

PERFORMANCE OF SAHIWAL CATTLE AT NIKAWARETIYA FARM, SRI LANKA

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ABSTRACT

Studies were conducted to evaluate production capacity and reproduction parameters of Sahiwal cattle reared at the National Livestock Development Board farm, Nikaweratiya, Sri Lanka. Data on age at first calving, lactation length, dry period, total milk yield, calving interval, gestation length, lactation number, birth weight and calving to service period were collected during the period 1990 – 2001 and analyzed using the statistical package SAS 6.12. The estimated values of each character were compared with those reported by earlier workers in Sri Lanka and tropics. The estimated mean values for production traits total, milk yield, lactation length, dry period and birth weight were 1144 ± 533 kg/lac, 278 ± 65.6 days, 98 ± 59 days and 21 ± 2.5 kg, respectively. Mean values of reproductive traits, age at first calving, calving to service period, calving interval and gestation length were 41 ± 6.9 months, 117 ± 102 days, 380 ± 64.2 days and 279 ± 6 days, respectively. Milk yield was significantly influenced by month of calving, lactation length, age at first calving and year of calving. Lactation number, dry period and calving to service period were significant contributors to lactation length. Calving to service period significantly controlled the calving interval. However, birth weight was unaffected by calving to service period, age at first calving, lactation number, dry period, sex of calf as well as year and month of calving.

KEY WORDS: Calving interval, Lactation length, Milk yield, Sahiwal cattle.

INTRODUCTION

Since 1936, the government of Sri Lanka has taken positive steps to improve the livestock industry by establishing livestock farms throughout the country, importing cattle and buffalo to upgrade local stock through crossbreeding and multiplication to increase milk production. Studies on the performance of imported breeds under local conditions are necessary to improve the livestock industry.

The Department of Animal Production and Health imported Sahiwal cattle to Sri Lanka from Pakistan in 1989 under the Livestock Development Project of the Asian Development Bank (SL- ADBLDP). These animals were reared at Nikawaratiya Livestock farm in the Kurunegala district at an altitude of 35 m above mean sea level. This was done to improve milk and meat producing qualities of indigenous Lanka cattle by crossbreeding with the male Sahiwal. This study was conducted to study the performance of these animals and suggest ways of improving the existing production system in the farm.

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MATERIALS AND METHODS

Data collection

Data used in this study were obtained from the NLDB farm, Nikarawetiya, covering a period of 11 years (1990 to 2001). There were 75 milking cows and 71 dry cows. For this study, history sheets and records of cows having three or more lactations were selected. The required data on cow identity, bull identity, service date, calving date, lactation number, date of dry off, calf identity, birth weight of calf, sex of calf, lactation length, total milk yield and monthly milk yield were obtained from the history sheets and analyzed using MS Excel and SAS 6.12 packages. Calving interval, gestation length, dry period, calving to service period were computed from the calving, service and dry off dates. Age at first calving (AFC), gestation length (GL), calving interval (CI), calving to service period (CSP), lactation length (LL), dry period (DP), lactation number (LN), total milk yield (TMY) and birth weight (BW) were studied.

Analysis of data

The PROC ANOVA of SAS was used to analyse the data. The LS means of variables for different classes were obtained using the General Linear Model (GLM) procedure of SAS. Effects of year of calving (YOC), month of calving (MOC) and month of drying off (MOD) on various traits were studied. The main effects were first tested for interactions, and the nonsignificant interactions were dropped from the model.

The MOC was defined into four seasons as, season 1 (January to March), season 2 (April to June), season 3 (July to September) and season 4 (October to December). Lactation number was grouped into 2 subclasses, subclass 1 consisting of first 6 lactations and subclass 2 to include 6 - 9 lactations. Lactation length was grouped into 8 subclasses with subclass 1 covering an interval of 99 to 180 days, subclasses 2-7 covering an interval of 30 days with the lower limit of 181 days, and subclass 8 covering the period over 365 days to capture all lactation lengths in the data. Age at first calving was divided into 13 subclasses. The first four subclasses included the ages 23, 29, 31, and 32 months respectively. Balance data were grouped into 9 subclasses with an interval of 30 days starting from 33 months. The last subclass included the period over 63 months. Calving interval was grouped into 7 subclasses starting from the lower limit 300 days with an interval of 30 days upto 484 days and subclass 7 covered the rest of the period over 484 days. Year of calving was grouped into 2 subclasses with subclass 1 comprising the period from 1990 to 1995 and subclass 2 comprising the period 1996 to 2000. The year of drying off was grouped into subclasses similar to year of calving starting from 1991 to 2001.

RESULTS AND DISCUSSION

Unadjusted means, standard deviations and coefficient of variations for different traits studied are given in Table 1. Summary of analysis of variance is given in Table 2 and least squares means of milk yield for different fixed effects are summarized in Table 3.

