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## Genetic and non-genetic factors affecting production traits of first parity in white Sindhi cow of Thar Desert

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### Abstract

In the present study, 91 white Sindhi cows were maintained at the Livestock Research Station, Beechwal, Bikaner for 11 years, from 2006 to 2016. Based on the data, we assessed the performance traits of white Sindhi cattle and examined the effect of genetic factors, such as sire group, and non-genetic factors, such as calving season and period. In general, least squares means for lactation milk yield of first parity, lactation length of first parity and dry period of first parity were found to be 1833 kg, 283.7 days, and 148.1 days. On first parity production traits, sire was shown to have a significant effect. Lactation length of first parity was significantly influenced by the period of calving, while season of calving did not have a significant impact on first parity production traits. There was a significant impact of the age at first calving on lactation milk yield of first parity and lactation length of first parity.

**Keywords:** Thar Desert, factors affecting, parity, Livestock

### Introduction

Throughout Indian history, cows have occupied a central position in rural life due to their contribution to food, livelihood, and agriculture. It is a result of thousands of years of selection, evolution, and development of the wild species through domestication to local agroclimatic conditions that has resulted in the diverse indigenous breeds of cattle in the country. In addition to climatic conditions, the Tharparkar or white Sindhi breed is adapted to recurrent famines and xeric plants, which are totally unsuitable for dairy farming. Currently, there are only a limited number of purebred animals of this breed in their home tract due to the fact that this breed has been extensively cross bred in the past. To improve the performance of Tharparkar cattle genetically, various criteria of selection can be used. It is crucial to evaluate the performance of dairy cattle in terms of various production traits of economic significance when formulating breeding programmes. Success in breeding depends on a thorough understanding of genetic and non-genetic factors that affect performance traits.

### Materials and Methods

In the present study, 91 Tharparkar cows were maintained at the Livestock Research Station, Beechwal, Bikaner for 11 years, from 2006 to 2016. The study period spans from 2006 to 2016. It was divided into the following four periods: (2006–2008), (2009–2010), (2011–2013), and (2014–2016). Each year was further divided into three seasons: summer (March to June), monsoon (July to October), and winter (November to February). The study measured three production traits: first parity milk yield, first parity length and first parity dry period. This study was performed using least-squares and maximum likelihood software program of Harvey (1990) [4] with the below written model:

$$Y_{ijkl} = \mu + S_i + A_j + B_k + b(X_{ijkl} - \bar{X}) + e_{ijkl}$$

Where,

$Y_{ijkl}$  = observation on the  $l^{\text{th}}$  cow of  $i^{\text{th}}$  sire, born in  $j^{\text{th}}$  period and  $k^{\text{th}}$  season,

$\mu$  = Overall population mean,

$S_i$  = random effect of  $i^{\text{th}}$  sire,

$A_j$  = fixed effect of  $j^{\text{th}}$  period of calving,

Bk = fixed effect of kth season of calving,  
 b = The regression of variable on age at first calving,  
 Xijkl = age at first calving corresponding to Yijkl,  
 $\bar{X}$  = average age at first calving,  
 eijkl = Random error NID (0,  $\sigma^2$ ).

## Results and Discussion

Milk yield of first parity was not affected by the calving period. Doharey (2012) [2] reported similar results in Haryana cattle. Season of calving did not affect lactation yield of first parity significantly. As in the case of Hussain *et al.*, (2015) [5]

who studied Tharparkar cattle, Dahiya (2002) [1] and Doharey (2012) [2] who studied Haryana cattle, the present results are in agreement with both of these studies. This may be due to animals' ability to adjust to local climatic conditions. There was an observation that sire affected milk yield during first parity in white Sindhi cows. Similar findings were also observed in Haryana cattle by Dahiya (2002) [1] and Doharey (2012) [2]. It has been shown that sire plays a significant role in causing variability in the first parity milk yield. This indicates that sire selection can lead to further genetic improvement in next generations.

**Table 1:** Average values  $\pm$  standard error for First parity milk yield First parity length and First parity dry period

Traits	First parity milk yield	First parity length	First parity dry period
Average values	1833 $\pm$ 42.43	284 $\pm$ 7.65	148 $\pm$ 6.05
Season	Non-significant	Non-significant	Non-significant
(Summer)	1806 $\pm$ 132.79	282 $\pm$ 24.34	149 $\pm$ 18.59
(monsoon)	1779 $\pm$ 195.09	276 $\pm$ 32.17	152 $\pm$ 26.60
(winter)	1819 $\pm$ 131.36	278 $\pm$ 24.18	135 $\pm$ 17.53
Period	Non-significant	*	Non-significant
(2006 - 2008)	1843 $\pm$ 163.44	298 $\pm$ 28.09 <sup>a</sup>	110 $\pm$ 23.42
(2009 - 2010)	1618 $\pm$ 155.95	240 $\pm$ 27.16 <sup>b</sup>	148 $\pm$ 24.08
(2011-2013)	1864 $\pm$ 139.19	278 $\pm$ 25.11 <sup>a</sup>	153 $\pm$ 18.31
(2014-2016)	1881 $\pm$ 145.14	299 $\pm$ 25.83 <sup>a</sup>	172 $\pm$ 21.72
Sire	*	**	*

(\*\* - Highly significant ( $p \leq 0.01$ ); \* - Significant ( $p \leq 0.05$ ); NS - Non-significant)

The average value of first parity length was found to be 284  $\pm$  7.65 days in this study which is similar to the values observed by Rahumathulla *et al.*, (1994) [7] and Panneerselvam *et al.*, (1990) in the same breed of cow. ANOVA revealed that period of calving had a significant effect on first parity length. Hussain *et al.* (2015) [5] and Gahlot (1999) [3] found a significant effect on first lactation length in the same breed of cattle, too. During different periods, there might have been different fodder availability and different management conditions that contributed to the significant difference in first parity length. Compared to Gahlot (1999) [3] in Tharparkar, and Doharey (2012) [2] in Haryana cattle, the season of calving didn't appear to have a significant effect on first parity length. Results of the study revealed that sire was highly significant in affecting first parity length in this breed. Singh (2015) reported same findings in Sahiwal breed as well. The present study found that the period of calving had no significant impact on the first parity dry period. In Haryana cattle breeds, Doharey (2012) [2] reported that the calving period did not have a significant effect on the first parity dry period. Season of calving had no significant impact on the first parity dry period. Hussain *et al.* (2015) [5] also observed the same results in the same breed. First parity dry period in this breed was significantly affected by sire. Singh (2015) [8] also reported the same in the Sahiwal breed.

## Conclusion

It can be concluded by this study that the significant difference in first parity lactation length in various periods is caused by feed availability, climatic changes and management in a particular period. It was found that sire selection could improve genetic improvement in the next generations for all the production traits under study on the basis of the first parity.

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