of basal diet. The Gir is a famous milch cattle breed of India. The native trait of this breed is Gir hills and forest of Kathiawar including Junagadh, Bhavnagar, Rajkot and Amreli districts of Gujarat and also in parts of Maharashtra and Rajasthan. Cattle of this breed are famous for their tolerance to stress conditions and resistance to various tropical diseases (Kumar and Singhal 2006) [3]. Nutrition plays pivotal role in exploiting the genetic potential of dairy animals. Most farm animals will develop with feeding systems consisting of a small range of components, or even a single component, but production levels may be low and the nutrient levels in the feed are not balanced. Optimum yields of milk are obtained by feeding farm animals appropriate quantities of various raw material components. Feeding is one of the most important determinants of profit in the livestock farming. Cost analysis indicates the feeds alone constitute major items of expenditure in livestock production and accounts for over 60-70 % of total cost (shahi *et al*., 2010) [4]. Variation in nutritive value of different feed stuff affects on feed intake palatability and digestibility of feed more over then feed also affect the milk yield. The objective of the feeding complete ration is to provide a blend of feed ingredients without giving any choice to the animal for the selection of any specific feed ingredient, so that each bite could supply the required amount of nutrients (Wadhwa and Bakshi 2006) [5]. Complete ration not only improves the feeding value of feed stuff but also simplifies feeding, minimizes labour and maximizes automation.

Materials and Methods

The experiment was carried out between 18 february 2018 to 18 may 2018 (90 days) under RKVY project at Dairy farm, Department of Livestock Production Management, S.K.N. College of Agriculture, Jobner (Jaipur). Geographically Jobner is located 45.0 km west of Jaipur at 26^0 05' North latitude, 75^0 28' East longitude and at an altitude of 427 meter above mean sea level. Sixteen lactating Gir cows in early stage of lactation were selected for the experiment. The details of treatments of experimental Gir cows are given in Table 1.

Table 1: The details of treatments of experimental Gir cows

Symbols	Treatments
T_1	Pelleted Concentrate Mixture
T_2	T_1 + Groundnut Cake @ 500g* per Cow per Day
T_3	T_1 +Til Cake @ 559g* per Cow per Day
T_4	T_1 + Cotton Seed Cake @ 1134g* per Cow per Day

All sixteen cows were randomly divided into four groups of four in each group on the basis of nearest in their body weight and milk yield of average per day (Table 2).

Table 2: All sixteen cows were randomly divided into four groups of four in each group on the basis of nearest in their body weight and milk yield of average per day

Treatments	Animal No.	Body weight (kg)	Milk production (litres/day)
T_1	004	346	4.3
	007	365	5.1
	012	374	9.4
	015	357	7.5
Average	-	360.5	6.5
T_2	011	370	3.9
	018	351	10.3
	023	359	7.3
	024	365	5.1
Average	-	361	6.6
T_3	008	422	4.6
	013	362	10.3
	014	336	5.3
	020	322	6.2
Average		360.5	6.6
T_4	16	385	4
	17	312	6.1
	21	374	6.3
	26	368	10.1
Average		359.75	6.6

The dry matter of sample was estimated by heating it in an oven to a constant weight at 105°C under atmospheric pressure. Dry the moisture cup in an oven at 100°C, cool it in a desiccator and record its weight. Take about 10 g of the material in the moisture cup and weigh out to calculate actual amount of material taken. Dry it in a hot air oven at 105°C for a longer period (8-24 h). Remove the moisture cup from the oven and cool it in a desiccator. Repeat the process of heating and cooling till a constant weight is achieved and record the constant weight of moisture cup with sample.

$$\text{Moisture (\%)} = \frac{\text{Initial wt. Of moisture cup + Sample - Final wt. After drying}}{\text{Wt. of the sample}} \text{x100}$$

Dry matter = 100 – Moisture (%)

The experiment data were statistically analyzed using standard statistical methods (Snedecor and Cochran, 1994) [6]. The experiment planned with subjected to analysis of variance (ANOVA) for a completely randomized design (CRD) with one way classification of analysis of variance Different statistical tools such as mean, standard deviation (SD), standard error (SE) were worked out to compare the group means. The difference among treatment means were tested for significance performing Duncan's multiple range tests (DMRT).

