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Effect of season on milk constituent in Gir cattle

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Abstract

The objective of the study was to evaluate the effect of season on test day milk yield and major milk components in lactating Gir cows. The effect of season was significant ($p < 0.01$) on milk fat, SNF, protein, lactose, total solids and test day milk yield. The highest milk fat, SNF, protein, lactose, and total solids were recorded in summer high as compare to winter and rainy season. A lower value of test day milk yield was reported in summer as compare to winter and rainy season.

Keywords: milk constituent, Gir cattle, milk yield

Introduction

The Gir cow is one of the principal zebu breeds originating in India and is known as milch breed of dairy cow. This breed is originated from Gir forest region and surrounding districts of Saurashtra region of Gujrat State (Gaur *et al.* 2003) [4]. Indigenous cattle breeds are famous for their tolerance to stress conditions and resistance to various tropical diseases. Milk is a fluid secreted by the mammary glands of mammals to feed their young. It is a good source of nutrients and hence important for growth, repairs and providing energy. The composition of cow milk is also of great importance for the dairy industry since it's process ability is highly influenced by composition. Now a day, milk pricing system is also based on the percentage of milk composition, mainly fat percentage (Sarkar *et al.* 2006) [7] It become necessary to assess the relative importance of the various environmental factors determining the magnitude of variation in the milk constituents as well as milk yields at the successive stage of lactation and in a complete lactation. The present study will be undertaken to access the effect of season on major constituents of milk of Gir cows.

Materials And Methods

The present study was carried out in the herd of Gir cow maintained at SRT AGRO SCIENCE PVT. LTD., Village-Funda, Block-Patan, District-Durg, (C.G) located at distance of 40 km from College of Veterinary Science and Animal Husbandry Anjora, District Durg (C.G.). The climate is light tropical, sub-humid with a seasonal variation in temperature and rain fall. The number of animals used was 42 during whole study period. The data generated during December 2016 to May 2017 for milk constituents were analysed for effect of season i.e. Winter (December and January), Spring (February and March) and Summer (April and May) season . A total 683 Milk samples were collected during winter, spring and summer season and analysed at laboratory of Livestock Production Management Department of the College for fat, SNF, Protein, and Lactose percentages. In winter season, spring and summer season a total of 248, 234 and 201 milk samples had collected and analysed, respectively. Laboratory analysis was taken by milkotester (milk analyzing device, model LM2), instrument used for determination of fat, SNF, Protein, Lactose and freezing point of milk. Statistical analysis of data will be made using least-squares analysis of variance (Harvey, 1966) [5] to study the effect of season, parity and stage of lactation on test day milk yield and on different milk constituents. The following fixed effect model was used for the analysis.

$$Y_{ijkl} = \mu + A_i + B_j + C_k + \epsilon_{ijkl}$$

Where,

Y_{ijkl} = l^{th} observation under i^{th} season j^{th} stage of lactation and k^{th} parity
 μ = Overall mean

A_i = Effect of i^{th} season, where i varies from 1 to 3

B_j = Effect of stage of lactation, where j varies from 1 to 3

C_k = Effect of parity, where k varies from 1 to 5

ε_{ijkl} = Random error, NID (0, $\sigma^2\varepsilon$)

Results And Discussion

The milk yield and milk composition in during different seasons has been presented in [Table-1]. The effect of season was significant ($p < 0.01$) on milk fat, SNF, protein, lactose, total solids and test day milk yield. The highest milk fat, SNF, protein, lactose, and total solids were recorded in summer high as compare to winter and rainy season. The highest test day milk yield was recorded in spring as compare to winter and summer season.

The effect of season on milk yield recorded significant (Painkra, 2007 and Utrera *et al.*, 2013) [6, 9]. The higher milk yield in spring season may be attributed to availability of better quality feed and fodder in spring season. The decline in milk production in summer was due to decrease in quality and quantity of available forage and summer stress.

Present study show seasonal variation in milk fat percentage of milk in indigenous cow this finding is similar to Bhaswan 2014 [2] and Verma *et al.* 2015 [10]. This variation is due to synthesis and secretion of fat is a complex phenomenon, influenced by interplay of various factors like components of climatic elements, nutritional and physiological status of animals. The higher milk fat percentage during summer

season may be related to lower milk yield in summer season and milk fat content is negatively correlated with the above.

Present study revealed non significant effect of season of calving on SNF content of milk Ibeawuchi, 1985 [3] and Saxsena *et al.*, 1997 [8] also found similar result. This may be due to the availability of green fodder is scanty during summer season which affects the milk yield may possibly increase solid not fat content of milk.

The present study revealed the significant effect of different season on protein content of milk (Painkra, 2007) [6]. With the decrease in milk yield during summer season there is increase in the percentage of milk constituents like milk fat, SNF etc. This might be attributed to the increase protein content of the milk.

Present studied show the significantly higher lactose content in milk during the spring season. This result was also supported by Arora and Bhojak (2013) [1]. The pleasant climatic condition along with good availability of fodder and also reduced temperature stress of other season like winter and summer may be helpful in encouraging higher feed intake which might increases lactose content of milk.

In this study showed that the values for total solid content of milk were significantly higher in summer season followed by spring and winter season. Lower milk yield might be resulted into higher mean value for milk TS percentage in summer season.

Tale 1: Mean values(\pm SE) of different milk constituents in different season

| Season | Test day milk yield | fat % | SNF% | Protein % | Lactose% | total solids % |
|--------|--------------------------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|--------------------------------|
| Winter | 5.215 ^{ab} \pm 0.12 | 4.229 ^a \pm 0.03 | 8.428 ^a \pm 0.03 | 3.168 ^a \pm 0.01 | 4.372 ^a \pm 0.02 | 12.657 ^a \pm 0.04 |
| Spring | 5.677 ^b \pm 0.16 | 4.385 ^b \pm 0.03 | 8.667 ^b \pm 0.04 | 3.132 ^a \pm 0.02 | 4.752 ^c \pm 0.03 | 13.052 ^b \pm 0.05 |
| Summer | 4.891 ^a \pm 0.14 | 4.655 ^c \pm 0.03 | 8.873 ^c \pm 0.03 | 3.232 ^b \pm 0.02 | 4.654 ^b \pm 0.03 | 13.528 ^c \pm 0.05 |

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