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Effect of calcium and phosphorus supplementation on milk yield in Gangatiri cows in different seasons

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Abstract

An experiment was conducted to examine the effect of calcium and phosphorus supplementation on milk yield in Gangatiri cow in different seasons. Sixteen lactating Gangatiri cows from Livestock, SHUATS Prayagraj (Allahabad) were categorized in four groups, T₀, T₁, T₂ and T₃, as per supplementation of calcium and phosphorus in different seasons. All cows were housed in tail to tail barn under similar management conditions. All sanitary precautions were undertaken to produce clean milk by dry full hand method of milking. Milk yield supplemented with calcium and phosphorus in different seasons was determined from daily milk yield records of each animal. The experimental period was divided in three different seasons as winter, summer and rainy. The results showed that winter and rainy season had significantly higher milk yield but in summer season had a non-significant influence of calcium and phosphorus supplementation.

Keywords: Gangatiri cow, milk yield, season of milk

Introduction

The livestock plays an important role in the economy of farmers. The farmers in India maintain mixed farming system i.e. a combination of crop and livestock where the output of one enterprise becomes the input of the other. Thereby realize the resource efficiency. The livestock products such as milk, meat and eggs are an important source of animal protein to the members of the livestock owners. The majority of calcium (99%) in organism is stored in bones and teeth. Calcium is important for activation of numerous enzymes and hormones. The calcium collaborates in processes of blood coagulation, nerves stimulation and muscles contraction. In blood serum approximately 55% of Ca is in ionised form and this is biologically active. The part of ionised Ca depends from blood pH, by decrease of pH the part of ionised Ca increase. A part of Ca in serum is bound to the albumins (40%) and smaller part (5%) to organic acids (Jazbec, 1990; Kraft, 1999) [4]. Phosphorus is important for normal growth and mineralization of bones. In the skeleton of adult animals is stored approximately 80% of all phosphorus in the body, which could be mobilised at need. The rest 20% of phosphorus is in soft tissues and body fluids where it collaborates in numerous important processes. It is the ingredient of deoxy- and ribonuclein acids, as phospholipids it is the part of cell membranes, as phosphate is important by regulation of osmotic and acid-base balance in the organism. Phosphorus has an important role in metabolism of energy, where it collaborates by transport of energy and fatty acids, synthesis of amino acids and proteins and working of Na/K pump (Underwood & Suttle, 2001) [9].

Material and method

The present experiment on “Effect of supplementation of calcium and phosphorus on milk yield in different seasons in Gangatiri cattle breed” was conducted at Department of Animal Husbandry and Dairying, SHUATS, Prayagraj (U.P.). 16 cows at Department of Animal Husbandry and Dairying, SHUATS, Prayagraj were subjected to Californian mastitis test with negative test were selected for the study and randomly divided into four groups. All experimental animals were housed in a tail to tail barn and managed under more and less similar management conditions. Ration and clean water were being offered. Treatments were as follows: T₀ (Control) Concentrate with zero Calcium carbonate and Sodaphos T₁ Concentrate with 62.5 gm Calcium carbonate T₂ Concentrate with 25 gm Sodaphos T₃ Concentrate with 62.5 gm Calcium carbonate and 25 gm Sodaphos based on consistent milk yield records in their earlier lactations. All the animals were clinically healthy with no physical deformities. Standard feeding and manage mental practices were followed during the study period.

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The animals were fed concentrate mixture according to milk yield as well as mixed seasonal green fodders. The animals were also examined to be free of endoparasites as anthelmintics were regularly fed at the research station. The health status of the selected animals was regularly evaluated based on behavior, rectal temperature, pulse rate and respiratory rate during the experimental period. The experimental period was divided into three phases coinciding with the three major seasons of the year i.e. summer (March to June), rainy²¹ (July to October) and winter (November to February). The results were statistically analyzed using two-way ANOVA as per method of Snedecor and Cochran 1994^[7].

Factors for the study season of milk

- Winter season (Dec-March)
- Summer season (April-June)

c) Rainy season (July-Sep)

Results and Discussion

The milk yield taken during winter, summer and winter supplementation calcium and phosphorus are presented in Table 1. The highest per week milk yield was recorded in (T₁) 80.34 followed by (T₃) 70.65, (T₂) 70 and (T₀) 62.29 in winter season. The differences in per week mean milk yield in different treatments were significant. Results reported by (Nocek *et. al.* 1983 and Wohlt *et. al.* 1987)^[6, 10] is in agreement with the present study.

The highest per week milk yield was recorded in (T₁) 73.66 followed by (T₃) 72.15, (T₂) 71.94 and (T₀) 70.86. The differences in per week mean milk yield in different treatments were non-significant in summer season. Results reported by (Stevenson *et. al.* 1999 and Emery *et. al.* 1964)^[8, 2] are in agreement with the present study.

Table 1: Milk yield of Gangatiri cows in different season influenced by different treatments of calcium and phosphorus supplementation.

Different season	Treatments groups				Results
	T ₀	T ₁	T ₂	T ₃	
Winter season	62.29±1.02	80.34±0.93	70.00±0.95	70.65±1.06	S
Summer season	70.86±0.64	73.66±0.84	71.94±1.41	72.15±0.89	NS
Rainy season	45.88±0.79	56.86±1.03	60.31±0.97	73.88±0.83	S

The highest per week milk yield was recorded in (T₃) 73.88 followed by (T₂) 60.31, (T₁) 56.86 and (T₀) 45.88. The differences in per week mean milk yield in different treatments were significant in rainy season. Results reported by (Wu Z. 2005 and Jagveer Singh 2017)^[11, 3] are in agreement with the present study.

Conclusion

It was concluded that the effect of supplementation of calcium and phosphorus had significant effect on winter and rainy season but non-significant effect on summer season in milk yield in Gangatiri cows. Hence, to improve the feeding of calcium and phosphorus in winter and rainy season to increase milk yield, awareness in farmers is needed with regard to scientific feeding and management of calcium and phosphorus practices as per season, age and live weight of animals to make a dairy business profitable.

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