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Om prakash choudhary
Department of Livestock Production Management, Sri Karan Narendra Agriculture University Jobner, Jaipur, Rajasthan, India

Dr. RP jat
Department of Livestock Production Management, Sri Karan Narendra Agriculture University Jobner, Jaipur, Rajasthan, India

Subhash yadav
Department of Livestock Production Management, Sri Karan Narendra Agriculture University Jobner, Jaipur, Rajasthan, India

Corresponding Author:
Om prakash choudhary
Department of Livestock Production Management, Sri Karan Narendra Agriculture University Jobner, Jaipur, Rajasthan, India

Behavioural study of cross-bred and gir cows feed green fodder during winter season

Om prakash choudhary, Dr. RP Jat and Subhash yadav

Abstract
A study was conducted on 20 lactating cows (in which 10 Crossbred and 10 Gir Cows) were divided into four groups on basis of nearest their body weight and milk yield/day at dairy farm (LPM) S.K.N. College of agriculture, Jobner (Rajasthan) and subjected to four dietary treatments were formulated. i.e. Green Lucerne (10 kg) + Wheat straw *ad-lib*.+ Concentrate (T_1-CB), Green Lucerne (20 kg) + Wheat straw *ad-lib*.+ Concentrate (T_2-CB), Green Lucerne (10 kg) + Wheat straw *ad-lib*.+ Concentrate (T_3-GC) and Green Lucerne (20 kg) + Wheat straw *ad-lib.*+ Concentrate (T_4-GC) and the studied for their behavioural pattern. Average maximum and minimum temperature (^{0}C) was 25.60±0.245 and 15.64±0.285 in closed barn. DMI (kg/animal/day) was significantly (P<0.05) higher in T_2 (12.77) than T_1 (12.18), T_4 (11.49) and T_3 (11.07). Average eating time (minutes/day) was significantly (P<0.05) higher in T_2 (307.70) than T_1 (292.90), T_4 (272.40) and T_3 (266.60). Average resting time (minutes/day) was significantly (P<0.05) higher in T_3 (688.20) than T_4 (680.60), T_1 (660.40) and T_2 (653.50) during 24 hours.

Keywords: Behavioural pattern, Crossbred, Gir cow, Green Fodder, Winter season.

1. Introduction
Livestock in India has a very important role in the agricultural sector and consequently in its rural economy. India has 190.90 million cattle population, which includes 39.73 millions cross-bred and 151.17 million Indigenious cattle (Anonymous 2012) [1]. Cattle are an important farm animal which play a significant role in the economy of the country by providing milk, manure, and draught power with very little input. 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 found in parts of Maharashtra and Rajasthan. Cattle of this breed are famous for their tolerance to stress conditions and resistant to various tropical diseases. Cross-breeding programme of dairy cattle has played significant role in attaining India's top position as highest milk producer country of the world. The green fodders is good sources of energy, protein, fat, minerals and vitamins. There for, the present study will be taken to assess behavioural pattern of Cross-Bred and Gir Cows feed green lucerne (*Medicago sativa*) fodder in ration during winter season.

2. Materials and methods
The present investigation was conducted to assess the behavioural pattern of Cross-Bred and Gir Cows feed green lucerne (*Medicago sativa*) fodder in ration during winter season at Dairy farm, Department of LPM S.K.N. College of Agriculture, Jobner (Jaipur). Twenty lactating 10 Cross-bred (Tharparkar/Sahiwal x Holstein Friesian) and 10 Gir lactating cows were selected for the experiment. They were randomly divided into four groups of five in each group on the basis of nearest in their body weight and milk yield and four dietary treatments were formulated. i.e. Green Lucerne (10 kg) + Wheat straw *ad-lib*.+ Concentrate (T_1-CB), Green Lucerne (20 kg) + Wheat straw *ad-lib*.+ Concentrate (T_2-CB), Green Lucerne (10 kg) + Wheat straw *ad-lib*.+ Concentrate (T_3-GC) and Green Lucerne (20 kg) + Wheat straw *ad-lib.*+ Concentrate (T_4-GC) and the studied for their behavioural pattern.

3. Experimental period
The total duration of trial was 105 days and divided into two parts, viz. first 15 days (07 Dec.

2018 to 21 Dec. 2018), Preliminary (adaptation) period and next 90 days (22 Dec. 2018 to 21 March 2019) experimental period.

3.1 Meteorological observations
Meteorological observations like maximum and minimum temperatures were recorded at 9.00 AM and 3.00 PM during experiment.

3.2 Feed Intake
The feed intake data comprising the intake of roughage and concentrate of each animal in all treatments was recorded on two consecutive days at fortnightly interval.

3.3 Animal behaviour
The actual feeding and resting behavior of cows were recorded for two consecutive days and nights (24 hour) of monthly interval during the experiment. The observations recorded were:-

a. Time spent in eating of feed and fodder.
b. Time spent in laying down.

The experiment planned with subjected to analysis of variance (ANOVA) for a (2X2) factorial randmized block design (FRBD) and the means were tested by least significance difference.

