PRODUCTIVE AND REPRODUCTIVE PERFORMANCE AND THEIR INTERACTION IN CROSSBRED CATTLE UNDER FIELD CONDITIONS IN DISTRICT BANNU

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ABSTRACT

A study was conducted in district Bannu located in the southern dry piedmont mountains of the NWF Province of Pakistan. Records of 300 crossbred cows, produced through use of Holstein Friesian semen in native, non-discript cows, were studies. Data on various productive and reproductive parameters were analyzed. The average age at puberty was 752±10.9 days, ranging from 420 to 1620 days and was positively correlated with mounting (r = 0.14) and negatively with estrus duration, vaginal mucus and calving interval (r = -0.14, -0.13, -0.15, respectively; P<0.05). the average inter-estrus interval was 20.0±9.07 days, ranging from 15 to 24 days. Estrus duration was 34.0±0.85 hours, ranging from 17 to 72 hours and was positively correlated with vaginal mucus (r = 0.12) and services per conception (r = 0.14) and negative with bellowing (r = 0.11), P< 0.05). number of services per conception in the crossbred cows averaged 1.6±0.1,, ranging from 1 to 12 and was correlated positively, with daily milk yield and negatively with lactation length and vaginal mucus (r = 0.32. –0.31, -0.27 respectively, P< 0.01). calving interval was 612±4.56 days, ranging from 360 to 900 days and was negatively correlated with age at puberty, daily milk yiekd and use of oxytocin (r = -0.15. –0.67, -0.62, respectively, P < 0.0)). The average lactation length of the cows was 503±6.36 days, ranging from 30 to 1441 days. The mean daily milk yield was 10.1±0.14 Kg, ranging from 1.0 to 18.0 Kg. The standard deviation (SD) for average daily milk yield was 2.36 Kg. Number of animals 1 SD above mean was 28.0% and those 2 SD above mean was 17.0%. number of animals 1 SD below mean was 51.4% and those 2SD below mean was 3.6%. the wide variation makes a good base for productivity enhancement through selective breeding. It may be concluded that productive and reproductive performance is satisfactory in crossbred cattle under field conditions showing their adaptability to the local environment.

Keywords: Crossbred cattle, reproductive performance, fertility, production

INTRODUCTION

In Pakistan, cattle upgradation through use of exotic semen, was initiated in 1954 at Lahore, followed by establishment of 10 centres during the following years in various provinces of the country. Today, the network of Artificial Insemination Centres has expanded throughout the country. The national policy for cattle breeding was reported (Khan, 1994), which allows selective breeding for the native breeds and upgradation of non descript cattle through use of Friesian and Jersey semen in the plain irrigated and hilly rain fed areas, respectively. The policy emphasizes that the level of exotic inheritance should be maintained between 50 and 62.5 percent. The crossbreeding between exotic and native breeds tended to improve the lactation length. The Friesian sires appeared to cause longest lactations as compared to that of jersey sires.

Artificial insemination establishment in North West Frontier Province (NWFP) was reviewed by Qureshi et al. (1993). Deep freezing of semen started in the province on 1st October, 1982 under an expanded AI project. One hundred and sixty four AI centers have been working in the province. However, very little information is available about the reproducive and productive performance of crossbred cows under field conditions. Therefore, the present project was planned to study productive and reproductive performance and their interaction in crossbred cattle in district Bannu.

MATERIALS AND METHODS

The study was conducted in district Bannu located in the southern dry piedmont mountains of the NWFP, Pakistan. Records of 300 crossbred cows, produced through use of Holstein Friesian semen in native, non discript cows in district Bannu, during the period 1981-1995, were analyzed. The district was divided into four zones; 1). Zone-I, Surani; 2) Zone-II, Eisakki, 3) Zone-III, Mandan; and 4) Zone-IV, Mamashkhel. In each zone 75 cows were selected randomly. The data were

collected from the records maintained by the farmers and Civil Veterinary Hospital, Bannu. Data on age at puberty, estrus symptoms (bellowing, vaginal discharge, vulvular redness and swelling, mounting, to be mounted, urination, tail raising, off feed) estrus symptoms intensity, estrus duration, estrus frequency, breeding method and dates, services per conception and breed type, were collected. Various symptoms of estrus were graded from 1 to 4, depending upon their intensity. Calving status was recorded as normal or abnormal and duration of expulsion of fetus and placenta were recorded.

