EFFECT OF WEIGHT AT FIRST CALVING ON FIRST LACTATION PERFORMANCE IN SAHIWAL COWS

Liaqat Ali, R.A. Gill & M. Anwar
Department of Livestock Management,
University of Agriculture, Faisalabad

The data on 112 lactation records of Sahiwal cows kept at the Livestock Experiment Station, Khizarabad were analysed to study the effect of weight at first calving on first lactation performance. The weight at first calving, first lactation 305-days milk yield and milk yield per day of lactation averaged 353.95 ± 3.84, 1896.03 ± 34.83 and 6.53 ± 0.12 kg, respectively. The postpartum oestrus interval, service period and number of services per conception on an average were 160.04 ± 7.72, 216.86 ± 11.26 days and 2.13 ± 0.15, respectively. The correlation coefficient between weight at first calving and first lactation 305-days milk yield, milk yield per day of lactation, postpartum oestrus interval, service period and number of services per conception were 0.047, 0.226, -0.289, -0.261 and 0.035, respectively. Similarly, the regression coefficients were 0.430 ± 0.865, 0.008 ± 0.003, -0.582 ± 0.184, -0.765 ± 0.270 and 0.001 ± 0.004, respectively.

INTRODUCTION

The Sahiwal cattle are considered to be the best dairy animals in the tropics and subtropics due to their adaptability to varying climatic conditions and having resistance against various diseases. Although this breed in comparison to other local breeds produces good quantity of milk, yet the production is considerably low than certain well-defined cattle breeds of temperate region. The animals with low production are not only uneconomical but also show delayed first calving and longer calving interval, which shrinks the total productive life of the animals. This study was thus planned to determine the effect of weight at first calving on first lactation performance of Sahiwal cows.

MATERIALS AND METHODS

The breeding and milk yield records of Sahiwal cows kept at the Livestock Experiment Station, Khizarabad (district Sargodha) during the period 1980-1988 were used. The data on the following traits of 112 first calvers were collected:

1. Date of birth
2. Date of first calving
3. Weight at first calving
4. Date of service after first calving
5. Date of drying
6. Milk yield

The abnormal lactations followed by stillbirth, abortion and less than 180 days length were excluded from the study. Similarly, the records of the animals which were culled or died during lactation and those which were positive to Brucellosis/Tuberculosis or other diseases were also excluded. The effect of weight at first calving on first lactation 305-days milk yield, milk yield per day of lactation were studied.

The correlation coefficients between weight at first calving (x_1) and first lactation 305-days milk yield (y_1), milk yield per day of lactation (y_2), postpartum oestrus interval (y_3), service period (y_4) and number of services per conception (y_5) were worked out. The regression of the dependent variables y_1, y_2, y_3, y_4 and y_5 on x_1 independent variable was also worked out.

Table 1. Means of first lactation traits as per class intervals of weight at first calving

Number of records	Weight at first calving	Age at first calving (kg)	First lactation 305-days milk yield (kg)	Milk yield per day of lactation (days)	Postpartum oestrus interval (days)	Service period	Number of services per conception
8	Up to 300	44.87	1964.62	6.41	202.37	316.25	2.50
19	301-325	39.63	1973.15	6.62	176.89	230.84	2.00
36	326-350	39.86	1779.91	6.12	168.44	231.61	2.02
20	351-375	42.40	1961.70	6.72	180.45	240.75	2.35
17	376-400	41.12	1944.76	6.39	132.82	189.76	2.47
12	400 >	42.91	1897.16	7.07	102.41	141.58	1.91

RESULTS AND DISCUSSION

First lactation 305-days milk yield, milk yield per day of lactation, postpartum oestrus interval, service period and number of services per conception in relation to various intervals of weight at first calving are given in Table 1.

First lactation 305-days milk yield: First lactation 305-days milk yield did not show any specific trend with weight at first calving. The correlation coefficient between the two traits was 0.047, which was not significant. The regression of milk yield due to weight at first calving was 0.43 for each kg increase of weight at first calving (Table 3).