Results and Discussion

The average daily dry matter intake (DMI) of Gir cows in different treatments is presented in Table 3. The average daily total dry matter intake (TDMI) in T_1, T_2, T_3 and T_4 groups were 10.317±0.587, 11.318±0.687, 11.232±0.345 and 11.200±0.691 kg/cow, respectively. The DMI through concentrate in T_1, T_2, T_3 and T_4 was 4.371±0.152, 4.535±0.432, 4.450±0.305 and 4.352±0.138 kg, respectively. The DMI through jowar kutti T_1, T_2, T_3 and T_4 was 5.121±0.053, 5.501±0.053, 5.451±0.055 and 5.009±0.049 kg, respectively. The DMI through green fodder in all groups similar and was 0.825 kg. DMI through cakes in T_1, T_2, T_3 and T_4 was 00, 0.458+0.012, 0.506+0.054 and 1.014+0.051, respectively. The averages DMI on 100 kg body weight were 2.865±0.128, 3.135±0.169, 3.115±0.197 and 3.111±0.205 kg in T_1, T_2, T_3 and T_4 groups respectively. Daily DMI, DMI/100kg body weight basis were influenced ($P<0.05$) in T_2 group cows as compared to T_1, T_3 and T_4 Gir cows. Similarly significantly higher in T_2 comparison T_1, T_3 and T_4 Gir cows which consequently improved dry matter intake by balance ration with additional protein through GNC which is having highly protien and palatable. This may be due to better palatability improving voluntary feed intake (Tiwari and Yadava, 1990) [7]. Similar higher voluntary consumption of roughage *vis-à-vis* total dry matter was observed in Singhal

and Mudgal (1983), Chaturvedi and Walli (2000), Yadav and Chaudhary (2004), Sampath *et al.* (2005), Mane *et al.* (2006) Khan *et al.* (2010) and Shankhpal *et al.* (2016) [8, 9, 10, 11, 12, 13, 14]. Season wise total dry matter intake (TDMI) was presented in Table 4. The DMI in T_1, T_2, T_3, and T_4 was 10.732±0.154, 12.1570±0.212, 11.719±0.142 and 11.524±0.310 kg, respectively in spring season. DMI was 09.902±0.175, 10.479±0.402, 10.744±0.124 and 11.176±0.547 kg. in T_1, T_2, T_3 and T_4 in summer season, respectively. The total DMI was more consumed during the spring season due to better micro climate or comfortable thermal neutral zone as compare to summer season.

Table 3: Average daily dry matter intake (kg) of per animal under different treatments during experiment

Parameters	T_1	T_2	T_3	T_4
Concentrate	4.371^{c}±0.152	4.535^{a}±0.432	4.450^{b}±0.305	4.352^{c}±0.138
Jowar kutti	5.121^{c}±0.053	5.501^{a}±0.053	5.451^{b}±0.055	5.009^{c}±0.049
Green lucerne	0.825 ± 0.058	0.825 ± 0.058	0.825 ± 0.058	0.825 ± 0.058
(Protein source) GNC, Cake, Til, CSC)	-	0.458^{c}±0.012	0.506^{b}±0.054	1.014^{a}±0.051
Total DMI	10.317^{c}±0.587	11.318^{a}±0.687	11.232^{b}±0.345	11.200^{b}±0.691
DMI Kg /100 kg BW	2.865^{c}±0.128	3.135^{a}±0.169	3.115^{b}±0.197	3.111^{b}±0.205

Means having different superscript differ significantly (P<0.05)

Table 4: Average daily dry matter intake (kg) of per animal under different treatments during spring and summer season

Treatments	T_1	T_2	T_3	T_4	Mean
Spring season	10.732^{c}±0.154	12.157^{a}±0.212	11.719^{b}±0.142	11.524^{b}±0.310	11.533±3.359
Summer season	09.902^{c}±0.175	10.479^{ab}±0.402	10.744^{b}±0.124	11.176^{a}±0.547	10.499±3.296

Means having different superscript differ significantly (P<0.05)

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