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Effect of supplementation of broken maize on milk production of crossbred cows reared at high altitudes

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Abstract

The present study was conducted to examine the effect of supplementation of broken maize on milk production in an organised dairy farm situated at an altitude of 1100m above sea level. The cows in the farm were offered concentrate mixture as per the package of practices recommendations (2016) of Kerala Veterinary & Animal Sciences University and with ad libitum *Setaria* grass while housed inside the shed. Cows were left out for grazing for 7 hrs in the forenoon. The study was conducted for a continuous period of 9 months of which the milch cows were unsupplemented with broken maize for the first three months, followed by supplementation with 0.5kg broken maize/cow/day for the next three months and with 1kg broken maize/cow/day for the last three months. The data regarding milk production was recorded daily and was analysed statistically to examine the effect of feeding intervention on milk production. The average milk yield (L/cow/day) of the herd before broken maize supplementation was 6.77 ± 0.54 . When broken maize was supplemented at a level of 1kg/cow/day the mean milk production significantly improved to 9.03 ± 0.61 (L/cow/day). The study concluded that broken maize supplementation improves the milk production of crossbred dairy cows reared at high altitudes.

Keywords: Broken maize, dairy cows, high altitude, milk production
Introduction

Maize (*Zea mays*) is the most widely used grain as energy supplement in animal feeds [1]. It is having higher metabolisable energy density compared to other cereal grains. Maize also has higher starch content and slower rate of rumen fermentation [2] among the common cereal grains. However, the protein content of maize is lower than other grains. Therefore, in maize based rations protein supplementation is required to meet the requirements of animals. Cold weather, increases cows appetite and increases their ability to utilize feed nutrients to keep the body warm [3]. In such conditions, a part of the metabolisable energy is utilized to maintain the body temperature. Therefore, the requirement of energy for animals is higher in colder climates. Hence, this study was conducted to examine the effect of supplementation of broken maize on milk production in high altitude dairy farming.

Materials and Methods

The study was conducted in a dairy farm at Kolahalamedu, Peerumedu Taluk of Idukki District, Kerala State. The farm is situated at an altitude of 1100 m above sea level (latitude of 9.5760° N and longitude of 77.0255° E), with an annual rainfall of 2295 mm. The total herd strength of the farm is around 150 and the cows are cross breeds having the mixed germplasm of native breeds with exotic breeds such as Jersey, Holstein Friesian and Brown Swiss. Nearly 40-50 animals contribute to the total milk production of the farm at a time. The population under investigation included the milch cows of the farm. The animals of the farm are usually fed concentrates twice daily (5.30 h & 15 h) as per the package of practices recommendations (2016) of Kerala Veterinary & Animal Sciences University [4] and with ad libitum fodder while housed inside the shed. Generally they are left out for grazing in pasture found in hilly meadows and valleys for 7 hrs in a day from 6.30 h to 13.30 h. Access to pasture for grazing enable the livestock to act out their innate behavior compared to intensive in-house situations [5]. The chief grass found in the hilly meadows and valleys includes congo signal and setaria respectively. The study was conducted for a continuous period of 9 months of which the milch cows were unsupplemented with broken maize for the first three months, followed by supplementation with 0.5kg broken maize/cow/day (15h) for the next three months and with 1kg broken maize/cow/day (15h) for the last three months.

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The data regarding milk production was recorded daily. The data obtained for the various treatments were subjected to Analyses of variance (ANOVA) procedure according to a Latin square design using the General Linear Model (GLM) of the SPSS system for windows.

Treatment means were compared by using Duncan's New Multiple Range Test.

Results and Discussion

The changes in milk production before and after feeding intervention is given in Table 1. The average milk production of the herd (L/cow/day) before broken maize supplementation was 6.77 ± 0.54 . When broken maize was supplemented at a level of 1kg/cow/day the mean milk production significantly improved to 9.03 ± 0.61 (L/cow/day).

Table 1: Effect of supplementation of broken maize on milk production

Parameter	Before intervention	After intervention		SEM	P Value
		Supplemented with broken maize (0.5 kg/cow/day)	Supplemented with broken maize (1 kg/cow/day)		
Milk production (L/cow/day)	6.77 ± 0.54^b	7.67 ± 0.48^{ab}	9.03 ± 0.61^a	0.56	0.04

It is reported that maize starch differs from other cereal starches in its degradation [6, 7]; 60% of maize starch being degraded in the rumen compared with 90% for other common cereal grains [8]. When broken maize is supplemented it is slowly degraded in the rumen, to meet the energy requirements of microbes facilitating better digestibility and utilization of roughages. Supplementation of crushed maize enhanced the energy level of the ration, which could have contributed to higher milk production as reported earlier [8]. A study in buffaloes concluded that the escape of 20-40% maize starch from rumen fermentation followed by its absorption in the lower tract contributes to the increased milk production [9]. The increase in milk yield was significantly evident when supplemented at a level of 1kg/cow/day, which indicates that the cows responded better to supplementary maize at this level.

Conclusion

Maize cereal is a valued energy source in ruminants. In dairy animals, it can support milk production because of its high content of total digestible nutrients. Good quality starch present in maize promotes rumen bacterial growth, thus enhancing forage digestibility. In the present study, maize supplementation (1kg/cow/day) proved in promoting milk production of dairy cows. The study concludes that feeding broken maize as an energy supplement is important in profitable and sustainable dairy farming at high altitudes.

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