Studied on Effect of Non – genetic Factors on Reproduction Traits in Holstein Friesian x Deoni Cows

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Abstract: The research was conducted to evaluate the effect of non-genetic factors on reproduction traits in Holstein Friesian x Deoni cattle. Data representing 287 Holstein Friesian x Deoni cows from 1177 total records of lactation over a 30 years period were analysed to determine the effect of age at first calving, season of calving and period of calving on reproduction traits. The overall least squares means of age at first calving, service period, gestation period and inter calving period were 1414.78 \pm 8.73, 158.70 \pm 4.10, 274.93 \pm 0.70 and 431.74 \pm 4.25, days respectively. The age at first calving were significant effect on service period, gestation period and non significant effect on inter calving period. All sources of variation for season of calving on reproduction traits were non significant. The period of calving had significant effect on age at first calving, service period, gestation period, whereas non significantly affected on inter calving period.

Keyword: CCBP, Holdeo Genetic factors, Reproduction, Traits,

I. Introduction

The improvement in indigenous cattle breeds for milk production through selection has not been effective up to the desired levels. Considering the large needs and the rapid development in milk production, crossbreeding of local cattle with exotic dairy breeds was therefore thought to be the only option. The impact of crossbreeding was improved milk production, per capita availability of milk, growth rate and reproductive efficiency in terms of age at first calving, service period, gestation period and inter calving period.

Thus, crossbreeding of indigenous breed with exotic breeds of high genetic potential is considered to be a rapid and effective method of improvement. Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani has taken a project Cattle Cross Breeding Project for improvement of Deoni cattle breed by cross breeding with Holstein Friesian. The present study was therefore, planned to assess the effect of non genetic factors on reproduction traits in HF x Deoni crossbred cows.

II. Materials And Methods

2.1 Study area

This study was conducted at Cattle Cross Breeding Project (CCBP) in Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani (MS). The CCBP is situated between 17° 35' N and 20° 40' N latitude and between 70° 40' N and 78° 15' E longitude. The mean daily maximum temperature varies from 29.1\textdegree C in December to 42.5\textdegree C in May. The mean daily minimum temperature varies from 6.9\textdegree C in December to 25.4\textdegree C in May. The relative humidity ranges from 11 to 90\%. Normally the summer becomes hot and general dryness persists through the year except during south-west monsoon. The region is essentially a subtropical one and it comes under assured rainfall zones with an average rainfall of 900 mm spread in about 70 rainy days mostly received from June to September.

2.2 Management of animals

The management and feeding practices followed on CCBP research farm is uniform. Deoni receive their ration according to the feeding schedule. After commencement of rainy season within a month grazing is available and grazing practices are followed from mid of July to end of January, in addition to grazing regular feeding of dry and green is practiced. At the time of morning and evening milking concentrates are allowed to each individual cow in accordance of their requirement for maintenance plus production. Dry roughages of sorghum and the green as per availability (Green maize, Lucerne, Green Sorghum, Natural grasses) are fed to them. Good housing facilities exist at the farm. Enough health cover is provided to protect the animals from epidemics and causal incidences of ill-health and eventualities.

2.3 Sources and nature of data

Data representing 287 HF x Deoni cows from CCBP with 1177 total records of lactation over a 30 years period (1981 to 2010) were collected and organized to study the effect of age at first calving, season of calving and period of calving on production traits. The complete years were divided into 4 seasons and 6 periods.
having 5 years each. Five levels of age at first calving (AFC) were coded as A_1 < 1200 days to A_6 < 1600 days with class interval 150 days. The four seasons namely winter (December to February), summer (March to May), monsoon (June to September) and post monsoon (October to November) were coded as S_1, S_2, S_3 and S_4. Each cow having at least three offsprings was considered in this study.

2.4 Statistical analysis

Data were analysed by linear model (SAS, 2002). When the analysis of variance indicated the existence of significant within class, Duncan Multiple Range Test (DMRT) Kramar (1957) were employed to test and locate means that are significantly differed from the rest.

The following statistical model was employed to analyse the data.

\[ Y_{ijk} = \mu + S_i + P_j + e_{ijk} \]

Where,

- \( Y_{ijk} \) is the record of a cow calved during jth period in ith season
- \( \mu \) is the population mean common to all the observations
- \( S_i \) is the effect of ith season of calving (1..4)
- \( P_j \) is the effect of jth period of calving (1..6)
- \( e_{ijk} \) is the random error assumed to be NID (0, \( \delta^2 \), e)

III. Results And Discussion

3.1 Age at first calving

Age at first calving is an important economic traits of cattle having bearing on life time production, generation interval and genetic gain. Early age at first calving may increase profit, reduce generation interval and help in enhancing genetic gain per unit time. However, too early age at first calving may be detrimental for growth, development and overall productivity of an animal. The least squares means and ANOVA of age at first calving as affected by season and period of calving are presented in Table 1 and 2, respectively. The overall LSM of AFC of Holstein Friesian x Deoni cow was 1414.78 ± 8.73 days. These results were similar to Patil (1983) in Holstein Friesian x Deoni crossbred, Singh and Dave (1989) Friesian x Tharparkar crossbred and Chewale (2008) in Holstein Friesian x Deoni intercross breed.

