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Study of effect of lactation order on milk fat percentage in Binjharपुरi cattle

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Abstract

The present study was conducted on Binjharपुरi cows from different clusters in Jajpur district of Odisha. The investigation pertaining to milk quality traits was carried out by collecting milk samples from Binjharपुरi cows spread over different locations. The data were then analysed by least-squares variance technique of fitting constants to estimate the mean performance and the effect of genetic and non-genetic factors on milk quality traits. In the present study, the overall least square mean for fat percentage was recorded to be 5.503 ± 0.087 percent and the analysis of variance revealed highly significant effect ($p \leq 0.01$) of lactation order on fat percentage.

Keywords: Binjharपुरi cattle, lactation order, milk fat percentage

Introduction

Livestock make multifaceted contributions to the growth and development of the agricultural sector. The Indian dairy sector is characterized more by 'production by masses' than 'mass production'. Binjharपुरi is a dual purpose breed which derives its name from the place of its natural habitat i.e. Binjharपुर block in Jajpur district of Odisha, present in the east coast of India. It is found in large density in Jajpur district and some areas in adjoining Kendrapara and Bhadrak district of Odisha state. The Binjharपुरi cows generally reared in free range system and occasionally in semi intensive system. The dietary inputs directly affect the composition of milk accordingly the nutritive value varies. The process-ability is highly influenced by composition. It also helps to assess adulteration and the quality of the milk for consumers and milk processing industries. Owing to the larger importance this study has been carried out to assess the influence of lactation order on milk fat percentage.

Materials and Methods

This study was carried out in the natural habitat of Binjharपुरi cattle i.e Binjharपुर block and adjacent blocks in Jajpur district. The investigation pertaining to milk quality traits was carried out by collecting milk samples from Binjharपुरi cows spread over different locations. After milking of individual cows, about 50 ml of milk from each cow were collected in disposable sterilized milk collection glass tube which were then labeled and transported in icebox for analysis. The milk samples were brought to the room temperature before analysis. The required quantity of milk (2 ml) was then transferred to the plastic vial from the collected milk samples and placed on the test slot in the device. The samples were then tested for Fat percentage with the help of milk analyzer. The study was undertaken in Binjharपुरi cattle at different locations with various lactation order namely L1 implying 1st lactation order, L2 signifying 2nd lactation order likewise L3 and L4 and ultimately the cows with lactation order 5 and above denoted by L5 and above.

The analysis of data was done using the least squares analysis of variance technique (Harvey, 1990) to study the effect of lactation order on milk fat percentage. Duncan's Multiple Range Test (DMRT) as modified by Kramer (1957) [18] was done for pair-wise comparisons of means wherever the significant difference among different levels of effects were obtained.

Result and Discussion

1. Fat Content (Percentage)

Fat content is one of the most important milk components and is influenced by various genetic as well as environmental factors. Milk fat percent reported by various scientists is reviewed and presented in the following table.

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Table 1: Milk fat percentage of various indigenous cattle breeds

No	Breed	FAT %	Reference
1	Assam local	5.117±0.087	Hussain <i>et al.</i> (2011) ^[5]
2	Binjharपुरi	4.4	Dash <i>et al.</i> (2013) ^[2]
3	Deoni	4.20±0.15	Kuralkar <i>et al.</i> (2014) ^[9]
4	Ghumusari	4.82	Samantaray <i>et al.</i> (2009) ^[19]
5	Gir	4.157	Gajbhiye (2019) ^[4]
6	Hallikar	4-5	Nivsarkar <i>et al.</i> (2000) ^[10]
7	Haryana	4-5	Kausik and Tondon (1979) ^[7]
8	Indigenous cattle of Arunachal Pradesh	5.895±.032	Kakki (2017) ^[6]
9	Khariar	4.92	Dhal <i>et al.</i> (2007) ^[3]
10	Khillari	4.22	Nivsarkar <i>et al.</i> (2000) ^[10]
11	Kangayam	4.5-5	Nivsarkar <i>et al.</i> (2000) ^[10]
12	Kosali cows	4.385±0.095	Sahu (2018) ^[12]
13	Malvi	4.28±0.03	Srivastava <i>et al.</i> (2002) ^[15]
14	Motu	4.87	Swain <i>et al.</i> (2003) ^[16]
15	Rathi	4.5	Nivsarkar <i>et al.</i> (2000) ^[10]
16	Sahiwal cows	4.9±0.02	Boro (2016) ^[1]
17	Vechur	6.13±0.12	Venkatachalapathy (1998) ^[17]

Most of studies showed that normal value of fat percentage for Indian breeds of cattle ranged from 4 to 6.5 percent. It is apparent from the table that there is wide variation in fat content in milk of indigenous breeds of cow.

In the present study, the overall least square mean for fat percentage was recorded to be 5.503±0.087 percent. Similar observation were earlier made by Kayastha *et al.* (2008) ^[8] in indigenous cows of Assam and Kakki (2017) ^[6] in Indigenous cattle of Arunachal Pradesh.

a) Effect of lactation order

As in dairy cows the most variable and viable constituents of milk is its butter fat content. The statistical analysis depicted highly significant effect of lactation order. The lower value of fat percentage (4.284±0.223 percent) was observed in 1st lactation followed by little higher value (4.701±0.191 percent) in 2nd lactation and the maximum value (7.357±0.205 percent) in 5th lactation. The present results showed an increasing trend of fat percent with lactation order.

Table 2: Least-squares analysis of variance for fat percentage according to lactation order

Source	DF	SS	MS	F
Lactation order	4	72.509	18.127	33.140**
Error	73	39.930	0.547	

** Significant at ($p < 0.01$).

Table 3: Least-squares means and standard errors for fat percentage according to lactation order

Lactation Order	No.	Fat Percentage	S.E.
Overall	78	5.503	0.087
L1	11	4.283 ^a	0.223
L2	15	4.701 ^a	0.191
L3	25	5.363 ^b	0.148
L4	14	5.811 ^c	0.198
L5	13	7.357 ^d	0.205

The least-squares means with same superscripts do not differ significantly.

The result was in approximation with Yogi Sourabh (2016) ^[14] in crossbred Holstein cows, Jyoti Sahu (2018) ^[12] in Kosali cows and Gajbhiye (2019) ^[4] in Gir cows. However, Akhand Pratap (2014) ^[11] in Holstein Friesian, Kayastha *et al.* (2008) ^[8] in native cows of Assam, Prasanta Boro (2016) ^[1] Sahiwal cows observed non- significant influence of calving on fat

percentage and fat yield.

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Conclusion

Binjharपुरi cattle, a distinct and relatively known dual purpose breed of Odisha possesses a good potential for milk production and has not yet been fully explored for its production potential. It not only produces handful amount of milk in low input system but also it is well known for its draft ability and heat tolerance capacity. The price of milk and consumers interest varies with milk components, which may directly affect the farm income. So, keeping in view its economic importance, this study has been carried out to make a data base and also to help in designing breeding plan for genotypic improvement of Binjharपुरi cattle.

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