

FACTORS AFFECTING CALVING INTERVAL AND SERVICE PERIOD IN HOLSTEIN FRIESIAN X SAHIWAL CROSSBRED COWS

M. Rafique, K.R. Chohan and M.A. Amer
Livestock Production Research Institute, Bahadurnagar, Okara,
College of Veterinary Sciences, Lahore, Pakistan

ABSTRACT

The data on 1491 breeding records of service period and calving interval of different grades of H. Friesian x Sahiwal 75, 62.5, 37.5, 25% and ½ (F1, F2, F3, F4) crossbred over a period of 19 years (1976-1994) were utilized. The overall average least square means and SE for service period and calving interval were 137.4 ± 6.82 and 419.78 ± 6.04 days, respectively. Both traits were significantly ($P > 0.01$) influenced by year, season and parity of calving, while the year x season interaction had non-significant effect on both traits. The Spring season calvers and older cows were having shorter service period and calving interval.

INTRODUCTION

Calving interval and service period have a great economic importance on the lifetime milk production and productive life of dairy animals, which ultimately affects the economics of the owner/farmers. The knowledge of different factors affecting service period and calving interval has imperative and radical importance for appraising genetic potential and predicting the breeding value of animals. Keeping in view these points, the present investigation was under taken to see the effects of certain factors like breed, year, season and parity of calving on service period and calving interval in crossbred dairy cows.

MATERIALS AND METHODS

For this investigation 1491 breeding records pertaining to service period and calving interval, belonged to eight breed groups ½ (F1, F2, F3 and F4) 75, 62.5, 37.5 and 25 per cent of H. Friesian cross with native Sahiwal breed, over a period of 19 years (1976-1994) were utilized. The entire duration was divided into five periods. Period P1-P4 consisted of 4 years each from 1976 to 1994. The year was further divided into four seasons, winter (November-January), Spring (February-April), Summer (May-July) and Autumn (August-October). The data were collected from history sheets maintained at Livestock Production Research Institute, Bahadurnagar, Okara. The effects of various genetic groups, year, season, year x season interaction and parity of calving were computed and analyzed by utilizing the mixed model least squares and maximum likelihood computer programme (Harvey, 1988).

The model used was

$$Y_{ijklm} = U + Y_i + S_j + G_k + P_l + E_{ijklm}$$

Where

Y_{ijklm} = Observations on m th animals belonging to i th subscripts period, j th season, k th breeding group and l th parity

U = over all population mean

Y_i = Effect of i th period ($i = 1, 2, \dots, 5$)

S_j = Effect of j th season ($j = 1, 2, \dots, 4$)

G_k = Effect of k th breed group ($k = 1, 2, \dots, 8$)

P_l = Effect of l th parity ($l = 1, 2, \dots, 8$)

E_{ijklm} = Random error

RESULTS AND DISCUSSION

The least squares means and least squares analysis of variance of different breed groups of H. Friesian x Sahiwal crossbred are presented in Table 1 and 2. The overall least square means for service period and calving interval were 137.4 ± 6.82 and 419.78 ± 6.84 days, respectively.

Service Period

The least square means of service period in different periods, seasons, parity of calving and various breed groups are presented in Table 1. The overall value for service period (137.34 ± 6.82 days) was in consonance with the findings of Reheja and Bhat (1982). The results revealed significant ($P < 0.05$) effect of period of calving on service period. The findings are in agreement with the results of earlier workers. Mudgal *et al.* (1986), Malik *et al.* (1995), Nagarcenkar and Rao, (1982) and Butte and Deshpande (1987) who reported that the effect of year was significant on service period.