3.1.1 Effect of season of calving on age at first calving

The AFC was non significantly affected by season of calving. Minimum age at first calving was occurred during summer season. Age at first calving was increased for cows born in post post monsoon season. The results revealed that Holdeo cow have expressed their efficiency in tolerating the seasonal variation. Similar results were reported by Patter and Dave (1977) in Red Dane x Red Sindhi and Friesian x Red Sindhi crossbred, Nagarcenkar and Rao (1982) in Friesian x Tharparkar, Brown Swiss x Tharparkar and Jersey x Tharparkar, Patel et al.(1989) in Jersey x Kankrej and Thombre (1991) in Holstein Friesian x Deoni halfbred.

3.1.2 Effect of period of calving on age at first calving

The age at first calving was affected by period of calving (P < 0.01). The present results indicated that there is a further scope to raise the culling levels so that AFC can be further reduced. These results were supported with Kaul et al.( 1985) in Friesian x Hariana and Brown Swiss x Hariana cattle, Kakran and Joshi (1990) in Karan Swiss cattle, Nagare and Patel (1997) in Gir crosses and Thombre et al.(2002) in Holstein Friesian x Deoni crossbred.

3.2 Service period

Longer service period rendered a cattle uneconomic by reducing the overall milk yield per day of calving interval. The least squares means and ANOVA of service period as affected by age at first calving, season and period of calving are presented in Table 1 and 2, respectively. The overall LSM of SP of Holstein Friesian x Deoni cow was 158.70 ± 4.10 days. The results were close to Siddiqui (1984) in Friesian x Sahiwal halfbred, Prabhukumar et al.(1990) in Friesian x Ongole and Thombre et al.(2001) in Holstein Friesian x Deoni halfbred.

3.2.1 Effect of age at first calving on service period

The service period was significantly (P < 0.05) influenced by AFC. The highest SP was observed from the cows that had AFC groups A_5 was significantly higher than cows born in A_4 , A_3 , A_2 and A_1. These results were supported with the findings of Patter and Dave (1977) in Red Dane x Red Sindhi and Friesian x Red Sindhi cattle, Nagarcenkar and Rao (1982) in Friesian x Tharparkar, Brown Swiss x Tharparkar and Jersey x Tharparkar crossbred and Thombre (1996) in Holstein Friesian x Deoni halfbred.
3.2.2 Effect of season of calving on service period

The statistical analysis revealed that observed differences of SP due to season of calving were non significant. The present results revealed that the Holstein Friesian x Deoni genotype basically possess certain shorter SP and well adapted to the seasonal changes of the tract, as such there will not be significant deviation in the expression of this character. Similar results were reported by Patter and Dave (1977) in Red Dane x Red Sindhi and Friesian x Red Sindhi crossbred, Chaudhary et al. (1977) in Friesian x Sahiwal crossbred, Nagarencar and Rao (1982) in Friesian x Tharparkar, Brown Swiss x Tharparkar and Jersey x Tharparkar cattle and Komatwar et al.(2010) in Friesian x Sahiwal cattle.

3.2.3 Effect of period of calving on service period

The analysis of variance indicated that effect due to period of calving on SP in Holstein Friesian x Deoni cow was non significant (Table 2). The higher service period was observed in P1 than other periods. P5, P3, P2, P4, and P6. The results were supported with the findings of Singh and Tomar (1991) in Karan Fries cattle, Rafique et al.(2000) in Holstein Friesian x Sahiwal interse crossbred, Dubey and Singh (2005) in Sahiwal x Holstein Friesian, Sahiwal x Red Dane, Sahiwal x Jersey and Sahiwal x Rathi x Holstein Friesian crossbred cattle and Bajetha and Singh (2011) in crossbred cattle.

3.3 Gestation period

It is the period from the date of conception to the date of parturition. During this period, with the development of foetus, the uterus of dam undergoes great anatomical and physiological modifications. Whereas the length of gestation is essential to forecast the approximate date of calving. The overall LSM of GP of Holstein Friesian x Deoni cow was 274.93 ± 0.70 days. The results were similar to Mondal et al.(2005) in Jersey cross x Sahiwal crossbred cattle, Saut et al.(2007) in crossbred cattle and Rokonuzaman et al.(2009) in crossbred cattle.