The difference in various parameters among the four zonal groups was worked out through analysis of variance (Steel and Torrie, 1980) and general linear model (GLM) was used through a computer package.

RESULTS AND DISCUSSION

Age at puberty

The average age at puberty of crossbred cows in the present study was 752 ± 10.9 days ranging from 420 to 1620 days (Table 1). These results fall in line with the findings of Syed et al. (1994) who reported an average age at puberty of 752.2 ± 38.5 days in crossbred cattle in the Central Valley of NWFP. In contrast, Chaudhry (1986) reported a mean age at puberty in 50 percent Holstein Friesian heifers as 466.0 ± 115 days, in India. This difference may be due to the difference in climatic conditions, inadequate feeding and management under field conditions.

At puberty was positively correlated with mounting ($r = 0.41$) and negatively with estrus duration, vaginal mucus and calving interval ($r = -0.14, -0.13, -0.15$, respectively; $P < 0.05$, Table 2). Similar observations were made by Siqueera et al. (1985). However, Syed et al. (1994) reported a positive correlation between age at puberty and calving interval, under state farm conditions. The present study reflects a favorable effect of age on reproductive performance, which may be due to maturity or reproductive organs and intensive care of cross bred heifers after puberty, under field conditions.

Inter estrus interval

The average inter estrus interval of crossbred cows was 20.9 ± 0.07 days, ranging from 15 to 24 days (Table 1). These findings confirm Roberts (1971), who reported inter estrus interval of 18 to 24 days in coes. Similarly, Salisbury (1985) observed an inter estrus interval of 21 ± 4 days, while Asdell (1946) has suggested a model cycle of 20 days for dairy heiferes and 21 days for dairy cows. All these reports fall in the range observed in the present study.

Estrus duration

The average estrus duration was 34.0 ± 0.85 hours ranging from 17 to 72 hours (Table 1). Gangwar et al. (1964) reported that the duration of estrus in the cows ranged from 12 to 13 hours in dairy or beef cattle. The average duration of estrus of dairy cattle under Louisiana conditions was 11 hours (Hall et al., 1959). These observations are in contrast to the findings of the present study. Climatic and breed differences may have contributed to these variations.

Correlation of estrus duration was positive with vaginal mucus and services per conception ($r = 0.12, 0.14$, respectively) and negative with bellowing ($r = -0.11$, $P < 0.05$, Table 2). Trimberger (1948) was not able to detect a significant effect of estrus duration on number of services per conception. It appears that prolonged estrus leads to repeat breeding probably due to non coincidence of the breeding with the timing of ovulation.

Services per conception

The average number of services per conception in the crossbred cows was 1.6 ± 0.1,, ranging from 1 to 12 (Table 1). The present study confirms the findings of Orlov and Frik (1992), reporting 1.56 to 1.72 services per conception in Simmental cattle. However, Usmani et al. (1986) recorded higher number of services per conception (2.4 – 3.0) in corssbred dairy cattle. Excellent performance of cows was associated with services per conception below 1.5 (Campbell and Marshall, 1975). In the present study, the slightly higher number of services per conception may be attributed to the technique or timing of insemination, hormonal imbalance or the quality of semen in the study area.

Services per conception was correlated positively with daily milk yield and negatively with lactation length and vaginal mucus ($r = 0.32, -0.31, -0.27$, respectively; $P < 0.01$; Table 2). It reflects a negative effect of milk yield on fertility, which may be due to protein and energy deficiency in high yielding cows under field conditions. The present results are in partial agreement with the findings of Syed et al. (1994), who reported a negative correlation between lactation length and reproductive efficiency. the negative correlation of vaginal mucus with services per conception with the lactation length was probably due to the fact that in the later stages of lactation the milk production levels were low, associated with better fertility.