Table 1: Least square means and SE of service period and calving interval of H. Friesian x Sahiwal crossbred cows

Effects	Service period (Days)		Calving Interval (Days)
	No.	Mean \pm SE	Mean \pm SE
U	1491	137.34 \pm 6.82	419.78 \pm 6.84
Parity			
1	477	169.99 \pm 5.73 ^a	453.20 \pm 5.74 ^a
2	332	160.68 \pm 6.81 ^a	443.73 \pm 6.82 ^a
3	245	139.75 \pm 7.97 ^a	420.17 \pm 7.99 ^b
4	165	129.21 \pm 9.55 ^{bc}	411.92 \pm 9.57 ^{bc}
5	110	116.12 \pm 11.22 ^c	385.42 \pm 11.24 ^c
6	69	133.32 \pm 13.53 ^{bc}	414.66 \pm 13.56 ^{bc}
7	49	125.05 \pm 15.90 ^{bc}	408.73 \pm 15.93 ^{bc}
8	44	121.60 \pm 16.74 ^{bc}	410.43 \pm 16.77 ^{bc}
Genetic Group			
½ F1	793	158.45 \pm 4.58 ^a	444.88 \pm 4.59 ^a
½ F2	271	138.83 \pm 8.23 ^{ab}	423.75 \pm 8.24 ^{ab}
½ F3	159	120.24 \pm 11.16 ^{bc}	406.01 \pm 11.18 ^{bc}
½ F4	37	107.41 \pm 18.61 ^c	388.71 \pm 18.64 ^{cd}
¾ (HXS)	106	159.07 \pm 10.51 ^a	441.80 \pm 10.53 ^a
5/8 (HXS)	57	158.91 \pm 14.02 ^a	441.86 \pm 14.05 ^a
3/8 (HXS)	17	117.05 \pm 24.29 ^{bc}	384.71 \pm 24.34 ^a
¼ (HXS)	51	138.76 \pm 14.41 ^{ab}	426.54 \pm 14.44 ^{ab}
Period			
P1	132	122.83 \pm 14.34 ^b	404.66 \pm 14.37 ^b
P2	413	126.36 \pm 9.58 ^b	406.21 \pm 9.59 ^b
P3	460	129.14 \pm 7.45 ^b	410.52 \pm 7.46 ^a
P4	350	151.38 \pm 7.01 ^a	434.30 \pm 7.02 ^a
P5	136	156.98 \pm 10.33 ^a	443.22 \pm 10.35 ^a
Season			
Winter	484	132.98 \pm 8.00 ^{ab}	415.06 \pm 8.01 ^b
Spring	314	123.81 \pm 9.27 ^b	409.58 \pm 9.28 ^b
Summer	293	143.58 \pm 9.16 ^a	422.46 \pm 9.18 ^{ab}
Autumn	400	148.99 \pm 8.08 ^a	432.02 \pm 8.09 ^a

Means superscripted by different letters differ significantly among themselves.

Table 2: Least square analysis of variance of service period and calving interval in different crosses of H. Friesian x Sahiwal crossbred cows

Source of variation	Service Period		Calving interval	
	df	M.S.	df	M.S.
Parity of calving	7	51173.83**	7	56.356.61**
Breed group	7	20817.98*	7	23908.67*
Period	4	25540.25*	4	31641.77**
Season of calving	3	3002.84*	3	24684.17*
Period x season interaction	12	8236.79 NS	12	8009.07NS
Remainder	1457	9111.75	1457	9147.97

d.f = degree of freedom; M.S. Mean squares; ** = significant at $P < 0.01$; * = significant at $P < 0.05$; N.S. non significant

The effect of season on calving was statistically significant ($P < 0.05$) on service period. Mudgal *et al.* (1986), Tewari and Khushwaha (1982), Malik *et al.* (1995) and Shah and Shah (1983) found effect of season of calving on service period to be significant which was in agreement with the present findings. Comparisons of season wise means showed that lowest service period (123.81 ± 9.27 days) was observed in Spring season calvers and highest (148.99 ± 8.08 days) service period was observed in Autumn calvers. These variations may be due to reflection of varying climatic conditions and availability of fodder.

The effect of parity (lactation order) had significant ($P < 0.01$) effect on service period. Similar results were reported by Nagarcenkar and Rao (1982), Mudgal *et al.* (1986), Sharma and Singh (1986) and Malik *et al.* (1995). The service period was higher (169.99 ± 5.73 days) in second lactation than the subsequent lactations. This might be due to disturbances of endocrinological functions of reproductive system.

