

FACTORS AFFECTING ON AGE AT FIRST CALVING IN CROSSBRED CATTLE MAINTAINED AT LES QADIRABAD DISTRICT SAHIWAL

M. Ahmad^{1,*}, M. N. Tahir¹, F. Ahmad¹, S. S. Shah¹, M. Jahanzeb², M. Akhtar², R. H. Mirza³ and M. Ikram⁴

¹Livestock Experiment Station Qadirabad District Sahiwal, Pakistan.

²Livestock Production Research Institute Bahadurnagar District Okara, Pakistan.

³Faculty of Veterinary Sciences, Bahauddin Zakariya University, Multan, Pakistan.

⁴University of Veterinary and Animal Sciences, Lahore

Corresponding author's e-mail: m.ahmad7943@gmail.com

ABSTRACT: The data on age at first calving for 539 records of crossbred cows of different filial/genetic groups were considered for the present investigation. These crossbreds belonged to eight filial/genetic groups (F1, F2, F3, F4, F5, F6, F7 and F8) maintained at Livestock Experiment Station Qadirabad District Sahiwal from 1991 to 2014 (24 years). The duration of 24 year was divided into 6 periods (P1, P2, P3, P4, P5 and P6) of four years each. Each year was further divided into three seasons as winter (November-February), summer (March- June) and spring (July-October) on the basis of geo-climatic conditions prevailing in the region. The overall population mean of age at first calving was determined 1261.88 ± 9.934 days. The analysis of variance revealed significant effect of period of calving on age at first calving. The finding of this study shows that age at first calving was subjected to non-genetic factor. Effect of season of calving on age at first calving was non-significant which indicate breed characteristic to adaptation with environment. Meanwhile effect of filial/genetic group was significant on age at first calving. Therefore, from the result of this investigation it can be determined that improving the feeding, health and other husbandry practices are essential to enhance the performance trait of this herd.

Key words: - Crossbred Cattle, Season, Filial Group, Age at first calving.

(Received 06.02.2022

Accepted 15.07.2022)

INTRODUCTION

Dairy production is a result of many ingredients contributing its overall performance which include genetic, environmental and managerial factors. In Pakistan, dairy industry generally consists of buffaloes and cattle contributing major share in milk production. Crossbred cattle in Pakistan have been produced by crossing of well improved *Bos taurus* breeds with local low productive *Bos indicus* breeds to enhance dairy production in the region (Hassan and Khan 2013). Crossbreeding in Pakistan has been started in cattle in 1970 and showed better production performance by the experiments carried out at private as well as at government sectors. Among government sectors, Livestock Production Research Institute Bahadurnagar District Okara and Livestock Experiment Station Qadirabad District Sahiwal, Punjab under the Livestock and Dairy Development Department Lahore, Punjab have played an important role in crossbreeding of cattle.

Dairy industry mainly depends upon the productive and reproductive performance traits of dairy animals, therefore, it is very necessary to tackle out the means for improving the performance efficiency by developing certain criteria for selection of different traits

(Dangar *et al.* 2014). The selection and evaluation of breeds to be used as the parental stock is a necessary step for the success of any animal breeding program (Sivamani *et al.* 2013). Estimate of the genetic progress achieved by selection programs is necessary to describe the genetic changes progress, to assess the benefits of the selection program and to introduce important adjustments (Euclides Filho *et al.* 1997). Among traits age at first calving is an important reproductive and economic trait in crossbred cattle. Decrease in age at first calving decreases the rearing cost, increases genetic gain and productive life of animal (Kumar *et al.* 2015). Age at first calving becomes more relevant to generation interval and influences response to selection. Thus, segregation of factors like season and years and their effect on age at first calving will enable us in assessing the effectiveness of selection programme, managerial conditions over time and breed characteristic of adaptation with existing environment. This study will also suggest the amendment in managerial standard operating procedures. Therefore, the present investigation was planned with a view to study the factors affecting age at first calving in crossbred cattle of different filial/genetic groups under different climatic condition/seasons.

MATERIALS AND METHODS

The data on age at 1st calving for 539 records of crossbred cows of different filial/genetic groups was considered for the present investigation. These crossbreds belonged to eight filial/genetic groups (F1, F2, F3, F4, F5, F6, F7 and F8) maintained at Livestock Experiment Station Qadirabad District Sahiwal from 1991 to 2014 (24 years). The duration of 24 year was divided into 6 periods (P1, P2, P3, P4, P5 and P6) of four years each. . The each year was further divided into three seasons as winter (November-February), summer (March- June) and spring (July-October) on the basis of geo-climatic conditions prevailing in the region. Records of cows showing specific or non-specific diseases and reproductive problems were not included in the present study.

