

# Effect of Feeding System on Productive Performance in Lactating Crossbred Cows

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**Abstract** – The experiment was conducted on 12 healthy crossbred cows of nearly similar age and stage of lactation to study the effect of feeding system on milk yield and composition of milk. Three systems of feeding namely; Dry, Traditional and Moist feeding system were adopted. All cows were kept under same feeding schedule for 9 days under preliminary period to adapt the test diet followed by 28 days experimental period. The cows were housed in tail to tail barn under identical condition and fed ration *ad lib*. Containing wheat straw and concentrate. The data on milk yield and composition of milk were collected and analyzed statistically using analysis of variance technique. The Results revealed that the average mean of Total solids (TS), Fat per cent and Milk yield were found significantly higher ( $P<0.05$ ) in moist feeding group as compared to dry and traditional feeding groups. However, there was no significant difference in specific gravity, and Solid not fat (SNF) among groups. Based on these analyses, moist feeding system was superior as compared to the dry and traditional feeding system.

**Keywords** – Crossbred Cows, Feeding System, Milk Composition and Milk Yield.

## I. INTRODUCTION

India is a largest producer of milk in the world with milk production reaching 146.3 million tons and there is a gradual increase in the per capita consumption of milk during from 217 g in 1999-2000 to 322 g in 2014-15 [4]. In developing countries, more than 70% of the expenditure in dairy farming is on the feeding of animals. Most of the farmers are, not aware of the benefits of quality feeding and that of balanced diet [16]. The feeding system is based on feeding balanced diet to dairy cattle so that each bite of food should provide the required amount of energy, protein, fibre and minerals, in order to boost and economize the productive performance [5]. The higher dry matter intake and efficient utilization of nutrients are responsible for considerably higher daily live weight gain and milk yield in lactating cattle. There is a need of developing practical method for improving the digestibility of feed stuffs. The feeding of complete feed stabilizes rumen fermentation, minimizes fermentation loss and ensures better ammonia utilization and help in utilization of poor quality roughage and unconventional feedstuff [13] [12]. The traditional feeding system for dairy cattle is based on the use of wheat straw, paddy straw, natural grasses supplemented with a little or no concentrates. The quantity and quality of fodder available from natural pasture shows seasonal fluctuation. There is an acute shortage of feed supply during the dry season and the available feed during this period is of very

poor quality. Poor nutrition results in low production and reproductive performance, slow growth rate, loss of body condition and increased susceptibility to diseases and parasites [9]. Thus, effective utilization of the available feed resources (agricultural and agro-industrial by products, natural pastures and browse) and appropriate supplementation of poor quality natural pasture and crop residue based diets appear to be the necessary steps to alleviate the nutritional problems of dairy animals. A number of studies by different authors [6] [17] revealed that highly fibrous crop residue and unconventional feed stuff can be effectively used in a complete ration. However, as per our knowledge, literature on the feeding system on lactating crossbred cows though replete but in Indian perspective there are meagre reports has been figured out so far. No systematic information is available in the literature regarding the effect of feeding system on crossbred cattle. Therefore, the present study was planned to compare different feeding systems of roughage and concentrate *i.e.* traditional, dry and moist feeding system of lactating crossbred cattle in India and to determine the effect of feeding systems on productive performance in lactating crossbred cattle.

## II. MATERIALS AND METHODS

### A. Experiment Design

The experiment was conducted at the dairy farm, Sam Higginbottom Institute of Agriculture, Technology & Sciences, Allahabad to determine the effect of the three feeding systems on productive performance in lactating crossbred cattle. It is situated on an altitude of 89 metre (320 feet) above elevation, latitude and longitude position being 25.413° N and 81.849° E respectively. Minimum ambient temperature is recorded near 9 °C in winter, and maximum temperature goes up to 36 °C in summer with annual rainfall of 1025 mm. For the study, twelve healthy crossbred lactating cows were selected and divided equally into three groups (4 cows in each group) *i.e.* Dry feeding system ( $T_0$ ) where cows were fed concentrate mixture without moist with wheat straw, Traditional feeding system ( $T_1$ ) where cows were fed concentrate mixture and wheat straw in manger filled with water and Moist feeding system ( $T_2$ ) in where cows were fed concentrate mixture and wheat straw moistened with water. All there are of animal nearly similar age and stage of lactation. All cows were kept under same feeding schedule for 9 days under preliminary period to adapt the test diet followed by 28 days experimental period for record.

### B. Feeding and Management of Animals

The experimental animals were kept in separate pens throughout the study. The concentrate mixture and wheat straw (Table 1) were offered in the morning and evening. Cows were fed individually to meet the requirements [8] on respective diets.

### C. Feed Sample Analysis

The chemical composition of samples (Dry Matter, Crude Protein, Crude Fibre, Ether Extract, Nitrogen Free Extract and Total Ash) was determined by the methods described by Association of Official Analytical Chemists [1].

### D. Milk Sample Analysis

Daily milk production of each cow was recorded and weighed by digital weighing balance. Milk samples, consisted of proportional volumes of morning and evening milk, were taken after cleaning and disinfection of teats and discarding the first streams of foremilk. Milk samples were collected in 100 ml sterile plastic vials at last 11 consecutive days of experiment during the lactation period. Specific gravity was determined in milk samples by using Lactometer according to [10], Total solids was done by Badcock's formula according to [15], Fat percent was determined in milk samples by using Gerber's fat test according to [2], Solid not fat was determined in milk samples according to [15] and Milk yield of cows was recorded daily in morning at 4.00 to 5.00 am and evening at 3.00 to 4.00 pm.