Calving interval

The average calving interval of crossbred cows was 612 ± 4.56 days ranging from 360 to 900 days (Table 1). Prabhukumar et al. (1991) reported that the average first calving interval of Ongole dams with

Friesian, Brown Swiss and Jersey sires was 453, 505, and 599 days, respectively. On the other hand, Osmonaliev (1992) observed shortest calving interval in Ala-Tau cows and 5/8 crossbreds (354 and 360 respectively). Wahab et al. (1990) reported calving intervals of 536 ± 88.6 and 447.3 ± 103.6 days in suckled and non suckled cows. A calving interval of 365 days is considered ideal for dairy cattle while a calving interval of ess than 330 days tends to depress subsequent lactation performance (Bourchier, 1981). The prolonged calving interval in the present study my be due to prolonged estrus duration associated with higher number of services per conception ($r = 0.14$, $P < 0.05$).

Calving interval was negatively correlated with age at puberty, daily milk yield and use of oxytocin ($r = -0.15, -0.67, -0.62$, $P < 0.01$) and vaginal mucus ($r = 0.89, 0.26$, $P < 0.01$; Table 2). A positive correlation was reported between calving interval and lactation length (Herrera-Garcia, 1977), which confirms the findings of the present study. The animals with higher milk yield perhaps attracted the attention of farmers for proper reproductive management, decreasing the calving interval.

Lactation length and milk yield

The average lactation length of crossbred cows was 503.0 ± 6.36 days, ranging from 30 to 1441 days (Table 1). The findings of the present study agree with those of Patnaik (1991) who observed lactation length of 498.5 days. In contrast, Teodoro et al. (1994) observed average lactation length of 320 days. Similarly, Talkari et al. (1995) reported average lactation length of 300 days. It may be attributed to the differences in breed, feeding and management specially during lactation and the interest of the farmer in persistency of lactation.

The mean milk yield of crossbred cows was 10.1 ± 0.14 Kg per day, ranging from 1.0 to 18.0 Kg per day (Table 1). These findings coincide with those of Hirooka and Bhuiyan (1995), who reported average milk yield of 10.32 Kg per day in crossbreeding experiments between Holstein and the local breed in Bangladesh. At a state farm in NWFP, the average milk production in local and cross-bred cattle was 5.04, 7.17 Kg per day (Syed et al., 1994). Daily milk yield was lowest in local cows, followed by those carrying 87.5, 62.5, 2.50, 75.0 and 50.0% Holstein Friesian genes (5.04, 6.40, 6.50, 6.62, 7.28 and 7.48 kg per day respectively). However, Shah and Sharma (1994) registered 3.55 liters per day for local cows in Bulandshahr district of Uttar Pradesh. Variation in breed type, feeding and management may have contributed to the difference in milk production.

The standard deviation (SD) for average daily milk yiled was 2.36 kg. Number of animals 1 SD above mean was 28.0% and those 2 SD above mean was 17.0%. Number of aminals 1SD below mean was 511.4% and those 2SD below mean was 3.6%. the wide variation makes a good base for productivity enhancement through selective breeding.

Based on the results of the present study, it may be concluded that productive and reproductive performance is satisfactory in cross-bred cattle under field conditions. Prolonged estrus and smaller mucus during estrus period, led to repeat breeding.

Table 1: range and mean values of productive and reproductive indices in crossbred cows (n = 300)

Parameters	Mean	S.E.M.	Range
Age at puberty (days)	752	10.9	420-1620
Inter estrus interval (days)	20.9	0.07	15-24
Estrus duration (hours)	34	0.85	17-72
Services per conception	1.6	0.1	1-12
Calving interval (days	612	4.56	360-1441
Lactation length (days)	503	6.36	30-1441
Average milk yield (Kg/day)	10.1	0.14	1-18

Table 2: Correlation analysis among various parameters in crossbred cattle under field conditions (Pearson's correlation coefficients).

	Age at puberty	Daily milk yield	Lactation length	Use of oxytocin	Estrus duration	Vaginal mucus
Estrus duration	-0.14*	0.001	0.001	0.05	=	=
Mounting	0.41**	0.73	-0.64*	0.57**	0.13	=
Vaginal mucus	-0.13*	-0.29**	0.16**	0.02	0.12	=
Bellowing	0.09	0.07	-0.02	0.03	-0.11*	-0.15*
Services/ conception	0.01	0.32**	-0.31**	-0.1	0.14*	-0.27**
Calving interval	-0.15*	-0.67**	0.89**	-0.62**	-0.03	0.26**

* = $P < 0.05$; ** = $P < 0.01$

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