Table 1. Descriptive statistics of different traits

Variable	N	Mean	SD	CV %
CSP (d)	155	117	102.7	87.4
AFC (mon)	281	41	6.9	16.9
CI (d)	220	380	64.2	16.9
GL (d)	280	279	6.2	2.2
LN	281	3	1.8	57.6
BW (kg)	242	21	2.5	11.9
LL (d)	234	278	65.6	23.5
DP (d)	234	98	59.8	60.6
TMY (l)	234	1144	533	46.6

CV- coefficient of variation, N- number of observations, SD- standard deviation

Table 2. Analysis of variance of different traits.

Source	Df	TMY	LL	CI	BW
CSP ⁽¹⁾	1	1.57 ^{ns}	4.54*	8.54**	0.70 ^{ns}
AFC	12	1.94*	1.79 ^{ns}	0.82 ^{ns}	1.25 ^{ns}
GL ⁽¹⁾	1	1.61 ^{ns}	0.46 ^{ns}	2.27 ^{ns}	-
LN	1	0.27 ^{ns}	5.94**	1.78 ^{ns}	0.24 ^{ns}
LL	7	15.52**	-	-	-
DP	8	-	3.22**	0.52 ^{ns}	1.26 ^{ns}
Sex	1	-	-	2.27 ^{ns}	0.13 ^{ns}
YOC	1	5.09*	3.40 ^{ns}	-	0.42 ^{ns}
MOC	3	3.87**	1.75 ^{ns}	0.72 ^{ns}	0.79 ^{ns}
MOD	3	-	-	0.79 ^{ns}	-

ns- non significant, *- significant at P<0.05, **- significant at P<0.01, ⁽¹⁾-included as co-variable.

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Table 3. Least square means for milk yield of different subclasses of LL, YOC, MOC and AFC.

Subclass	No of observations	LS means for milk yield (l/lac)	Subclass	No of observations	LS means for milk yield (L/lac)
LL			AFC		
1	25	502 ^{abc}	1	6	1404 ^a
2	9	732 ^{abcd}	2	9	1260 ^b
3	20	896 ^{bcd}	3	8	1159 ^c
4	36	1037 ^{bcd}	4	7	1356 ^d
5	52	1301 ^{ceh}	5	22	1202 ^e
6	49	1651 ^{fgh}	6	24	1521 ^{fgh}
7	24	1705 ^{fgh}	7	14	763 ^s
8	9	1916 ^{efgh}	8	67	1062 ^{hr}
YOC			9	35	1161 ⁱ
1	54	1873 ^a	10	30	1177 ^j
2	228	1044 ^b	11	23	1157 ^k
MOC			12	19	1301 ^l
1	57	1124 ^a	13	17	1304 ^m
2	31	1193 ^b			
3	89	1457 ^{cd}			
4	104	1095 ^{cd}			

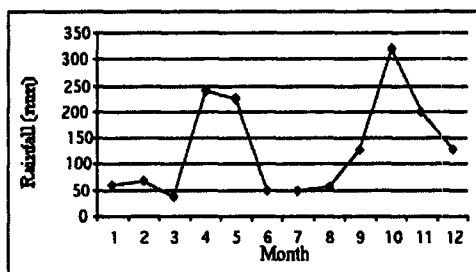


Fig. 1. Rainfall pattern at Nikawaretiya farm (1996-2000).

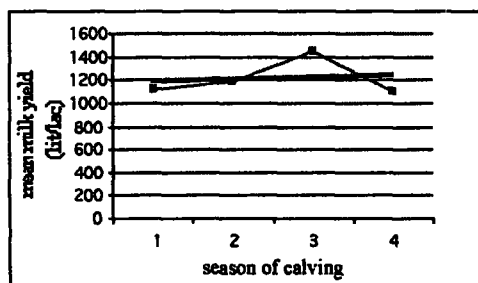


Fig. 2. Change in milk yield with season of calving.

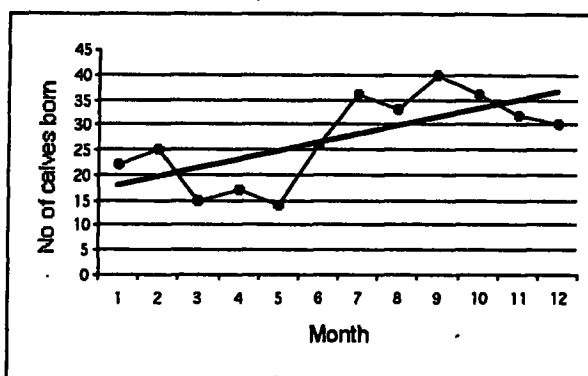


Fig. 3. Calving pattern with month of calving.

Milk yield

Mean milk yield was 1144 ± 533 kg per lactation (Table 1). This value is low when compared to the values of 1852 and 1360 kg reported by Abeyaratne (1995) and Jeyalingawathani (2000) respectively for other Sahiwal herds in Sri Lanka (NLDB Polonnaruwa). In India the mean milk yields are about 1698, 1602 and 1329 kg according to Venkatasubramaniyam *et al.* (1996), Basu *et al.* (1997) and Mudgal *et al.* (1995) respectively. The higher variation in milk yield as indicated by the coefficient of variation (46%) can be one of the causes for the low yield. Season of calving ($P < 0.01$), lactation length ($P < 0.01$), age at first calving ($P < 0.05$) and year of calving ($P < 0.05$) had significant influence on milk yield. However, milk yield was unaffected by lactation number. The significant reduction in milk yield from the year of calving, subclass 1 (1873 l/lac) to subclass 2 (1044 l/lac) may be attributed to deterioration in feeding, breeding, other management practices and also environmental changes.

