



Journal of Experimental Biology and Agricultural Sciences

<http://www.jebas.org>

ISSN No. 2320 – 8694

EFFECT OF PROBIOTIC AND PRILLED FAT ON LACTATION PERFORMANCE OF CROSS BRED COW DURING TRANSITION PERIOD

Meeti Punetha¹, AK Roy¹, Irshad Ahmed Para¹, Deepanshu Gupta¹, Nitika Singh Jalmeria¹,
Yogesh Pandey², Mahendra Singh^{1*}

¹Division of Animal Physiology, ICAR- National Dairy Research Institute, Karnal-132001 (Haryana)

²Physiology and Climatology Division, ICAR-Indian Veterinary Research Institute (Izatnagar)

Received – January 12, 2018; Revision – July 05, 2018; Accepted – July 09, 2018

Available Online – August 10, 2018

DOI: [http://dx.doi.org/10.18006/2018.6\(4\).746.750](http://dx.doi.org/10.18006/2018.6(4).746.750)

KEYWORDS

Saccharomyces cerevisiae

Prilled fat

Milk yield

Profit/cow/day

Fat

ABSTRACT

In present study, combined effects of prilled fat and yeast culture (YC) mixture supplemented diet on 12 early lactating crossbred cows were evaluated. Cows were divided into two groups as control group (CON group) and supplemented group (SG). Animal of CON group were fed on wheat straw, maize fodder and concentrate mixture, while animal of supplemented group were additionally supplemented with 100g/d prilled fat, 25g/d *Saccharomyces cerevisiae* (SC)/day and sweetener 1g/d from 30 days prepartum to 30 days postpartum. The effect of feeding on milk production was monitored up to 60 days of lactation. Result of study revealed that milk yield was increased ($p<0.01$) by 9.76% in SG than the control group (14.77 ± 0.34 kg/d vs $13.44\text{kg/d}\pm 0.44$). Further, Milk fat yield was also increased ($p<0.01$) by 5.91% in SG than the CON. The overall net average profit was Rs 77.77/cow/day assuming selling price of milk @ Rs 50/kg milk at 3.5% FCM. The overall net daily gain of milk kg/day/cow due to supplementation mixture was 1.76 kg.

* Corresponding author

E-mail: chhokar.ms@gmail.com (Mahendra Singh)

Peer review under responsibility of Journal of Experimental Biology and Agricultural Sciences.

Production and Hosting by Horizon Publisher India [HPI]
(<http://www.horizonpublisherindia.in/>).
All rights reserved.

All the article published by Journal of Experimental Biology and Agricultural Sciences is licensed under a Creative Commons Attribution-NonCommercial 4.0 International License Based on a work at www.jebas.org.



1 Introduction

In developing countries like India most of the animals are fed agriculture by-products and low quality crop residues which have low nutritive value and digestibility. Increased nutrient demand and limited feed intake during early lactation affects production potential and cause an increase in energy demand (Sirohi et al., 2010). Due to this reason animals mobilizes its body reserves to satisfy energy requirements (negative energy balance) leading to substantial loss in body weight and lower milk yield (Kim et al., 2003). Supplementation of bypass fat increases energy intake shows more economic returns to dairy farmers (Parnerkar et al., 2010). The previous results on effect of prilled fat containing vegetable palm oil have shows significant impact on milk yield and fat percentage in cows and buffaloes (Rajesh, 2013; Yadav et al., 2015; Singh et al., 2015; Sharma et al., 2016). Similar to prilled fat, the yeast supplementation in the diet of animals can modify microbial fermentation and digestion in the rumen. Studies have shown the positive effects of yeast culture on rumen environment and its microbial activities (Chevaux & Fabre, 2007). Yeast culture used as a dietary supplement for dairy cattle improve rumen function, which in turn improve milk production and feeding efficiency, by stimulating selective growth of rumen bacteria species (Harrison et al., 1995). Yeast stimulates cellulolytic bacteria in the rumen, increase fiber digestion and flow of microbial protein from the rumen (Newbold et al., 1996; Jouany & Morgavi, 2007). The effect of prilled fat and *S. cerevisiae* feeding on milk production has been reported but the combined effect of supplementation on the economics has not been studied. Therefore, present study was conducted to investigate the effect of *S. cerevisiae* and prilled fat feeding concurrently on economics of feeding in crossbred cows.

2 Materials and Methods

2.1. Experimental site and animals

National Dairy Research Institute, Karnal is situated at an altitude of 250 meter above mean sea level, latitude and longitude position being 29° 42" N and 79° 54" E, respectively. The maximum ambient temperature in summer goes up to 45°C and minimum temperature in winter comes down to <1°C with a diurnal variation in the order of 15-20°C. The average annual rainfall is 700 mm, most of which is received from early July to mid September. For the present study, 12 Karan Fries (KF) cows at 45 days pre-partum were selected from the herd of National Dairy Research Institute (NDRI) Karnal.