3.3.1 Effect of age at first calving on gestation period

The gestation period was significantly (P < 0.05) influenced by AFC. The highest GP was observed from the cows that had AFC groups A4 followed by A5, A3, A2 and A1. These results were supported with the findings of Nahar et al.(1992) in Red Sindhi x Deshi, Sahiwal x Deshi, Jersey x Deshi and Holstein Friesian x Deshi crossbred cattle.

3.3.2 Effect of season of calving on gestation period

The analysis of variance indicated that effect due to season of calving on GP in Holstein Friesian x Deoni cow was non significant. Higher GP was observed in S4 followed by S1, S2 and lowest in S3. The results revealed that seasonal changes do not influence on the variation on GP in Holdeo cow. Similar results were reported by Maulik and Systrad (1974) in Jersey x Hariana crossbred cattle.

3.3.3 Effect of period of calving on gestation period

The gestation period was significantly (P < 0.01) affected by period of calving. The DMRT revealed that the GP of Holstein Friesian x Deoni observed in P6 (275.89 ± 0.20) was significantly higher than P4, P5, P1, P3 and lowest in P2. The results were supported with the findings of Das et al.(1990) in Jersey cattle and Click and Tekin (2007) in Brown Swiss cattle.

3.4 Inter calving period

For profitable milk production and to achieve best reproductive efficiency, the dairy cattle should reproduce at fairly regular interval. The inter calving is a period between two consecutive calvings. The overall LSM of ICP of Holstein Friesian x Deoni cow was 431.74 ± 4.25 days. The results were close to Deshapande and Bonde (1983) in Friesian x Sahiwal cattle, Thalkari (1984) in Friesian x Deoni cattle, Dalal et al.(1991) in Brown Swiss x Hariana cattle and Thombre et al.(2002) in Holstein Friesian x Deoni halfbred.

3.4.1 Effect of age at first calving on inter calving period

The effect of AFC on inter calving period was significant ( P< 0.01). The highest inter calving period was observed from cows that had AFC group A5 followed by A3, A2, A1 and lowest in A4. These results were supported with the findings of Patil (1983) in Holstein Friesian x Deoni crossbred, Siddiqui (1984) in Holstein Friesian x Sahiwal, Dalal et al.(1993) in Holstein Friesian x Hariana and Chewale (2008) in Holstein Friesian x Deoni interse crossbred cattle.
3.4.2 Effect of season of calving on inter calving period

The effect of season of calving on inter calving period was non significant. The LSM for ICP (Days) was higher in cows calved during S3 followed by S2, S1 and lowest in S0. The results revealed that Holstein Friesian x Deoni crossbred genotype possess shorter ICP and well adopted to the season of tract as such there will not be significant deviation in the expression of character. Deshpande and Bonde (1983) in Friesian x Sahiwal crossbred, Bhatnagar et al.(1986) in Karan Fries and Karan Swiss cattle, Thakur and Singh (2000) in Jersey x Hariana crossbred and Ghatcharle (2003) in Holstein Friesian x Deoni interse crossbred.

3.4.3 Effect of period of calving on inter calving period

The statistical analysis revealed that observed differences of ICP due to period of calving were non significant. The LSM for ICP (Days) was higher in cows calved during P3 followed by P1, P2, P4 and lowest in P0. The results were supported with the findings of Deshpande and Ingole (1986) in Friesian x Sahiwal crossbred, Bhoite et al.(1998) in Friesian x Jersey x Gir, Jersey x Friesian x Gir and Brown Swiss x Friesian x Gir crossbred, Ghatcharle (2003) and Chewale (2008) in Holstein Friesian x Deoni interse crossbred cattle.

Table 1. Least square means and standard error for Age at first calving (AFC), Service period (SP), Gestation period (GP), and Inter calving (ICP) as affected by AFC groups, season of calving and period of calving in Holstein Friesian x Deoni cows