Highest and lowest milk yields were obtained during seasons 3 and 4 respectively. Despite the low rainfall (Fig. 1) highest milk yield was obtained during season 3, probably due to more calving. The low value recorded during season 4 was probably due to the rains and poor quality and bulkiness of the grass available during the season. Cows with lactation length of over 365 days, gave highest milk yield of 1916 L/lac. Probably the seasonal variation in milk yield could have been minimized if measures were taken to conserve pasture and fodder when they were in surplus and supplement it with concentrated feeds when necessary.

Lactation length

Mean lactation length was 278 ± 65.6 days and was in agreement with the values of 272 and 297 days reported by Abeyaratne (1995) and Rifai (1987) respectively, in Sri Lanka, but was lower than the value (293 days) reported by Mudgal *et al.* (1995) in India. However, lactation length values obtained in the present study ranged from 99 to 422 days. It is possible that the cows were not allowed to dry off at the proper time and continued to milk for extended

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period. The shorter lactation length may be due to factors such as improper feeding regimes, inadequate dry period and prevalence of disease. Lactation length was significantly influenced by lactation number ($P<0.01$) dry period ($P<0.01$) and calving to service period ($P<0.05$). A higher mean value (198 days) was observed in subclass 1 (lactation number 1 to 6). Lactation length was not significantly influenced by age at first calving, gestation length, year of calving and month of calving.

Birth weight

Mean birth weight was 21 ± 2.5 kg and was not significantly influenced by CSP, AFC, sex, LN, DP, YOC and MOC. The value was low when compared to the value (23 kg) reported by Abeyaratne (1995) in Sri Lanka and by Jong (1996) in Pakistan. The birth weight values ranged from 13 to 27 kg and sex of calf had no significant effect on birth weight, probably due to poor management of pregnant cows.

Calving interval

Mean calving interval was 380 ± 64.2 days. Calving to service period significantly influenced calving interval. Factors such as AFC, GL, LN, DP, sex, MOC and MOD did not show any significant effect on calving interval. In general the mean value was lower than those of Jong (1996) in Pakistan, Bhuiyan (1997) in Bangladesh, Basu *et al.*, (1997), Mudgal *et al.*, (1995), Venkatasubramaniyam *et al.*, (1996) in India and Rifai (1987) in Sri Lanka, respectively. However, it was greater than the value reported by Jeyalingawathani (2000) in Sri Lanka. The calving interval of Sahiwal breeds at Nikawaratiya farm, lie within the optimum value (less than 13 months), reported by Kruif (1975). This indicates that heat detection, proper time of service to next calving, use of fertile bulls for natural service and the adoption of an ideal bull : cow ratio for natural service have been effective and artificial insemination has been efficiently done. Though the mean calving interval was 380 ± 64 days, in some animals it was 2 years. This may be due to various reasons such as over milking, fertility problems, heat stress, drought and under feeding. Cows with higher calving interval should be identified and measures taken to breed the animals on time so that their productivity could be increased. Abnormal cows that do not respond to treatment should be culled to increase farm profitability.

Age at first calving

Mean age at first calving (41 ± 6 month) was comparable to the values (35 to 41 months) reported elsewhere. In Sri Lanka a lower average value (26.5 month) was reported by Rifai (1987). In the present study the maximum age at first calving was 63 months. Age at first calving could have been reduced if proper calf rearing scheme and weight-monitoring system were adopted.

Dry period

The mean dry period was 98 ± 59 days. Venkatasubramaniyam *et al.* (1996) reports it to be 95 days, while Jong (1996) gives it as 45-60 days. The high value obtained in this study may be due to the inability to confirm pregnancy of the cows and not adopting proper milking and dry off schedules. Hence, dry cow management should be improved to shorten the dry period.

Calving to service period

The mean calving to service period was 117 ± 102 days, and this was greater than the value (68 days) reported by Basu *et al.* (1997) in India and lower than the value (213 days) reported by Rifai (1987). Proper postpartum cow management system could narrow down the present calving to service period and shorten the calving interval. Thereby ultimate production potential of the cow could be increased.

Gestation length

Mean gestation length was 279 ± 6 days, and was in agreement with the value (280 days) reported by Ellsemont and Ellis (1974) for zebu cattle.

CONCLUSION

Performance of Sahiwal cattle at Nikawaretiya farm, Sri Lanka is relatively low as far as total milk yield, dry period, lactation length, birth weight, calving to service period and age at first calving are concerned. Compared to cattle breed in other tropical countries, calving interval of Sahiwal cattle is shorter under local conditions, which is advantageous to the livestock industry.

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