2.2 Experimental Design

The experimental crossbred cows (Holstein Friesian x Thaparkar) were divided into two groups of six animals each on the basis of

MPPA. Six cows were kept as control and fed as per the standard feeding practices followed at NDRI farm. While the rest six experimental cows were supplemented daily with prilled fat @100g /cow, *S. cerevisiae* @ 25g/cow and sweetener @ 1g/cow in addition to the standard feeding practices from -30 days of pre-partum until 30 days of lactation. Milk yields of the cows were recorded daily up to 30 days of lactation. Milk samples were collected on 7, 14, 21 and 30 days from both the groups of cows and analyzed for fat, protein, lactose, and SNF by milk analyzer.

3 Result

The average milk production was lower in control (13.44kg/d) than the supplemented group (14.77kg/d). The milk yield was 9.76% higher in SG than that of control group cows (Figure 1). The milk fat and protein increased by 5.91% and 6.47% respectively in the supplemented as compared to control group cows (Figure 2, 3). Feeding of prilled fat @100g/day/cow, *S. cerevisiae* @ 25g/day and sweetener @ 1g/day during prepartum and postpartum was found to be economical and beneficial. Supplementation of prilled fat along with *S. cerevisiae* and sweetener costs Rs.13.4; in which cost of prilled fat is Rs 80/kg, *S. cerevisiae* cost Rs. 210/Kg and sweetener Rs150/kg. On supplementation of prilled fat, milk yield was significantly ($P<0.01$) increased and fat percentage was also significantly ($P<0.01$) higher. The milk yield at 3.5%FCM at different weekly interval was calculated. The overall net average profit was Rs 77.77/cow/day assuming selling price of milk @ Rs 50/kg milk at 3.5% FCM. The overall net daily gain of milk kg/day/cow due to supplementation mixture was 1.76 kg (Table 1)