The effects of period of birth, season of birth and filial/genetic group on age at first calving were analyzed by utilizing Mixed Model Least Square and Maximum Likelihood computer programme of Harvey (1990). Duncan's multiple range test (DMRT) as modified by Kramer (1957) was used for forming all possible pair wise comparison of means.

RESULT AND DISCUSSION

The average age at first calving in crossbred cows was recorded as 1261.88±9.34 days. The result are close to similar with Crossbred cows (1300±5.5 days) reported by Hassan and Khan (2013), while age at first calving is lower when compare with Gir cows (1490.50 ±111.04 days) reported by Dangar *et al* (2014) and Gangatiri cows (1608.4 ±83 days) reported by Ravi *et al* (2018). Similar results were also observed in Kankrej cows (1376 ±14.55 days) reported by Pareek *et al* (2016).

Effect of Period of Calving on Age at First Calving in Crossbred cows: The least square analysis of variance shows that differences in the age at first calving during different periods were highly significant (P<0.01). According to the period of birth, average age at first calving in six period P1 (1991-1994), P2 (1995-1998), P3 (1999-2002), P4 (2003-2006), P5 (2007-2010) and P6 (2011-2014) were 1133.14±57.93, 1313.29±60.33, 1323.27±61.39, 1412.07±58.83, 1234.70±57.88 and 1318.06 days respectively. The results are lower than those reported by Nikhil *et al* (2014) in Gir cows and Ravi *et al* (2018) in Gangatiri cows.

In the present study, age at first calving was highest in period P4 and lowest in periods P1 and P5 respectively. The lowest least square mean value of age at first calving in period P1 and P5 respectively may be due better nutrition strategies and better management practices during this time. When compared among

periods, P2 does not differ significantly with P3 and P6 while P1 and P5 differ significantly with P4 (Table-1).

Table -1. Least square means and standard errors for age at first calving in Crossbred cows for different periods, seasons and genetic groups.

Factors	No. of Observation	Least square means and SE of Age at First calving
μ (n)	539	1261.88±9.34
Period		
P1 (1991-94)	153	1133.14±57.93 ^d
P2 (1995-98)	114	1313.29±60.33 ^{bc}
P3 (1999-02)	82	1323.27±61.39 ^b
P4 (2003-06)	81	1412.07±58.83 ^a
P5 (2007-10)	93	1234.70±57.88 ^c
P6 (2011-14)	16	1318.06 ^{bc}
Season		
Winter (Nov.-Feb)	242	1273.76 ^a
Summer (March-June)	157	1254.46±21.89 ^a
Spring (July-Aug)	140	1262.34±22.77 ^a
Filial/Genetic Group		
F1	98	1260.62±87.29 ^{abcd}
F2	66	1289.41±77.67 ^{abc}
F3	79	1291.70±77.28 ^{abc}
F4	94	1198.66±76.78 ^{dc}
F5	80	1231.71±77.53 ^{bdc}
F6	79	1312.19±76.72 ^{ab}
F7	34	1347.12±80.11 ^a
F8	9	1174.11 ^d

Means with different superscripts differ significantly from each other

Table -2. Least squares analysis of variance for age at first calving in Crossbred cow:

Source of variation	Df	S.S	M.S	F. Ratio
Period of birth	5	5028429.120	1005685.824	22.47*
Season of birth	2	7705.271	3852.636	0.09**
Filial/Genetic group	7	1053998.668	150571.238	3.36*

Df= Degree of freedom M.S= Mean Squares
S.S= Sum of Square
* = Significant ** = Non-Significant

Hadia *et al.* (2011) reported significant effect of period of birth on age at first calving in Giroland cattle. Similar to present result, Javed *et al.* (2000) and Sivamani *et al.* (2013) reported significant effect of period of birth on age at first calving in Sahiwal cattle. Japheth *et al.* (2015) and Dahiya *et al.* (2003) was also

reported the significant effect in Karan Fries crossbred cattle and crossbred cattle respectively

Contrary to present result, Parmar and Johar (1982) in Tharparker cattle found non-significant effect of year of birth on age at first calving.

