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Short Communication

Evaluation of Lactation and Performance of Friesian Cow in Local Environment of Quetta, Balochistan, Pakistan

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ABSTRACT

The present study was conducted in order to analyze lactation performance of Friesian cattle in the local environment of Quetta, Pakistan and to evaluate non-genetic factors affecting the lactation traits. For this purpose, data on lactation performance of Holstein Friesian cows were collected from government livestock farms located at Quetta. Data obtained on calving from 608 cows during last sixteen years (2000-2016) were analyzed. After editing the data for consistency and errors it was subjected to statistical analysis using fixed effect models. Independent variables were year of birth, season of birth, year of calving, season of calving and parity. Age of animal (linear and quadratic effects) and lactation period were fitted as co-variables. Dependent variables were lactation performance traits (lactation milk yield, dry period, etc.). The results of all traits showed that the year of calving had a highly significant ($p<0.01$) effect on lactation length, month of calving and parity. Lactation milk yield was significantly affected by year of calving ($p<0.01$) and month of calving ($p<0.05$) while parity had a non-significant ($p>0.05$) effect. Milk yield over 305 days was significantly ($p<0.05$) affected by year and month of calving, while parity had a non-significant ($p>0.05$) effect. Similarly, year of calving and month of calving had a highly significant ($p<0.01$) effect on dry period which is non-significantly ($p>0.05$) affected by parity.

Geographically Balochistan is the largest province of Pakistan; having social and cultural variations. Balochistan contains 44% of the national sheep population and smaller number of cows and buffalo due to which dairy production is low in this province (GOP, 2008-09). In 1977-78, the Livestock and Dairy Development Department Government of Balochistan decided to import the non-native cattle breeds to overcome the shortage of milk. For this purpose, Holstein Friesian cattle was imported from Denmark. About 175 pregnant heifers and 2 bulls were imported and stationed at Government Dairy Farm Quetta in order to breed non-native dairy cattle under different climatic conditions.

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Inspite of the import of non-native cattle breeds over thirty years, it is estimated that the desired production is not achieved up till now (Afzal and Naqvi, 2004). The main objective of this study is to evaluate the potentials, problems and solutions concerning the dairy industry in Pakistan and to identify potential options to improve the lactation performance of Holstein Friesian cow kept under different conditions in different areas of country.

Materials and methods

Several traits of interest were recorded from Holstein Friesian cattle (n=610 out of which 2 died) reared at the Government Dairy Farm Pishin, Balochistan, Pakistan. These included various measures of lactation performance and general information on the cows: traits like lactation milk yield, lactation length, dry period, year of calving, month of calving and parity. Standard management conditions were offered (24-h *ad lib* water, 2 times green fodder) with concentrate (Anmol Vanda @ 3 kg per head). The animals were housed in semi-open system and vaccination against various diseases were done according to vaccination schedule given by Govt of Balochistan

Livestock Department. Avg age at calving ranged from 24-30 months and 6 parities were recorded on average.

The data was fed into MS excel worksheet and edited. Any record beyond ± 3 S.D. (standard deviation) was omitted/removed. After editing, the data was analyzed using following mathematical models:

$Y_{(ijklm)}= YOC_{(i)}+SOC_{(j)}+LL_{(k)}+Age_{(l)}+Age^2+ YOC\ \varepsilon\ SOC_{(IJ)}.+\varepsilon_{(ijklm)}$

where Y_{ijklm} is lactation performance recorded, $YOC_{(i)}$ is I^{th} year of calving, $SOC_{(j)}$ is j^{th} season of calving, $YOC\ SOC_{(ij)}$ is interaction of i^{th} and j^{th} year of calving, $LL_{(k)}$ is k^{th} length of lactation related to any milk or lactation performance recorded, $Age_{(l)}$ is age of the animal at time of calving recorded in months, Age^2 is quardatic effects of age of animal (as both linear and quadratic effects of age are usually used in such models mostly as covariables), E_{ijklmn} is random error associated with each observation.

Preliminary descriptive analysis was conducted using SPSS software. Further analysis was conducted using ASREML software.

Different models were applied and finally one model was reached for optimum results for all traits. LL was both treated as dependent variable in milk traits and independent variable as well. Parity remained non-significant in all models so it was excluded ultimately.

Results and discussion

The average lactation milk yield (LMY) of 2322.53±150.7 L as found in present study was greater than the values reported by different findings of many researchers. Nahar et al. (1992) reported LMY of Desi × HF as 1702.8±44.2 L, value of average LMY by Talbott (1994) was 1314±23.7 L in Desi cross. Mean lactation milk yield was found to be 1395±9.9 L in cross animals (Dahlin et al., 1998). Average LMY was found to be 1432.8±51.2 L (Aslam et al., 2002) and 429±11.4 L (Rehman et al., 2008). LMY in the study of Habib et al. (2010) was found to be 500.7±19.3 L. LMY value reported by Hassan and Khan (2013) was 1633±49.03 L while in the findings of Fernando et al. (2016) stated LMY was 2235±77.6 L. All these given values of different research work were lower than present results. Similarly reported values of LMY of Afridi (1999), Sattar et al. (2005), Irshad et al. (2011), Sandhu et al. (2011), Usman et al. (2012) and Faid-Allah (2015) were 3002.66±45.49, 2772.76±65.0, 3992.41±16.20, 3977.75±37.20, 3438±887.19 and 7208.72±1753.6 L respectively, which are higher than the current findings.