4. Results and discussion
The data collected during the experiment were subjected to standard methods of statistical analysis and presented in this chapter in the form of tables, figures along with the implications of the results to the effect of green fodder on their nutrients utility of cows under following heads:

4.1 Micro-cilmate condition in conventional barn during winter season: The average maximum temperature in morning was 24.36±0.141 °C and 26.84±0.102 °C in evening and mean maximum temperature was 25.60±0.245 °C. The mean minimum temperature was 14.63±0.214 °C and 16.66±0.228 °C in morning and evening, respectively. Average minimum temperature during winter season in closed barn was 15.64±0.285 °C.

4.2 Dry matter intake
The average daily total dry matter intake (TDMI) in T_1, T_2, T_3 and T_4 groups was 12.18±0.044, 12.77±0.036, 11.07±0.030 and 11.49±0.053 kg/cow, respectively.

4.3 Animal behaviour
Behaviour is basically inherited through genes and modified through environment. Although animals of a particular species have some common specific behavioral pattern yet several factors may influence variation in the same. In fact an animal's makes behavioral adjustments to adapt to any change in microenvironment. Thereby in the present study feeding and resting time of cross-bred and Gir cows have been investigated.

4.3.1 Eating time
The average eating time was 179.20±0.550, 190.50±0.423, 163.90 ± 0.372 and 166.40±0.521 minutes during day time in T_1, T_2, T_3 and T_4, respectively. The average eating time was 113.70±0.651, 117.20±0514, 102.70±0.561 and 106.0±0.564 minutes during night time in respective treatments. The overall mean of eating time was 292.90±0.629, 307.70±0.388, 266.60±0.495 and 272.40±0.539 minutes per day in T_1, T_2, T_3 and T_4, respectively

4.3.2 Resting time
The average resting during day time was 246.60±0.590, 242.50±0.794, 243.0±0.682 and 239.30±0.880 minutes in T_1, T_2, T_3 and T_4, respectively. The average resting time was 413.80±0.555, 411.0±0.447, 445.20±0.759 and 441.30±0.739 minutes during night in respective treatments. The overall mean of resting time was 660.40±0.590, 653.50±0.572, 688.20±0.800 and 680.60±0.720 minutes per day in T_1, T_2, T_3 and T_4, respectively.

Therefore, It is concluded the feeding level of 20 kg green Lucerne feed group was significantly (P<0.05) higher in eating time and low in resting time as compared to 10 kg green lucerne fed group. It is also showed that the better performance as well as increased palatability and utility of wheat straw in same group of cross-bred and Gir cows during winter season.

Table 1: Average maximum and minimum temperature (^{0}C) in conventional barn system during winter season.

	Parameter		
	Morning	**Evening**	**Mean**
Maximum temperature	24.36±0.141	26.84±0.102	25.60±0.245
Minimum temperature	14.63±0.214	16.66±0.228	15.64±0.285

Table 2: Average daily dry matter intake (kg) of per animal under different treatments during winter season.

Parameters	**CrossBred**		**Gir cow**	
	T_1	**T_2**	**T_3**	**T_4**
Lucerne	1.65^{cd}±0.000	2.34^{a}±0.026	1.65^{d}±0.000	2.22^{b}±0.014
wheat straw	6.25^{a}±0.009	6.10^{b}±0.019	5.37^{c}±0.014	5.17^{d}±0.015
Concentrate	4.28^{b}±0.072	4.33^{a}±0.050	4.05^{d}±0.053	4.10^{c}±0.078
Total DMI	12.18^{b}±0.044	12.77^{a}±0.036	11.07^{d}±0.030	11.49^{c}±0.053
DMI kg /100 kg BW	2.82^{b}±0.012	2.95^{a}±0.013	2.58^{d}±0.022	2.68^{c}±0.021

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

Table 3: Average eating time (minutes) of cows under different treatments during season.

Parameter	**CrossBred**		**Gir cow**	
	T1	**T_2**	**T_3**	**T_4**
Day	179.20^{b}± 0.550	190.50^{a}±0.423	157.50^{d}±0.286	164.40^{c}±0.531
Night	113.70^{b}±0.651	117.20^{a}±0.514	96.20^{d}±0.526	103.0^{c}±0.442
24 hour	292.90^{b}±0.629	307.70^{a}±0.388	266.60^{d}±0.495	272.40^{c}±0.539

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

Table 4: Average resting (minutes) of cows under different treatments during winter season.

Parameter	**CrossBred**		**Gir cow**	
	T1	**T_2**	**T_3**	**T_4**
Day	246.60^{a}±0.569	242.50^{c}±0.794	243.0^{bc}±0.682	239.30^{d}±0.880
Night	413.80^{cd}±0.555	411.0^{d}±0.447	445.20^{a}±0.759	441.30^{b}±0.739
24 hour	660.40^{c}±0.590	653.50^{d}±0.572	688.20^{a}±0.800	680.60^{b}±0.720

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

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