

## Factors Affecting Average Milk Protein Percentage in Sahiwal Cattle and Murrah Buffalo

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**Abstract** India is a mainly agriculture country. In Indian agriculture, the vast and diverse livestock population plays a vital role in the rural economy. The present investigation was carried out using data on performance records spread over a period of 6 years (2005-2010), on 188 Sahiwal cows and 94 Murrah buffaloes maintained at ICAR-NDRI, Karnal, Haryana. The research was conducted to study the effect of various factors on average milk protein percentage in Sahiwal cows and Murrah buffaloes. Least squares analysis was carried out to assess the effect of non-genetic factors namely season, period

and parity on average milk protein percentage. The effect of season was found significant in Sahiwal cows whereas non-significant in Murrah buffaloes; the effect of period was found to be significant in both species; the effect of Parity was found to be non-significant in both species.

**Keywords** Sahiwal, Murrah, Average milk protein percentage, Non-genetic factors.

### Introduction

Sahiwal cattle and Murrah buffalo play a vital role in the rural economy. There are various step has been taken for increasing lactational milk yield, however, other important aspect of milk production i.e., milk constituents received little attention in livestock improvement programs. Presently to establish a profitable and sustainable dairy industry, we must have producer animal in term of quantity and quality of milk. Although Sahiwal cows and Murrah buffaloes are very good milk producing dairy animals but their milk production, composition and reproduction efficiency varied under different management and environment regime [1]. Therefore, quality of milk should be considered in present day breed improvement program. To enhance quality milk production of a dairy animal, it is necessary to develop

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an understanding of the factors affecting its milk quality. Milk production and composition traits affecting by various genetic and non-genetic factors therefore, determining the genetic and non-genetic estimate and correlation of parameters might be helpful in determining the method of selection to predict direct and correlated response to selection, choosing a breeding system to be adopted for further improvement as well as in the estimation of genetic response. Several studies have reported genetic parameter estimates for milk yield but, literature in milk components is scanty therefore, the present investigation was undertaken with the objective to study the effect and influence of non-genetic factors on average milk protein percentage of Sahiwal cattle and Murrah buffalo.

### Materials and Methods

Data pertaining to average milk protein percentage (LPA) were collected from milk constituents registers of 188 Sahiwal comprising 353 lactations and 94 Murrah buffalo comprising 180 lactations spread over a period of 6 years from 2005 to 2010 from Dairy cattle Breeding division, ICAR-NDRI Karnal, Haryana. These data are the average of monthly test day milk protein percentage of whole lactation length. Collected data were classified in three periods [1<sup>st</sup> (2005-2006), 2<sup>nd</sup> (2007-2008) and 3<sup>rd</sup> (2009-2010)]; Four seasons [Winter (December-March), Summer (April-June), Rainy (July-September) and Autumn (October—November)]; Six group in parities [1<sup>st</sup> (1<sup>st</sup> parity), 2<sup>nd</sup> (2<sup>nd</sup> parity), 3<sup>rd</sup> (3<sup>rd</sup> parity), 4<sup>th</sup> (4<sup>th</sup> parity), 5<sup>th</sup> (5<sup>th</sup> parity) and 6<sup>th</sup> (6<sup>th</sup> & above parity)] in order to examine the effect of various non-genetic factors on average milk protein percentage.

**Table 1.** Least squares analysis of variance of average milk protein percentage (LPA) in Sahiwal cattle and Murrah Buffalo. Figures in parentheses indicates degree of freedom.

Source of variance	Sahiwal cattle	Murrah buffalo
Sire	0.009 (26)	0.057 (32)
Season	0.043** (3)	0.102 (3)
Period	1.252** (2)	5.545 ** (2)
Parity	0.015 (5)	0.044 (5)
Error	0.010 (316)	0.048 (137)

Mixed model least square procedure was used to analyzed the data using following model [2].

$$y_{ijklm} = \mu + c_i + s_j + p_k + l_l + e_{ijklm}$$

Where,  $y_{ijklm}$  = Total lactation milk yield, milk yield in 305 days or less, lactational average fat % and lactational average solid-not-fat% of daughter of  $i^{\text{th}}$  sire in  $j^{\text{th}}$  season of  $k^{\text{th}}$  period under  $l^{\text{th}}$  parity.