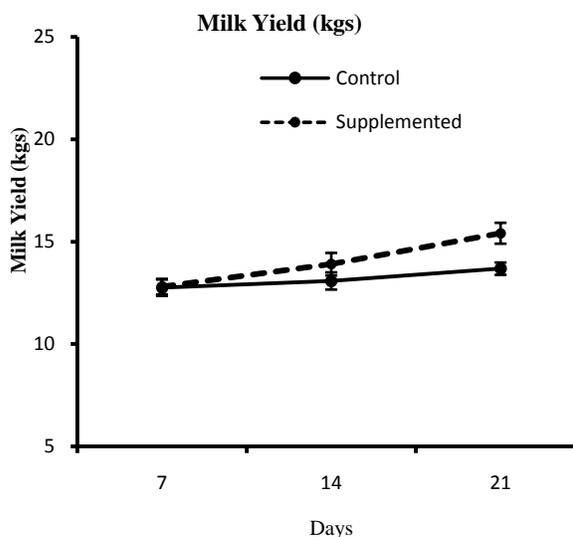


Figure 1 Effect of supplemented diet on milk yield

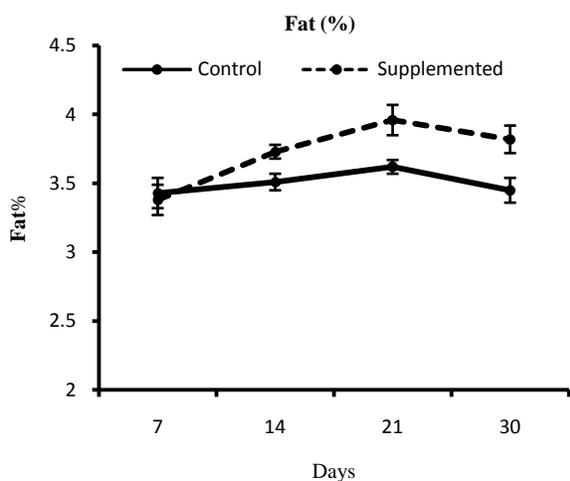


Figure 2 Effect of supplemented diet on milk fat percentage

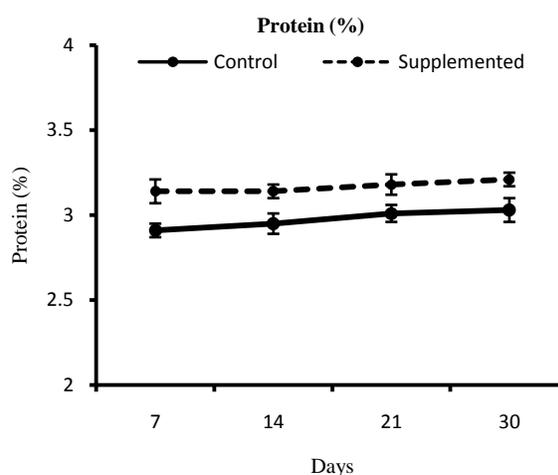


Figure 3 Effect of supplemented diet on milk protein percentage

Table 1 Cost benefit Ratio

Cost-benefit ratio		
Input cost	C group	S group
cost of green fodder(@Rs 3/kg) taken by 12 cows @30Kg/day	30*6*3	32*6*3
	Rs 540	Rs 576
cost of dry fodder(@Rs 5/kg) taken by 12 cows @5Kg/ day	5*6*8.5	5*6*8.9
	Rs 255	Rs 267
cost of concentrate(@Rs 22/kg) taken by 12 cows @3/Kg day	3*6*22=Rs 396	3*6*22=Rs 396
cost of FYC (@Rs 350/kg) prilled fat plus S.C and sweetener taken by cows per day		8+5.25+0.15=13.4
Total input cost	Rs 1191	Rs 1252.4
Output cost	C group	S group
FCM (3.5%) yield of 12 cows per day	13.43	15.19
cost of milk(@Rs 50/kg) produced from one animal per day	13.43*50=Rs 671.5	15.19*50=Rs 759.5
Increased yield /day/cow	15.19-13.43	1.76kg
Increased profit /day/cow	1.76*50	Rs 88
actual profit/cow/day, -cost of FYC	88-10.23=	Rs 77.77
Cost: benefit ratio	10.23/77.77	1:7

4 Discussion

The increases in milk production in supplemented group of crossbred cows suggest that the mixture of prilled fat and *S. cerevisiae* is galactopoitic and sustained the milk production during the experiment. However, the inclusion of sweetener was supposed to enhance the palatability of feed. Sharma et al. (2016) observed that milk yield increased significantly at 2 kg/day during different weeks of the experiment in SG in comparison to CG. The greater response in milk yield and fat content in crossbred cows indicated that energy was limiting the milk production. Similar results on milk yield have been reported earlier in mid-lactating cows fed with prilled fat 75g/d (Singh et al., 2014) and in buffaloes maintained in organized farm of the institute (Singh et al., 2015). Ranjan et al. (2012) concluded that bypass fat supplementation with 1.4 % of dry matter intake (200g/day) increased the milk production and feed efficiency in lactating Murrah buffaloes. Rajesh (2013) reported an improvement of 6.02% in milk yield of early lactating crossbred cows fed 75g/d/animal prilled fat. The significant increase in milk production associated with yeast supplementation have previously been reported in dairy cows (Bruno et al., 2009). Yeast supplemented @ 15g /day, showed a significant (P<0.05) improvement in milk yield (8.8%), protein content (P<0.05) and SNF in cross bred cows (Hossain et al., 2012). Formigoni et al. (2005) reported that Yea-Sacc@1026 improved significantly the DMI and milk yield of dairy cows, on the overall period, but also, during heat stress period. Yea-Sacc @1026 improved significantly the composition of cows milk, including fat (P<0.01) and protein (P<0.05) content. An increase in milk yield due to yeast culture feeding usually ranged between 1 and 2 kg/day (Robinson & Garrett, 1999). A positive effect of yeasts on the performance of dairy cows resulted in increased daily feed intake and improved digestibility of nutrients or change in rumen parameters. Ayad et al., (2013) observed that when *S. cerevisiae* was given 20 g/day the average milk production per cow was reported between the all experiment groups (by about +25%, i.e. 4.8l/day/cow), with a positive effect in milk fat content. The significant increase in milk protein in SG is due to increase in VFA production by yeast culture (*S. cerevisiae*) which in turn increases milk proteins (Oetzel et al., 2007).

Conclusion

Supplementation of a mixture of prilled fat along and *S. cerevisiae* with sweetener significantly improves milk yield and fat percent. Further being cost effective it could be used successfully to augment the productive performance of cows. The increase in milk yield, milk fat, milk protein and more profitability by INR 77/day/animal indicate its important role in sustaining the rural livelihood in the near future.

Ethical Procedure

The experimental protocol was duly cleared by the Institute Animal Ethics Committee.

Acknowledgements

The authors thank Director, ICAR-National Dairy Research Institute Karnal for providing necessary facilities for the above research work. The grant used under BRNS project no. 2013/35/48-RTAC, Mumbai is thankfully acknowledged.

