ANALYSIS AND INTERPRETATION OF BREEDING RECORDS OF A SAHIWAL HERD FOR REPRODUCTIVE PERFORMANCE

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Data on 3438 breeding records of 1062 Sahiwal cows maintained during 1963-87 were analysed to estimate various parameters of reproductive efficiency. The age at first service and that at first calving averaged 912.55 ± 5.79 and 1242.49 ± 5.85 days, respectively and were significantly affected by the year of birth. Calving interval averaged 428.88 ± 1.71 days. The autumn calvers had relatively shorter calving interval than cows calving in other seasons. Conception rate expressed as the total number of cows conceived as percentage of total services performed averaged 48.27%. Calving rate calculated as the percentage of cows calved out of the total number of cows mated during the period under study averaged 86.23%. The breeding efficiency averaged 86.36 ± 0.44% and varied form 45 to 119%.

INTRODUCTION

The Sahiwal cattle are well adapted to the tropical and subtropical conditions and also have a potential for high milk production. Therefore, popular view in vogue is to preserve and improve this breed through selective breeding. The cows of this breed produce good quantity of milk but their production is considerably lower than the well defined breeds of temperate region. The low productivity is due to low daily yields coupled with reduced reproductive efficiency. The reproductive efficiency represents the integrated effects of the processes like oestrus, ovulation, fertilization, implantation, gestation and successful parturition. The age at first conception and calving interval are the most important factors in determining the reproductive efficiency. These parameters depend greatly on growth rate, age at first oestrus, service period and number of services per conception and vary widely between different breeds, herds and periods (Tahir *et al.*, 1983; Martinez *et al.*, 1984; Farooque, 1985). The estimates of

various parameters of reproductive efficiency help to determine the economic feasibility of a particular breed or herd. These estimates also help in determining the reproductive status and are useful in formulating the future breeding plans. The present study was planned to estimate various parameters of reproductive efficiency in a herd of Sahiwal cattle.

MATERIALS AND METHODS

Data on 3438 breeding records of 1062 Sahiwal cows maintained at the Livestock Experiment Station Bahadurnagar, Okara during 1963-87 were utilized. The reproductive traits such as age at first service (AFSE), age at first calving (AFCG), and calving interval (CI) were calculated from the available data. The conception rate (CNR) was defined as the total number of cows conceived as a percentage of total services performed. The calving rate (CGR) was calculated as the percentage of cows calved out of the total number of cows mated during the total period under study.

The breeding efficiency (BE) of each cow was worked out using the formula given by Wilcox *et al.* (1957).

The effect of year of birth of AFSE and AFCG was studied by the analysis of variance technique. The approximate method of unweighted means with disproportionate sub-class numbers (Bancroft, 1968) was used to study the effect of year and season on CI. The seasonal means of CI were also compared.

A significant variation in AFSE due to year of birth indicated that there had been wide variation in feeding and management of the heifers in this herd. It can be reasonably reduced to less than 700 days with good feeding and care. An early first calving as a result of early AFSE will ensure smaller investment and quicker returns of the capital. Genetically it reduces the generation interval resulting in large annual gain from selection.

Table 1.   Mean values of various reproductive traits in Sahiwal cows

Trait	Number of records	Mean ± SE	Range	Coefficient of variation (%)
Age at first service (days)	808	912.55 ± 5.79	385-1601	18.04
Age at first calving (days)	1062	1242.49 ± 5.85	733-2515	17.67
Calving interval (days)	3438	428.88 ± 1.71	295-1160	23.40
Conception rate (%)		48.27		
Calving rate (%)		86.23		
Breeding efficiency (%)	3438	86.36 ± 0.44	45-119	15.14

RESULTS AND DISCUSSION

Age at first service: The AFSE averaged 912.55 ± 5.79 days with a range from 385 to 1601 days (Table 1). Average AFSE varied from 688 to 1161 days in heifers born in different years. The analysis of variance revealed that the difference in AFSE of heifers born in different years was significant (Table 2). AFSE estimated in the present study was higher than those reported by Ishaq and Shah (1975) and Rehman (1979) in Sahiwal cows. The present estimate was however, lower than that reported by Tahir *et al.* (1983) in the Sahiwal cows of the same farm. Farooque (1985) has also reported higher AFSE (1041.36 ± 11.26 days) in Sahiwal cows maintained at different farms.