The results obtained in the present study pertaining to the effect of liveweight at first calving on milk yield were in close proximity with the findings of Koul *et al.* (1985) who analyzed data on 93 crossbreds with 50% Jersey blood and reported that the first lactation 305-days milk yield and weight at first calving averaged 1373 ± 57 and 264.5 ± 4.8 kg, respectively. The regression of the first lactation milk yield on weight at first calving was non-significant. Kerr *et al.* (1985) analyzed data on 78 Friesian heifers which calved at ages ranging from 21-43 months and body weight of 363-681 kg. The lactation milk yield was increased by 8.7 litres in the first lactation for each kg increase in body weight at first calving. A non-significant effect of weight at first calving on first lactation 305-days milk yield indicated that milk yield in the first lactation is not dependent upon the weight at first calving in Sahiwal heifers. The body weight over 325 kg at first calving is not going to add any dividend. Any effort to breed Sahiwal heifers around 225 kg would be much more economical and feasible for milk production.

Milk yield per day of lactation: The milk yield per day of lactation averaged 6.41 kg for cows having up to 300 kg weight at first

calving. The cows which calved for the first time having more than 400 kg weight yielded 7.07 kg of milk per day of lactation (Table 1). The correlation coefficient between two traits was 0.226 which was statistically significant. The milk yield per day of lactation increased significantly by -0.008 kg for each kg increase in weight at first calving (Table 3).

Table 2. Means and coefficients of variation of various first lactation performance traits

Traits	Number of observations	Mean ± S.E.	Range	C.V. (%)*
Weight at first calving (kg)	112	353.95 ± 3.84	280-540	11.50
First lactation milk yield (kg)	112	1896.03 ± 34.83	1028-2871	19.44
Milk yield per day of lactation (kg)	112	6.53 ± 0.12	4.0-10.5	19.61
Postpartum oestrus interval (days)	112	160.04 = 7.72	17-404	51.08
Service period (days)	112	216.86 ± 11.26	17-614	54.96
Number of services per conception	112	2.13 ± 0.15	1-9	74.23

*Coefficient of variation.

These results are supported by Patel *et al.* (1989) who studied the milk production efficiency (first lactation milk yield per kg body weight at first calving), daily milk production efficiency (daily milk yield per kg body weight at first calving), lactation milk yield and lactation length. Body weight at first calving averaged 352.11 ± 9.71 kg and 421.73 ± 7.41 kg. There were significant correlations of milk production efficiency with body weight at 24 months and at first calving (-0.38 and -0.32 respectively). The results suggested that increased body weight at first calving would result in higher daily milk yield per day of lactation. However, the 305-days milk yield is not significantly influenced by the weight at first calving. Therefore, any increase in weight at first calving for increased daily milk yield in heifers would impair the relative efficiency of milk production.

Postpartum oestrus interval: The postpartum oestrus interval decreased with increasing the weight at first calving (Table 1). The correlation coefficient between the two traits was -0.289 which was found to be significant. The postpartum oestrus interval decreased by -0.582 (regression coefficient) for each kg increase in weight at first calving (Table 3). This decrease was also found to be significant.

Service period: An overall declining trend in service period was noticed with increasing weight at first calving (Table 1). The correlation between the two traits was significant (-0.261). The reduction in service period for each kg increase in weight at first calving was significant (Table 3). A significant reduction in postpartum oestrus interval and service period suggested that attention should be given to weight of animal at breeding to improve the reproductive efficiency. This will shorten the calving interval which is reported to very large in Sahiwal cows.

Table 3. Correlation and regression coefficients of various first lactation traits with weight at first calving

Traits regressed	Number of records	Correlation coefficient	Regression coefficient	Regression equation
First lactation 305-days milk yield (kg)	112	0.047NS	0.430NS ± 0.865	Yi = 1743.75 + 0.430 Xi
Milk yield per day of lactation (kg)	112	0.226*	-0.008* ± 0.003	Yi = 3.45 + 0.008 Xi
Postpartum oestrus interval (days)	112	-0.289**	-0.582** ± 0.184	Yi = 365.87 - 0.583 Xi
Service period (days)	112	-0.261**	-0.765** ± 0.270	Yi = 487.67 - 0.765 Xi
Number of services per conception	112	-0.035NS	0.001NS ± 0.004	Yi = 1.65 + 0.001 Xi

* = Significant (P<0.05); ** = Significant (P<0.01); NS = Non-significant.

Number of services per conception: The weight at first calving did not seem to influence the number of services per conception (Table 3). The correlation between these traits was non-significant and was of the magnitude of 0.035. The regression of number of services per conception was 0.001 which was found to be non-significant (Table 3).

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