Competing Interests

The authors declare that they have no competing interests.

Reference

- Ayad MA, Benallou B, Saim MS, Smadi MA, Meziane T (2013) Impact of Feeding Yeast Culture on Milk Yield, Milk Components, and Blood Components in Algerian Dairy Herds. *Journal of Veterinary Science Technology* 4: 135.
- Bruno RG, Rutigliano HM, Cerri RL, Robinson PH, Santos JE (2009) Effect of feeding *Saccharomyces cerevisiae* on performance of dairy cows during summer heat stress. *Animal Feed Science and Technology* 150: 175-186.
- Chevaux E, Fabre MM (2007) Probiotic yeast in small ruminants. *Feed Mixture* 15: 28- 29.
- Formigoni A, Pezzi P, Tassinari M, Bertin G, Andrieu S (2005) Effect of yeast culture (Yea-Sacc@1026) supplementation on Italian dairy cow performance. *Proceedings of the 21st Annual Symposium Nutritional Biotechnology in the Feed and Food Industries, (Suppl. 1), Lexington, KY, USA (May 23-25) Pp. 125.*
- Harrison JH, Kincaid RL, McNamara JP, Waltner S, Loney KA, Riley RE (1995) Effect of whole cotton seeds and calcium salts of long-chain fatty acids on performance of lactating dairy cows. *Journal of Dairy Science* 78:181-193.
- Hossain S, Parnerkar N, Haque R, Gupta D, Kumarand A, Tyagi K (2012) Influence of dietary supplementation of live yeast (*Saccharomyces cerevisiae*) on nutrient utilization, ruminal and biochemical profiles of Kankrej calves. *International Journal of Applied Animal Sciences* 1 : 30-38.
- Jouany JP, Morgavi DP (2007) Use of 'natural' products as alternatives to antibiotic feed additives in ruminant production. *Animal* 1: 1443-1466.

- Kim MS, Yoon CY, Park KH, Shin CS, Park KS, Kim SY, Cho BY, Lee HK (2003) Changes in ghrelin and ghrelin receptor expression according to feeding status. *Neuroreport* 14:1317-1320.
- Newbold CJ, Wallace RJ, Mcintosh FM (1996) Mode of action of the yeast *Saccharomyces cerevisiae* as a feed additive for ruminants. *British Journal of Nutrition* 76: 249- 261.
- Oetzel GR, Emery KM, Kautz WP, Nocek JE (2007) Direct-Fed Microbial Supplementation on Health and Performance of Pre- and Postpartum Dairy Cattle: A Field Trial. *Journal of Dairy Science* 90: 2058-2068.
- Parnerkar S, Kumar D, Shankpal SS, Thube H (2010) Effect of feeding bypass fat to lactating buffaloes during early lactation. In Proc. of 7th Biennial Animal Nutrition Association Conference, Orissa University of Agriculture and Technology, Bhubaneswar, India, Pp. 126-131.
- Rajesh G (2013) Studies on Postpartum physiological adaptation in hormones, metabolites and milk production in crossbred cows fed with prilled fat. MVSc thesis submitted to NDRI, Karnal, Haryana, India.
- Ranjan A, Sahoo B, Singh VK, Srivastava S, Singh SP, Pattanaik AK (2012) Effect of bypass fat supplementation on productive performance and blood biochemical profile in lactating Murrah (*Bubalus bubalis*) buffaloes. *Tropical Animal Health Production* 44: 1615–1621.
- Robinson PH, Garrett JE (1999) Effect of yeast culture (*Saccharomyces cerevisiae*) on adaptation of cows to postpartum diets and on lactational performance. *Journal of Animal Science* 77: 988-999.
- Sharma S, Singh M, Roy AK, Thakur S (2016) Effect of pre-partum prilled fat supplementation on feed intake, energy balance and milk production in Murrah buffaloes. *Veterinary World* 9 : 256-259.
- Singh M, Roy AK, Sharma S (2015) Augmentation of milk production by supplementing bypass fat in dairy animals. *Asian Journal Animal of Veterinary Advances* 10: 476-488.
- Singh M, Sehgal JP, Roy AK, Pandita S, Rajesh G (2014) Effect of prilled fat supplementation on hormones, milk production and energy metabolites during mid-lactation in crossbred cows. *Veterinary World* 7: 384-388.
- Sirohi SK, Walli TK, Mohanta RK (2010) Supplementation effect of bypass fat on production performance of lactating crossbred cows. *Indian Journal of Animal Sciences* 80: 733.
- Yadav G, Roy A K, Singh M (2015) Effect of prilled fat supplementation on milk production performance of crossbred cows. *Indian Journal of Animal Nutrition* 32: 133-138.