

International Journal of Advanced Biochemistry Research



ISSN Print: 2617-4693
 ISSN Online: 2617-4707
 IJABR 2024; SP-8(6): 605-606
www.biochemjournal.com
 Received: 23-03-2024
 Accepted: 27-04-2024

Komal
 Lala Lajpat Rai University of
 Veterinary and Animal
 Sciences, Hisar, Haryana,
 India

Devender Singh Bidhan
 Lala Lajpat Rai University of
 Veterinary and Animal
 Sciences, Hisar, Haryana,
 India

Sandeep Dhillod
 Lala Lajpat Rai University of
 Veterinary and Animal
 Sciences, Hisar, Haryana,
 India

Amandeep
 Lala Lajpat Rai University of
 Veterinary and Animal
 Sciences, Hisar, Haryana,
 India

Jyotsana
 Lala Lajpat Rai University of
 Veterinary and Animal
 Sciences, Hisar, Haryana,
 India

Corresponding Author:
Komal
 Lala Lajpat Rai University of
 Veterinary and Animal
 Sciences, Hisar, Haryana,
 India

Effect of faba bean (*Vicia faba*) as a cheap protein source on milk composition in Murrah buffalo

Komal, Devender Singh Bidhan, Sandeep Dhillod, Amandeep and Jyotsana

DOI: <https://doi.org/10.33545/26174693.2024.v8.i6Sh.1382>

Abstract

The present study was carried out to study the effect of Faba Bean (*Vicia faba*) as protein source on performance of Murrah Buffaloes. For this, eighteen Murrah buffaloes in transition phase were selected and divided into 3 treatment groups having six buffaloes in each group on the basis of milk yield, body weight and parity, following completely randomized design (CRD). Treatment 1 (control) was given concentrate as per ICAR standard 2013 (T₀), in treatment 2; 15% of the CP of the concentrate of the control group was replaced with faba bean (T₁) and Treatment 3 was given concentrate by replacing 30% of the CP of the control group with faba bean (T₂). Milk composition parameters were observed. It was reported that replacement of protein source with 15 and 30% faba bean did not have significant effect on milk composition in terms of milk fat, FCM, milk protein, SNF content and total solids. Overall, it can be concluded that replacement of high cost protein source with faba bean (cheap protein source) upto 30% level does not have any deleterious effect on performance of the animal.

Keywords: Faba bean, concentrate, fat corrected milk, murrah, protein

Introduction

Feeding high-yielding dairy animals with sufficient protein is a common challenge for dairy nutritionists^[1]. Due to rising costs and consumer preferences for sustainable practices, there's a growing interest in finding more affordable and eco-friendly alternatives for protein feeds^[2]. Legume seeds, particularly, have become attractive options because of their high crude protein (CP) and starch levels^[3-5]. One notable example is the faba bean, which stands out as a valuable protein source with a crude protein content typically ranging between 25% and 33%^[5-7]. Additionally, faba beans are rich in starch, providing 32% to 44%^[5-7], which makes them an effective energy source. By incorporating faba beans into dairy feed, farmers can potentially decrease their dependence on expensive protein supplements and reduce the need for costly cereal grains such as corn. This strategy not only supports the nutritional needs of dairy cattle but also aligns with economic and environmental sustainability goals. There is no available literatures on the positive and negative consequences of replacing protein source by faba bean as an alternative protein source on lactation of Murrah buffalo. Therefore, the present investigation was conducted to study the effect of faba bean (*Vicia faba*) as protein source on milk production and its quality parameters in lactating buffaloes.

Materials & Methods

The experiment was conducted at the buffalo farm of Livestock Production Management, College of Veterinary Sciences, Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar, over a period of 180 days. Eighteen Murrah buffaloes in the transition phase (one month before calving) were selected and divided into three treatment groups, each comprising six animals. The animals were divided based on milk yield, body weight and parity, following a completely randomized design (CRD). The experimental Murrah buffaloes were provided with a ration consisting of concentrate mixture and roughage (berseem and wheat straw). The concentrate mixture was offered to each animal twice daily (during morning and evening milking) according to the experimental diet. During the transition phase, concentrates were fed in the shed itself.

The treatments were as follows: Treatment 1 (control): Concentrate fed as per feeding standards^[8] (T₀), Treatment 2: Concentrate with 15% of the crude protein (CP) of the control group replaced with faba bean (T₁), Treatment 3: Concentrate with 30% of the crude protein (CP) of the control group replaced with faba bean (T₂). Buffaloes were hand-milked twice daily. Milk samples for composition analysis were initially taken on the tenth day after calving and subsequently at weekly intervals until the end of the experiment. Samples were collected during both morning and evening milking from each experimental buffalo and processed on the same day using a Milko-Scan autoanalyzer. The daily average of both milk samples (morning and evening) was calculated for the estimation of milk fat (%), milk protein (%), solid-not-fat content (%), total solids (%), and 6% FCM (Fat Corrected Milk).