Age at first calving: The AFCG in this herd averaged 1242.49 ± 5.85 days and varied from 733 to 2515 days (Table 1). The AFCG in different years varied significantly and was the lowest (1044 days) in heifers born in 1963. A general overall increase in AFCG from the year 1963 onward was obvious till the year 1978 whereupon it showed a declining trend.

The average AFCG was reported to be 1470.06 ± 7.15 days in Sahiwal cows kept at the Allah Dad Cattle Farm, Jahanian (Ahmad, 1972). This estimate was higher than that obtained in the present study. Average age at first calving in Sahiwal cows kept at the Livestock Experiment Station, Bahadurnagar, Okara, had been reported to vary from 1360.0 ± 14.0 to 1379.4 ± 11.5

days (Tahir *et al.,* 1983; Farooque, 1985). A wide variation in AFCG as observed in the present herd indicated that the trait can be reduced advantageously through proper feeding and management.

estimate was, however, very low as compared to the estimates reported by Alpan and Aritan (1970) who reported 84% conception rate in Holstein Friesian cows kept at Ankra, Turkey. Martinez *et al.* (1984) also

Table 2. Analysis of variance of age at first service and age at first calving in Sahiwal heifers born in different years

Source of variation	Age at first service		Age at first calving	
	df	Mean squares	df	Mean squares
Years	21	550364.87**	21	745658.75**
Error	786	13072.70	1034	21750.26

** = Significant (P<0.01).

Calving interval: The CI averaged 428.88 ± 1.71 days and varied from 295 to 1160 days. It was significantly affected by the year and season of calving (Table 2). The average CI varied from 413.59 ± 4.61 days to 443.34 ± 4.81 days for different seasons. The shortest and the longest calving intervals were in autumn calvers and for the cows calving during hot-dry season, respectively. The CI in dairy cows has also been reported to be significantly influenced by the season and year of calving (Aguilar and Hinojosa, 1981; Oliveira Filho *et al.,* 1985). Oliveira Filho *et al.* (1985) analyzed records of Gir cows in Sao Paulo State in Brazil and reported that CI was *significantly affected by the month* and year of calving.

Conception rate: The CNR in the herd was 48.27%. Further analysis revealed that about 56.34% of the cows conceived at the first service while 85.11% of the cows mated were confirmed with three services, the re-*maining 14.89% took more than three ser*-vices to conceive. This estimate was very close to that reported by Rehman (1979) in Sahiwal cows of the same herd. The present

reported range of 60.0 to 77.78% in heifers and 62.07 to 73.0% in Zebu cows maintained in Cuba. The present estimate of CNR was slightly higher than that reported by Badinga *et al.* (1985) in Holstein Friesian and Brown Swiss cows in USA. The CNR was reported to be 39.0 and 41.0% in Holstein Friesian and Brown Swiss Cows. The differences in the estimate of CNR between the present study and those reported by other workers could be due to the differences in the method of estimation or might be due to differences in the breed or the differential management at different farms.

Calving rate: The CGR in this herd was calculated to be 86.23% (Table 1). The present estimate of the CGR was very close to the estimates reported by Eversbusch (1978) who had reported CGR ranging from 76.9 to 88.8% in different breeds/genetic groups.

Breeding efficiency: The BE based on 3438 calving records of 896 cows averaged 86.36 ± 0.44% and varied from 45 to 119% (Table 1). The present estimate of BE was lower than that reported by Singh *et al.* (1980) in Sahiwal cows. The present estimate was

slightly better than the estimate reported by Chaudhry *et al.* (1984) in Sahiwal cows. Farooque (1985) has reported 86.46 ± 1.29% as the BE in Sahiwal cows which was very close to the present findings. The present estimate suggested that the trait can be improved as there was good scope for improvement either through improved feeding and management or through selection of cows which breed regularly.

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