Effect of Season of Calving on Age at First Calving in Crossbred cows: Non-significant effect of season of calving was found on age at first calving in crossbred cows ($P>0.05$). According to season, the age at first calving in Winter (November-February), Summer (March-June) and Spring (July to October) were 1273.76, 1254.46±21.89 and 1262.34±22.77days respectively.

These results showed that there was no precise drift in age at first calving due to season of birth (Figure 1). In summer least square means was found to be lowest as compared to winter and spring which may be due to availability of better feeds in this season (Table-1). Non-significant effect of season of calving was reported by Nikhil *et al* (2014) in Gir cows, Pareek *et al* (2016) in Kankrej cows and Ravi *et al* (2018) in Gangatiri cows. Sivamani *et al.* (2013) and Dahiya *et al.* (2003) were also reported the non-significant effect in Sahiwal cattle and Crossbred cattle respectively.

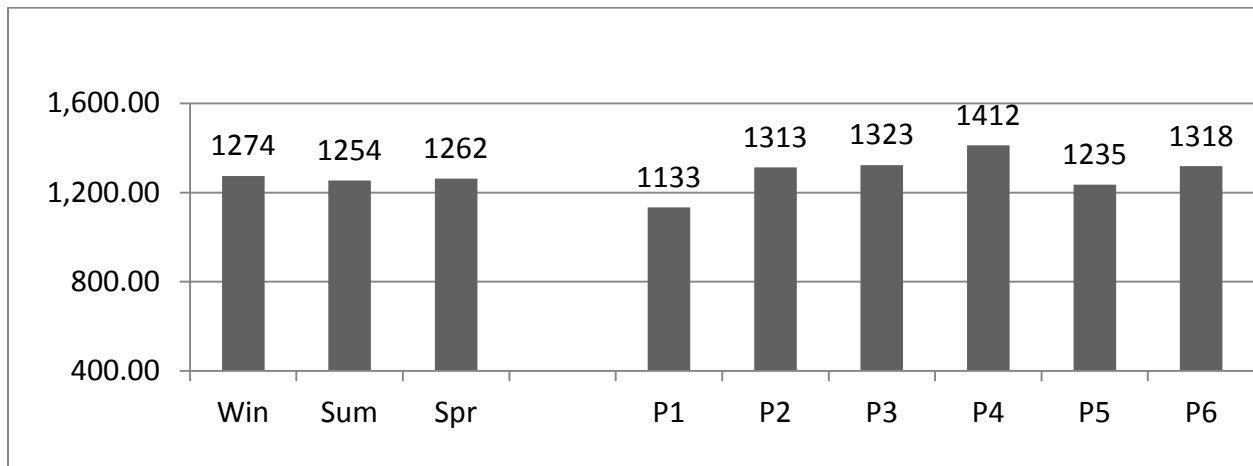


Figure 1 – Season and Period-wise age at first calving (days) in Crossbred cows

Contrary to present result, Hadia *et al.* (2011) in Girolando cattle and Kumar (2007) examined significant influence ($P<0.01$) of season of calving on age at first calving in Sahiwal cattle respectively.

Effect of Genetic/Filial Group on Age at First Calving of Crossbred cows: Least square analysis of variance

showed that age at first calving differed significantly ($P<0.05$) between the filial/genetic groups. The average age at first calving in filial/genetic groups F1, F2, F3, F4, F5, F6, F7 and F8 were 1260.62±87.29, 1289.41±77.67, 1291.70±77.28, 1198.66±76.78, 1231.71±77.53, 1312.19±76.72, 1347.12±80.11 and 1174.11 respectively.



Figure 2 – Genetic/filial group-wise age at first calving (days) in Crossbred cows

The least square analysis revealed that among filial/genetic groups, F8 had shortest age at first calving

(may be due to smaller number of observation) and F7 had longest age at first calving. However, there were no

significant difference among other different genetic groups except F8 and F7as shown (Table-1). The results comparison among filial/genetic groups in the present study was in agreement) with Getahun *et al.* (2019). The significant effect of filial/genetic group on age at first calving was supported by Deokar *et al* (2017) in Phule Triveni Crossbred cows and Singh *et al.* (2002) in Crossbred cow. Dahiya *et al.* (2003) also reported the significant effect in crossbred cattle. The difference of this comparison of genetic groups from others findings might be due to difference in environmental condition , number of observation taken for the study and level of management practices.