The averages of the treatment groups were subjected to statistical analysis following procedures outlined by Snedecor and Cochran^[9]. Differences in significance among the variables between the three groups were compared using one-way analysis of variance (ANOVA), conducted with the help of SPSS computer software version 21. Mean differences among different treatments were then separated using Duncan's multiple range tests. A significance level of $p < 0.05$ was utilized as the criterion for statistical significance^[10].

Result and Discussion

The average milk fat (%), milk protein (%), solid non-fat content (%), total solids (%), and 6% FCM of lactating Murrah buffaloes under different treatment groups analyzed at weekly intervals from the tenth day of calving to six months post-partum are presented in Table 1. Notably, there were no significant differences in these parameters between the different treatment groups. Moreover,^[11] tested flaked faba beans as a partial substitute for soybean meal in the diet of Reggiana breed dairy cows and found no significant differences in fat %, protein %, lactose %, and casein % between the control and flaked faba bean diet groups. Similarly,^[12] substituted raw or rolled faba bean seeds at a rate of 171 g/kg DM diet for soybean meal at 9.2 g/kg DM diet in lactating Holstein cows and found no significant effects on milk composition between the groups.

Table 1: Average fat (%), Average FCM (Kg), Average Milk Protein (%), Average SNF (%) and Average Total Solids (%) in milk of experimental Murrah buffaloes at weekly intervals under different dietary treatments

Period (Weekly)	Treatments		
	T ₀	T ₁	T ₂
Average milk fat (%)	7.07±0.08	7.13±0.12	6.84±0.177
Average FCM (kg)	10.84±0.31	11.47±0.22	11.42±0.29
Average Milk Protein (%)	3.43±0.02	3.44±0.01	3.48±0.03
Average SNF (%)	09.33±0.08	09.28±0.09	09.36±0.06
Average Total solids (%)	16.41±0.12	16.37±0.15	16.21±0.17

Conclusion

On the basis of results obtained in the present study it may be inferred that there was non-significant difference between the treatment groups in overall milk composition parameters. Overall, it can be concluded that replacement of high cost protein source with faba bean (cheap protein source) upto 30% level does not have any deleterious effect on performance of the animal. Therefore, it can be inferred that faba bean does not have any deleterious effect on

animal and also economical to the farmers as it reduced the milk production cost. So, it can be used in the ration of dairy animals.

The above study was conducted under loose housing system and from period July to Feb. So, further studies are required under different agro-climatic conditions and with larger herd size.

Competing Interests

The authors declare no competing interest regarding publication of this paper.

Acknowledgement

The authors are thankful to Worthy Vice-Chancellor, Lala Lajpat Rai University of Veterinary and Animal Sciences, Hisar for providing needed facility for conducting this work.

References

- Huhtanen P, Hetta M, Swensson C. Evaluation of canola meal as a protein supplement for dairy cows: a review and a meta-analysis. *Canadian Journal of Animal Science*. 2011;91:529-543.
- Puhakka L, Jaakkola S, Simpura I, Kokkonen T, Vanhatalo A. Effects of replacing rapeseed meal with faba bean at 2 concentrate crude protein levels on feed intake, nutrient digestion, and milk production in cows fed grass silage-based diets. *Journal of Dairy Science*. 2016;99:7993-8006.
- Petit HV, Rioux R, Ouellet DR. Milk production and intake of lactating cows fed raw or extruded peas. *Journal of Dairy Science*. 1997;80:3377-3385.
- White CL, Staines VE, Staines MV. A review of the nutritional value of lupins for dairy cows. *Australian Journal of Agricultural Research*. 2007;58:185-202.
- Crepon K, Marget C, Peyronnet B, Carrouee P, Duc G. Nutritional value of faba bean (*Vicia faba* L.) seeds for feed and food. *Field Crops Research*. 2010;115:329-339.
- Yu P. Potential protein degradation balance and total metabolizable protein supply to dairy cows from heat-treated faba beans. *Journal of Science of Food and Agriculture*. 2005;85:1268-1274.
- Larsen M, Lund P, Weisbjerg MR, Hvelplund T. Digestion site of starch from cereals and legumes in lactating dairy cows. *Animal Feed Science and Technology*. 2009;153:236-248.
- Indian Council of Agricultural Research. *Nutrient Requirements of Cattle and Buffalo 3rd Edn.*, New Delhi; c2013.
- Snedecor GW, Cochran WG. *Statistical Methods*. 7th Edn., Oxford and IBH Publishing Co., New Delhi; c1994.
- Duncan DB. Multiple range and multiple F tests. *Biometrics*. 1955;11(1):1-42.
- Cherif C, Hassanat F, Claveau S, Girard J, Gervais R, Benchaar C. Faba bean (*Vicia faba*) inclusion in dairy cow diets: Effect on nutrient digestion, rumen fermentation, nitrogen utilization, methane production, and milk performance. *Journal of Dairy Sciences* 2018;101:8916-8928.
- Oquendo GVH, Espinosa MER, Yu P. Research progress on faba bean and faba forage in food and feed types, physiochemical, nutritional, and molecular structural characteristics with molecular spectroscopy. *Critical Reviews in Food Science and Nutrition*. 2021, 1-11.