<table>
<thead>
<tr>
<th>Source</th>
<th>Code</th>
<th>AFC (Days)</th>
<th>SP (Days)</th>
<th>GP (Days)</th>
<th>ICP (Days)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overall mean</td>
<td>µ</td>
<td>1414.78 ± 8.73</td>
<td>15.70 ± 4.10</td>
<td>274.93 ± 0.70</td>
<td>431.74 ± 4.25</td>
</tr>
<tr>
<td>AFC groups</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>A1</td>
<td>-</td>
<td>149.58 ± 7.23</td>
<td>274.28 ± 0.12</td>
<td>422.09 ± 7.48</td>
<td></td>
</tr>
<tr>
<td>A2</td>
<td>-</td>
<td>154.33 ± 8.85</td>
<td>275.69 ± 0.14</td>
<td>425.17 ± 9.16</td>
<td></td>
</tr>
<tr>
<td>A3</td>
<td>-</td>
<td>157.48 ± 6.01</td>
<td>274.88 ± 0.90</td>
<td>432.48 ± 6.22</td>
<td></td>
</tr>
<tr>
<td>A4</td>
<td>-</td>
<td>162.27 ± 5.94</td>
<td>275.38 ± 0.10</td>
<td>435.50 ± 6.14</td>
<td></td>
</tr>
<tr>
<td>A5</td>
<td>-</td>
<td>179.83 ± 10.89</td>
<td>275.20 ± 0.17</td>
<td>456.45 ± 11.26</td>
<td></td>
</tr>
<tr>
<td>Season of calving</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S1</td>
<td></td>
<td>1406.76 ± 14.06</td>
<td>164.78 ± 6.38</td>
<td>274.66 ± 0.10</td>
<td>440.22 ± 6.60</td>
</tr>
<tr>
<td>S2</td>
<td></td>
<td>1394.00 ± 14.54</td>
<td>161.63 ± 6.51</td>
<td>274.55 ± 0.11</td>
<td>434.40 ± 6.74</td>
</tr>
<tr>
<td>S3</td>
<td></td>
<td>1422.89 ± 13.42</td>
<td>157.10 ± 6.06</td>
<td>274.50 ± 0.10</td>
<td>427.48 ± 6.28</td>
</tr>
<tr>
<td>S4</td>
<td></td>
<td>1437.47 ± 16.13</td>
<td>148.28 ± 7.20</td>
<td>274.80 ± 0.12</td>
<td>421.86 ± 7.46</td>
</tr>
<tr>
<td>Period of calving</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P1</td>
<td></td>
<td>1387.72 ± 11.45</td>
<td>165.60 ± 5.87</td>
<td>275.35 ± 0.80</td>
<td>433.78 ± 6.07</td>
</tr>
<tr>
<td>P2</td>
<td></td>
<td>1413.43 ± 12.93</td>
<td>156.06 ± 5.89</td>
<td>274.29 ± 0.90</td>
<td>428.44 ± 6.09</td>
</tr>
<tr>
<td>P3</td>
<td></td>
<td>1435.26 ± 14.52</td>
<td>158.31 ± 6.48</td>
<td>275.05 ± 1.00</td>
<td>430.59 ± 6.71</td>
</tr>
<tr>
<td>P4</td>
<td></td>
<td>1462.36 ± 29.46</td>
<td>143.78 ± 12.99</td>
<td>275.64 ± 0.22</td>
<td>419.34 ± 13.44</td>
</tr>
<tr>
<td>P5</td>
<td></td>
<td>1434.21 ± 24.72</td>
<td>159.29 ± 10.77</td>
<td>274.57 ± 0.18</td>
<td>453.80 ± 11.14</td>
</tr>
<tr>
<td>P6</td>
<td></td>
<td>1495.72 ± 24.42</td>
<td>143.16 ± 12.21</td>
<td>275.89 ± 0.20</td>
<td>410.48 ± 12.63</td>
</tr>
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</table>

Table 2. Analysis of variance for age at first calving (AFC), service period (SP), gestation period (GP) and inter calving period (ICP) on AFC groups, season of calving and period of calving in Holstein Friesian x Deoni cows

<table>
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<tr>
<th>Sources</th>
<th>DF</th>
<th>AFC</th>
<th>SP</th>
<th>GP</th>
<th>ICP</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>MSS *1000</td>
<td>F value calculated</td>
<td>MSS *1000</td>
<td>F value calculated</td>
</tr>
<tr>
<td>AFC</td>
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<td>23580.00</td>
<td>2.39</td>
<td>9.88</td>
<td>3.70</td>
</tr>
<tr>
<td>Season</td>
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<td>17660.00</td>
<td>1.79</td>
<td>4.99</td>
<td>1.71</td>
</tr>
<tr>
<td>Period</td>
<td>5</td>
<td>27500.00</td>
<td>2.79</td>
<td>506.60</td>
<td>189.52</td>
</tr>
<tr>
<td>Error</td>
<td>198</td>
<td>9843.00</td>
<td>2.67</td>
<td>10530.00</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>211</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

IV. Conclusion

This study indicates that the performance of Holdeo x Deoni cows for age at first calving and inter calving period is comparatively medium which needs an improvement to lowering this using overall managerial practices in dairy farm. Most of the reproductive traits concerns seasonal changes had not any affects. Therefore, additional reproduction strategies like improving environment factors and managemental factors needed to improve the reproduct performance.

References

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