Factors Affecting Age at First Calving in Gir Cattle
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Abstract
The production records on 228 Gir cows with 680 lactations sired by 52 bulls, maintained at Cattle Breeding Farm, Junagadh Agricultural University, Junagadh, for 24 years (1987 – 2010) were studied. The data were analyzed to study the effect of period of calving and season of calving as fixed effect on the reproduction trait viz., age at first calving. The average age at first calving in Gir cows was found to be 1490.50 ± 111.04 days. The analysis of variance revealed highly significant effect of period of calving on age at first calving indicating thereby that age at first calving was subjected to non-genetic factors. Season of calving did not affect significantly to this trait under study. Effect of season of calving was not significant on age at first calving indicating breed characteristic to adoption with environment. Age at first calving showed a significant rise over the period that indicate some selection measure require for age at first calving.

Key words: Age at first calving and Gir cattle

Introduction
High production efficiency in livestock production is an economically desirable attribute that targets ultimately for genetic upgradation. In fact, the economy of dairy industry mainly rely upon the performance parameters of dairy animals, therefore, it becomes more relevant to tackle out the means for ameliorating the performance efficiencies by developing certain guidelines for selection. First calving marks the beginning of a cow’s productive life. Age at first calving is closely related to generation interval and, therefore, influences response to selection. Thus, segregation of factors like season and years and their effect on trait like age at first calving will enable the breeder in assessing the effectiveness of selection programme and managerial conditions over time. This will help in designing more appropriate breeding strategies to maximize genetic gain and also suggest amendments in managerial standards if desired. Therefore the present investigation was planned with a view to study the factors affecting age at first calving in Gir cattle.
Materials and Methods

In order to achieve the objective, the data pertinent to production traits on 680 Gir cows calving from 1987 to 2010, progeny of 52 sires maintained at Cattle Breeding Farm, Junagadh, Gujarat, India were considered. The duration of 24 years was divided into 6 periods of four years each. The three seasons were delineated as winter (November-February), summer (March-June) and monsoon (July-October) on the basis of geo-climatic conditions prevailing in the region. The Parity was considered up to 12th lactation. Records of cows with some specific or non-specific diseases, reproductive disorder and physical injury were excluded from the present investigation. The least-squares solutions were obtained using the mixed model given below:

\[ Y_{ijkmn} = \mu + P_i + C_j + L_k + S_m + e_{ijkmn} \]

Where, \( Y_{ijkmn} \) - Performance trait of individual animal (n), calved in (i)\(^{th}\) period and (j)\(^{th}\) season, of the (k)\(^{th}\) parity, born to (m)\(^{th}\) sire, \( \mu \) - overall population mean, \( P_i \) - fixed effect of period of calving (i = 1 to 6), \( C_j \) - fixed effect of season of calving (j = 1 to 3), \( L_k \) - fixed effect of parity (k = 1 to 12), \( S_m \) - random effect of sire (m = 1 to 52), \( e_{ijkmn} \) - random error with mean zero and variance \( \sigma^2_E \).

The least-squares and maximum likelihood computer program of Harvey (1990) was used to estimate the effect of various factors on lactation milk yield. Duncan’s multiple range test as modified by Kramer (1957) was employed for making all possible pair wise comparison of means.

Results and Discussion

Least squares means of age at first calving with standard errors for different periods and seasons are presented in Table.

The average age at first calving in Gir cows was found to be 1490.50 ± 111.04 days. The results were lower than 1690.70 days reported by Ulmek (1990) in same herd of Gir cows, indicating a decrease in the average age at first calving in Gir cows over the years. The result was also lower as compare to Red Sindhi (2154.6 ± 92.3) reported by Khatri (2004) and was near to similar with Rathi (1482.00 ± 314.07) reported by Kushwaha et al. (2008).

Effect of Period of Calving on Age at First Calving of Gir cows

The least squares analysis of variance shows that differences in the age at first calving for period of calving during different periods were highly significant (\( P<0.01 \)). These results revealed that there was increasing trend in the age at first calving due to period of calving (Figure). Increasing trend of age at first calving...
calving may be due to some environmental variation and age at first calving was also found highly heritable trait. We may also say that some managemental practises over the year also responsible for higher age at first calving. Ulmek et al. (1993a) reported that the age at first fertile service was significantly affected by period of calving in Gir cattle.

**Table 1- Period-wise Least square means and standard errors**

<table>
<thead>
<tr>
<th>Factors</th>
<th>Least square means and standard errors of Age at First Calving</th>
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<tbody>
<tr>
<td>µ (n)</td>
<td>1490.50± 111.04(680)</td>
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<tr>
<td><strong>Period</strong></td>
<td></td>
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<tr>
<td>1987-90 (36)</td>
<td>1268.33 ±128.36</td>
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<tr>
<td>1991-94 (81)</td>
<td>1359.00 ±116.64</td>
</tr>
<tr>
<td>1995-98 (129)</td>
<td>1401.54 ±113.41</td>
</tr>
<tr>
<td>1999-02 (166)</td>
<td>1470.72 ±112.63</td>
</tr>
<tr>
<td>2003-06 (189)</td>
<td>1655.47 ±115.36</td>
</tr>
<tr>
<td>2007-10 (79)</td>
<td>1787.96 ±121.27</td>
</tr>
<tr>
<td><strong>Season</strong></td>
<td></td>
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<tr>
<td>March–June (191)</td>
<td>1468.50 ± 112.30</td>
</tr>
<tr>
<td>July–October (202)</td>
<td>1515.06 ± 112.20</td>
</tr>
<tr>
<td>Nov.–Feb. (287)</td>
<td>1487.94 ± 111.42</td>
</tr>
</tbody>
</table>

Mean of a trait bearing different superscript differ significantly (P<0.01)

Odedra et al. (1978b) observed that, the period of calving significantly contributed to the variance for age at first calving in Gir, indicating thereby that age at first calving was subjected to non genetic factors. Hadia et al. (2011) reported significant effect of period on age at first calving in Girolando cattle.

Similar to the present finding, Basu et al. (1979) and Chawla and Mishra (1982) also reported significant effect of period of calving on age at first calving in Sahiwal cattle (P<0.05). Khan et al. (1999) and Javed et al. (2000) found significant effect of year of birth on age at first calving in Sahiwal cows.

Contrary to the present finding, non-significant effect of period of calving on age at first calving was reported by Parmar and Johar (1982) in Tharparkar cattle. Chaudhary and Shafiq (1995) studied the factors affecting production and reproduction traits in Cholistani cows and reported that the effect of year of birth on age at first calving was non-significant.

**Effect of Season of Calving on Age at First Calving of Gir cows**

Non-significant effect of season of calving was observed on age at first calving (P>0.05). These results revealed that there was no precise trend in the age at first calving due to season of calving (Figure). This result was similar with that reported by Ulmek (1990) in Gir cows.
Contrary to the present finding, Hadia et al. (2011) reported significant effect of season of calving on age at first calving in Girolando cattle. Roy et al. (1985) and Tajane and Rai (1990) reported that season of birth had significant effect (P < 0.05) on age at first calving in Sahiwal cattle. Kumar (2007) reported highly significant influence (P < 0.01) of season of birth on AFC in Sahiwal cattle.


**Conclusion**

Following conclusions can be made based on this study:

- Effect of season of calving was not significant on age at first calving indicating breed characteristic to adoption with environment. As the herd which we studied situated at tropical environment.
- Age at first calving had periodic trend. Age at first calving having a significant rise over the period that indicates some selection and managemental measure require for age at first calving.

**References**