The average lactation length (LL) in Holstein-Friesian cattle (n=608) was found to be 278.18±10.86 days which is higher than those reported by other authors. Talbott (1994), Dhalin et al. (1998), Khatri et al. (2004) and Rehman et al. (2008) stated average lactation length as 238±2.6, 232±1.3, 226.98 and 235±2.2 days respectively in different cattle breeds and these values are lower than present results. Islam and Bhuiyan (1997) reported LL value of 247.23±3.51 days, Habib et al. (2010) as 259.6±6.2 days and Hassan and Khan (2013) as 240±5.5 days. All of these values are lower than current findings.

Table I.- Average mean values of LMY, LL, DP and MY-305 days of Holstein Friesian cattle

Traits	Mean Values
LMY (liters)	2322.53±150.7
LL (days)	278.18±10.86
DP (days)	234.46±52.16
MY-305 days (liters)	2781.08±551.26

LL, lactation length; LMY, lactation milk yield; MY-305 days, milk yield 305 days; DP, dry period

Table II. Analysis of variance of LL, LMY, MY-305 days and DP of Holstein Friesian cattle affected by YOC, MOC and Parity.

Traits	YOC	MOC	Parity
LL	***	NS	NS
LMY	***	**	NS
MY-305 days	**	NS	**
DP	***	NS	NS

YOC has highly significant effect on LL, LMY and DP ($p<0.01$) while significant effect ($p<0.05$) on MY-305 days.
MOC non-significantly ($p>0.05$) effected on LL, MY-305 days and DP while this factor has significant effect ($p<0.05$) on LMY.
Parity has significant effect ($p<0.05$) on MY-305 days while all other traits were non-significantly affected ($p>0.05$) by this factor.
MOC, month of calving and YOC, year of calving. See Table I for remaining abbreviations.

Some LL values were higher compared to present study as reported by Nahar *et al*. (1992) as 330.5±3.6 days, Afridi (1999) as 315.09±17.75 days, Sattar *et al*. (2005) as 291.86±6.55 days, Irshad *et al*. (2011) as 320.14±11.14 days, Sandhu *et al*. (2011) as 314.19±0.91 days, Usman *et al*. (2012) as 366.5±76.71 days, Fernando *et al*. (2016) as 323.78±91.02 days. Javed *et al*. (2004) reported this value as 278.40±90.17 days which was similar to the current results. The variations reported in the results from different researchers may be attributed to the variations in breed, housing, management and nutritional conditions.

Overall average dry period (DP) in present study was found to be 234.46±52.16 days that was considerably longer than reported by Nahar *et al*. (1992) as 148.1±8.8 days, Talbott (1994) as 228±11.7 days, Aslam *et al*. (2002)

as 198.9±17.17 days, Sattar *et al*. (2005) as 224.99±10.00 days, Habib *et al*. (2010) as 162.4±7.7 days, Suhail *et al*. (2010) as 169.26±16.45 days, Sandhu *et al*. (2011) as 87.06±1.63 days, Usman *et al*. (2012) as 100.26±61.38 days, Faid-Allah (2015) as 72.33±20.03 days and Fernando *et al*. (2016) as 120±12.2 days. DP reported by Khatri at el. (2004) and Rehman *et al*. (2008) was 455.1 and 244±2.8 days respectively, which were higher than the current findings.

Regarding average 305 days milk yield (days MY), results were 2781.08±551.26 L which are higher than reported values of different researchers. Average values of MY-305 days reported by Mohiuddin *et al*. (1991), Chaudary *et al*. (1994), Dahlin *et al*. (1998), Aslam *et al*. (2002), Rehman *et al*. (2008), Hassan and Khan (2013) were found to be 1603±12.3, 2729.0±669.3, 1363±30.1, 1864.5±77.1, 1393±11.7 and 1613±49.03 L. The results of Nawaz *et al*. (1993) and Faid-Allah (2015) were 2889±92 and 6384.95±1236.9 L, which were considerably higher than current values.

Non-genetic factors like year of calving (YOC), month of calving (MOC) and parity also have different effects on the lactation traits. LMY was significantly ($p<0.01$) affected by year of calving and month of calving while parity influenced non-significantly ($p>0.05$) on this lactation trait. Similarly, year of calving and month of calving also significantly ($p<0.01$) affected the lactation length. In this case parity showed non-significant ($p>0.05$) effect as in previous trait. Milk yield 305 days and dry period was significantly ($p<0.01$) affected by year of calving and month of calving. Parity has non-significant ($p>0.05$) effect on both traits.

The relationship between fixed factors and lactation performance could be used to increase production. For example, if year of calving had a positive effect on milk yield, we can use this relationship in practice to increase milk yield by adopting the management practices to inseminate the animal regarding our desired calving year. Month of calving and year of calving has significant effect on milk yield, hence the husbandry practices could be adopted for fruitful gains.

Supplementary Table I gives study conditions, parameters investigated and findings from literature data by different researchers to have a deep look on productive performance of crossbred and exotic cattle.

Conclusion

Non-native cattle breeds imported and kept at Balochistan at different locations are performing well regarding production. The climate in Quetta is cool, humid and temperate so these climatic conditions are favoring the production potential exploitation. Better performance of dairy cattle could be achieved by modern husbandry practices, nutritional manipulations and proper disease control. By adopting these manipulations, we can attain the desired effects of YOC, MOC, SOC and age of the cow to increase milk production.

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Supplementary material

There is supplementary material associated with this article. Access the material online at: https://dx.doi.org/10.17582/journal.pjz/20190328080332

Statement of conflict of interest

The authors have declared no conflict of interest.

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