$\mu$  = Overall mean

$c_i$  = Effects of  $i^{\text{th}}$  sire

$s_j$  = Effects of  $j^{\text{th}}$  season of calving ( $j= 1, 2, 3$  & 4)

$p_k$  = Effect of  $k^{\text{th}}$  period of calving  
( $k= 1, 2, 3, 4$  & 5)

$l_l$  = Effect of  $l^{\text{th}}$  order of parity  
( $l= 1, 2, 3, 4, 5$  & 6)

$e_{ijklm}$  = Random error associated with  $y_{ijklm}^{\text{th}}$  observation, assumed to be NID ( $0, \sigma_e^2$ )

### Results and Discussion

Overall least squares mean in different periods, seasons and order of parities along with standard error of average milk protein percentage trait is presented in Table 2 and analysis of variance is in Table 1. The least squares means of average milk protein percentage (LPA) was found to be  $3.28 \pm 0.01$  in Sahiwal cattle. These estimate obtained in present study was close agreement with those reported by ICAR-NDRI [3].

While in Murrah buffaloes, the overall least square mean of LPA was found to be  $3.90 \pm 0.02$ . These estimate obtained in present study was close agreement with those reported earlier [4]. These estimates were slightly higher than those reported earlier [5] and lower than those reported earlier [6].

The effect of sires was found to be statistically non-significant on average milk protein percentage in both species.

Effect of season of calving on LPA was found to be highly significant ( $p \leq 0.01$ ) in Sahiwal cattle which was in consistent with the results obtained earlier [7] in Holstein Frisian cattle, while in Murrah buffalo, the effect of season was found to be non-

**Table 2.** Least square analysis means of average milk protein percentage (LPA) in Sahiwal cattle and Murrah buffalo. Figures in parentheses indicate respective number of observation. Means with same superscript do not differ significantly ( $p < 0.05$ ).

Effect	Sahiwal cattle	Murrah buffalo
Overall	3.28 ± 0.01 (353)	3.90 ± 0.02 (180)
Seasons of calving		
Winter	3.29 <sup>b</sup> ± 0.01 (178)	3.91 ± 0.05 (51)
Summer	3.26 <sup>a</sup> ± 0.01 (105)	3.97 ± 0.04 (32)
Rainy	3.24 <sup>a</sup> ± 0.01 (67)	3.90 ± 0.03 (64)
Autumn	3.30 <sup>b</sup> ± 0.01 (33)	3.84 ± 0.04 (33)
Period of calving		
2005-2006	3.48 <sup>c</sup> ± 0.02 (35)	4.31 <sup>c</sup> ± 0.05 (48)
2007-2008	3.24 <sup>b</sup> ± 0.01 (153)	3.61 <sup>a</sup> ± 0.03 (47)
2009-2010	3.11 <sup>a</sup> ± 0.01 (165)	3.79 <sup>b</sup> ± 0.05 (55)
Order of parity		
1 <sup>st</sup>	3.29 ± 0.02 (105)	4.03 ± 0.07 (37)
2 <sup>nd</sup>	3.30 ± 0.01 (103)	3.99 ± 0.05 (49)
3 <sup>rd</sup>	3.25 ± 0.02 (56)	3.89 ± 0.04 (38)
4 <sup>th</sup>	3.27 ± 0.02 (49)	3.87 ± 0.06 (21)
5 <sup>th</sup>	3.28 ± 0.03 (17)	3.84 ± 0.07 (14)
6 <sup>th</sup> & above	3.26 ± 0.03 (23)	3.79 ± 0.09 (21)

significant which was consistent with the earlier finding [5, 8—10]. The Autumn calvers had highest LPA in Sahiwal cattle while in Murrah buffaloes, the Summer calves had highest LPA as compared to calving in other seasons.

Highly significant effect of period of calving on LPA was observed ( $p \leq 0.01$ ) in both species. Similar results were reported earlier [5], however Sarkar et al. [9] reported non-significant effect of period of calving in Murrah buffalo, the animals calved in third period (2005-06) have highest LPA

in both species as compared to other periods.

Parity effect was found to be non significant on LPA in both species. Similar results were reported in Sahiwal cattle [11] and in Murrah buffalo [9], the average protein percentage (LPA) was highest on first lactation in both species as compared to other parities.

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