Conclusion: Season of calving had non-significant effect on age at first calving which indicates the breed characteristics to adaptation with environment, while Period of calving and filial/genetic group had significant effect on age at first calving which may be due to better feeding, management practices during specific period of time and better selection criteria adopted by farm management. Hence, importance should be given to feeding, health of animals, husbandry facilities and selection measures to enhance the performance trait of this herd.

REFERENCES

- Dangar NS and Vataliya PH. (2014). Factors affecting age at first calving in Gir cattle. *Intern. J. Live. Res.* 4(2).
- Deokar, D.K., Kamble, V.P., Gaikwad, U.S. and Jadhav S.S. (2017). Studies on First Lactation Reproduction Traits of Phule Triveni Crossbred Cattle. *Intern. J. of Tropical Agri.* ISSN: 0254-8755 Vol. 35. No. 1.
- Dahiya, D.S., Singh, R.P. and Khanna, A.S. (2003). Genetic group differences and effect of non-genetic factors in crossbred cattle for reproduction traits. *Indian J. Anim. Res.* 37(1): 69-72.
- Getahun K, Hunde D, Tadesse M and Tadesse Y. (2019). Reproductive performances of crossbred dairy cattle at Holetta Agricultural Research Center. *Livestock Research for Rural Development. Volume 31, Article #138.*
- Hadia, M. Y., Alkoiret, I. T., Gbangboche, A. B. and Lokossou, R. (2011). Reproductive Performance and Milk Production of Girolando Cows in the Ranch of Kpinnou, South-West of Benin Republic. *J. Anim. Vet. Adv.* 10(19): 2588-2592.
- Hassan, F. and Khan, M.S. (2013). Performance of crossbred dairy cattle at military dairy farms in Pakistan. *J. Anim. Plant Sci.* 23(3).
- Harvey, W. R. (1990). Users' Guide for LSMLMW and MIXMDL, Mixed model least squares and maximum likelihood computer program. PC-2 version, the Ohio State University, Columbus, USA.
- Javed, K., Mohiuddin, G. and Abdullah, M. (2000). Environmental Factors Affecting Various Productive Traits in Sahiwal Cattle. *Pak. Vet. J.* 20(4): 187-192.
- Japheth KP, Mehla RK, Imtiwati and Bhat AS. (2015). Effect of nongenetic factors on various economic traits in Karan Fries crossbred cattle. *Ind. J. Dairy. Sci.* 68(2):163- 169.
- Kamble, S.S. and Fulpagare, Y.G. (2018). Effect of Non Genetic Factors on Reproduction Traits of Gir Crossbred. *Intern. J. of Tropical Agri.* ISSN: 0254-8755 Vol. 36. No. 4.
- Krammer, C.Y. (1957). Extension of multiple range tests to group related adjusted mean-biometrics 13:20.
- Kumar, A. (2007). Genetic analysis of stayability in Sahiwal cattle. Ph. D. Thesis, NDRI, Karnal, India
- MS Sivamani Balasubramaniam. (2013). Estimate of genetic and nongenetic parameters and trends for age at first calving in Sahiwal cows. *Ind. J. Anim. Scie.* 83(9):948-952.
- Pareek N.K., Ankuya K.J., Patel M.P., Joshi N.A., Rathod B.S., Prajapati K.B., Patel J.B. (2016). Factors affecting age at first calving in kankrej cattle. *J. Anim. Res.* 6(2).
- Penchev, P., Y. Ilieva and K. DimovI (2014). Effect of season of birth on season of calving and age at first calving in buffalo heifers. *Bulg. J. Agric. Sci.*, 20: 447-451.
- Parmar, S.N. and Johar, K.S. (1982). Factor affecting age at first calving in Tharparkar cows. *Ind. Vet. J.*, 50: 870-73.
- Ranjan R, Kumar V, Shukla A.K and Gangwar S. (2018). Influence of non-genetic factors on age at first calving in gangatiri cattle breed at organized farm, Araji Line, Varanasi. *The Pharma Inn. J.* 7(8): 198-200.
- Singh, K., Khanna, A.S. and Jaiswal, U. (2002). Genetic and non-genetic factors affecting reproduction traits in crossbred cattle. *Indian J. Anim. Res.* 36 (2):90 – 93.