The results revealed that the effect of breed groups is significant ($P < 0.05$) on service period. These results are not in agreement with the results of earlier workers (Deshpande *et al.*, 1988; Chaudhry and Ahmad, 1994; Malik *et al.*, (1995).

Calving interval

The overall least square means of calving interval was 419.78 ± 6.84 days. The result of the present study on calving interval was close to the findings of Aragonosa and Rigor (1988) and Parmar *et al.* (1986).

The period of calving had highly significant ($P < 0.01$) effect on calving interval. These results are in consonance with the earlier findings of Butte and Deshpande (1987). However, Nagarcenkar and Rao (1982) and Malik *et al.* (1995) concluded that the calving interval was not significantly affected by year of calving.

The season of calving had significant ($P < 0.05$) effect on calving interval. Similar results were reported by Sharma and Singh (1986) and Malik *et al.* (1995). The Spring calvers showed minimum calving interval (409.58 ± 9.28 days) and the Autumn calvers had the highest (432.02 ± 8.09 days) calving interval which might be due to change in geoclimatic conditions.

The parity of calving had highly significant ($P < 0.01$) effect on calving interval. Similar results were reported by the earlier workers (Sharma and Singh, 1986; Deshpande *et al.*, 1988).

The breed group has significant effect on calving interval. These results are in consonance with the findings of Sharma and Singh (1986) and Butte and

Deshpande (1987). They found significant effect of breed group on calving interval. Deshpande *et al.* (1988) and Malik *et al.* (1995) on contrary found non-significant effect of breed group on calving interval.

REFERENCES

- Aragonosa, A.S. and E.M. Rigor, 1988. Productive and reproductive performance of Sahiwal Holstein crosses. Proceedings VI world conference on animal production, Helsinki, Finland. Finnish Anim. Breed. Assoc., pp: 501.
- Basu, S.B. and A.S. Ghai, 1980. Studies on inheritance of different cattle breed groups in hot humid tropics. Annual Report. Natl. Dairy Res. Inst., Karnal, pp: 133.
- Chaudhry, M.Z. and M. Ahmad, 1994. Performance of crossbred and Sahiwal cows under optimum feeding and managemental conditions. Pakistan Vet. J., 14: 155-159.
- Deshpande, K., G.K. Ingole and P.G. Sakhare, 1988. Factors affecting service period and calving interval in Friesian x Sahiwal crossbreds. Indian J. Anim. Sci., 58: 986-997.
- Harvey, W.H., 1988. Mixed model least squares and maximum likelihood computer programme (LSMLMW) PC-I version.
- Mudgal, K.C., C.M. Taylor and A. Singh, 1986. Studies on dry period and service period in crossbred cattle. Indian Vet. J., 63: 561-565.
- Malik, Z.S., B. Singh and S.S. Dhaka, 1995. Factors affecting service period and calving interval in crossbred dairy cattle. J. Dairy Foods and Home Sci., 14: 117-120.
- Nagarcenkar, R. and M.K. Rao, 1982. Performance of Therparker exotic crosses for productive and reproductive traits. Indian J. Anim. Sci., 52: 129-138.
- Parmar, O.S., A.K. Jain and G.S. Gill, 1986. Evaluation of two breed and three breed crossbred cows with reference to economic traits and production efficacy. Indian J. Dairy Sci., 39: 210-214.
- Rahija, K.I. and Bhat, 1982. Note on the comparative performance of three zebu breeds and their F1 crosses with H. Friesian for certain economic traits. Indian J. Anim. Sci., 52: 333-336.
- Shah, S.K. and I.H. Shah, 1983. Factors affecting service period in Sahiwal cows. Indian J. Anim. Sci., 53: 759.
- Sharma, N.C. and B. Singh, 1986. Service period in crossbred cows. Indian Vet. J., 63: 160-162.
- Tewari, R.P. and N.S. Khushwaha, 1982. Effect of season of calving on service period of Sahiwal cows and Murrah buffaloes. Indian J. Anim. Reprod., 2: 34-36.