### E. Statistical Analysis

The data on milk yield and its composition were analyzed statistically using one way ANOVA technique as per [18]. Means were separated for significance by using Tukey Kramer range test.

## III. RESULTS AND DISCUSSION

### A. Dietary Chemical Composition

The chemical composition of wheat straw and concentrate is presented in Table I. Dry matter (DM %) content of wheat straw and concentrate mixture was 89.35 and 89.50 %, respectively. Crude Protein (CP) and Total Digestible Nutrients (TDN) content of wheat straw and concentrate mixture were 3.30 %, 10.59 % and 40.24 %, 65.51%, respectively.

### B. Milk Yield and its Composition

The milk yield and its composition are shown in Table II. The highest specific gravity of milk was found in group T<sub>1</sub> (1.0374), followed by T<sub>2</sub> (1.0370) and T<sub>0</sub> (1.0370) and the differences in specific gravity of milk were found non-significant in among the groups. Similar findings were reported by [3]. The total solids percent was observed in different group T<sub>2</sub> (14.578) followed by T<sub>0</sub> (14.077) and T<sub>1</sub> (14.039). The differences in these values of total solids were found significant indicating thereby a significant effect of treatments on total solids in milk. The milk of cows in T<sub>2</sub> registered significantly (P<0.05) highest total solids percent than milk of cows in T<sub>0</sub> and T<sub>1</sub>. These findings are in accordance with [13] [7]. The highest Fat per cent in milk was higher in group T<sub>2</sub> (4.434) followed by T<sub>0</sub> (4.025) and T<sub>1</sub> (3.898). The differences in the fat per cent in milk of

cows due to treatments were found significant (P<0.05) which indicated a significant effect of treatments on the fat percent in milk of cows. Similar findings were reported by [14] and who has reported that the fat per cent of milk as well as Total solids increased with moist feeding system. The highest SNF per cent in milk was found in group T<sub>2</sub> (10.144) compared to T<sub>1</sub> (10.142) and T<sub>0</sub> (10.052). The differences in SNF per cent of milk was found non-significant among the groups. If the milk fat percentage increases, the percentage may be reduced in the SNF. These findings are in accordance with [7], who have reported that solid not fat of milk was 9.56 to 11.11% and these was no any significant difference in the groups. The highest average milk production was recorded in group T<sub>2</sub> (7.189) compared to T<sub>0</sub> (5.241) and T<sub>1</sub> (3.405). These values of milk yield were found significantly different (P<0.05) and these results are assumed with finding of [11].

Tables

Table I. Feed ingredients and chemical composition used in the experimental ration.

Ingredients	Proportion (in parts)	
	Concentrate	Wheat Straw
Pigeon pea bran (Arhar bran)	25	
Wheat bran	72	
Mineral	2	
Salts	1	
Total	100	100
Chemical composition		
Dry matter (%)	89.50 ± 0.65	89.35 ± 0.24
Crude Protein (%)	10.59 ± 0.12	3.30 ± 0.08
Ether extract (%)	2.52 ± 0.07	1.10 ± 0.02
Crude Fibre (%)	15.99 ± 0.12	38.48 ± 0.16
Nitrogen Free Extract (%)	64.89 ± 0.68	47.24 ± 0.52
Total Ash (%)	6.01 ± 0.45	9.88 ± 0.58
*TDN (%)	67.47 ± 0.84	46.12 ± 0.59

\*Total Digestible Nutrient calculated by NRC, 1989.

Table II. Milk yield and its composition of lactating cows fed different types of feeding system.

Parameters	T <sub>2</sub>	T <sub>1</sub>	T <sub>0</sub>	SEM	P-value
Specific gravity	1.0370	1.0374	1.0370	0.00015	0.085
Total Solids (%)	14.578 <sup>a</sup>	14.039 <sup>b</sup>	14.077 <sup>b</sup>	0.1112	0.002
Fat (%)	4.434 <sup>a</sup>	3.898 <sup>b</sup>	4.025 <sup>b</sup>	0.0909	0.0006
Solid Not Fat (%)	10.144	10.142	10.052	0.0404	0.215
Milk yield (kg/day)	7.189 <sup>a</sup>	3.405 <sup>c</sup>	5.241 <sup>b</sup>	0.0797	0.000

\*Means with different superscripts (a, b, c) in row differ significantly (P<0.05).

## IV. CONCLUSION

From the experiment exercised, it has been concluded that systems of feeding greatly influence on the cow's performance increasing its feed intake and better utilization thereby increasing its feed efficiency in alimentary canal, thereby improving Total Solids, Milk fat and Milk yield also reducing feed cost up to a certain level. Moist feeding has positive effect on in milk fat, total solids than that of dry

and traditional feeding systems. It was concluded that moist feeding system was superior as compared to dry and traditional feeding system.

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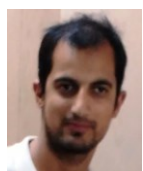
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