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Original Research

Productive and Reproductive Performance Traits Associated with Sahiwal Cattle of Punjab

M. Singh[1]*, S. Kaur[2], M. P. Singh[1] and H. K. Verma[3]

[1]Veterinary Officer, Veterinary Polytechnic and Regional Research Training Centre, Kaljharani, Bathinda, Punjab, INDIA
[2]Animal Geneticist, Directorate of Livestock Farms, Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana, Punjab, INDIA
[3]Director of Extension Education, Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana, Punjab, INDIA

*Corresponding Author: mandeepsekhon1988@gmail.com

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Abstract

Preliminary data on Productive and Reproductive efficiency traits associated with Sahiwal Cattle maintained at Regional Research and Training Centre (RRTC), Kaljharani, Bathinda, Punjab, India, during period 2011 to 2016 revealed average values for productive traits i.e. 305 day Milk Yield (305 DMY; kg), Total Milk Yield (TMY; kg), Lactation Length (LL; days), Peak yield (PY; kg), Days to reach Peak Yield (DPY; days) and Dry Period (DP; days) as 1897.03±392.27, 1920.07±508.00, 270.71±64.32, 11.04±3.45 kg, 37.05±18.90 and 119.90±44.27, respectively. Fat and Solid-not-fat (SNF) percentage recorded was 4.25±0.81 and 8.16±0.19. Similarly, average values for reproductive traits i.e., Body Weight at birth (BWT; Kg), Age at Puberty (AP; days), Age at first Calving (AC; days), Service Period (FSP; days), Calving Interval (CI; days) and First Postpartum Heat Period (PPHP; days) were 24.50±2.89, 1139.30±420.28, 1444.79±305.56, 141.13±34.29, 449.74±110.45 and 73.29±17.34, respectively. Satisfactory feeding, breeding and genetic improvement strategies would result in improved performance in Sahiwal cattle of Punjab.

Keywords: Sahiwal, Lactation, Reproduction, Traits

Introduction

As per the 19th Indian Livestock Census, India has the 2nd largest cattle population (190.9 million) in the world accounting to be 37.27% of the total livestock population (GOI, 2012). According to this census, Sahiwal, Hariana, Rathi and Tharparkar are four cattle breeds available in Punjab. Of them, Sahiwal cattle is common with population accounting to be only 9.19% (0.042 million). Though Sahiwal breed is late maturing animal with short lactation length but is the best milch breed in the tropics including India (Khan and Mirza, 2014). This dairy breed is well endured for hot climate under tropics and subtropics, resistance to the various diseases, requires low cost of maintenance and has high feed conversion efficiency (Ilatsia *et al.,* 2012). In Indian subcontinent, majority of the cattle belong to a non-descript group known as desi cattle, still significant improvement in indigenous cow has been achieved through cross breeding with exotic breeds (Ilatsia *et al.,* 2012). Therefore, it is imperative to take necessary steps to increase the productivity in Sahiwal cattle of Punjab by promoting rearing, improving feeding and breeding in a scientific manner, undertaking genetic improvement programme for Sahiwal cattle breed and also upgrading nondescript cattle using semen of elite Sahiwal bulls (Rehman *et al.,* 2008).

The primary goal of dairy industry has been to identify an efficient and economical way of increasing milk production and its constituents without increasing the size of the dairy herd (Rachagani *et al.,* 2006). So, to show the overall efficiency, lactation milk yield and reproduction could prove to be the most important performance traits (Zafar *et al*., 2008) in Sahiwal cattle. The production and reproduction performance of cattle reared in Kaljharani research centre could be much better than the overall performance of local cattle breeds in Punjab. Estimation of various performance traits can help in developing models to predict future genetic abilities in Sahiwal cattle of Punjab. Keeping in view the above intricacies, present study was undertaken under the All India Coordinated Research Project on cattle to assess the various lactation production and reproductive performance traits in Sahiwal cattle maintained at an organized herd.

Materials and Methods

The study was conducted at Regional Research and Training Centre (RRTC), Kaljharani, Bathinda, Punjab (India) that lies between 30° 4' N latitude and 75° 5' E longitude. This centre has been established by Guru Angad Dev Veterinary and Animal Sciences University (GADVASU), Ludhiana, Punjab, India

Animals and Data Used

Data on lactation performance and reproduction records from purebred Sahiwal cattle (N=89) herd, was collected respectively from the record registers maintained by Veterinary Officers and one Livestock Assistant at Regional Research and Training Centre (RRTC), Kaljharani, Bathinda, Punjab (Table 1a and b). The record was produced during the period from 2011 to 2016. Seven Cattle that had exceptionally long lactation length and calving interval were not included in the study. The milking cows were entirely confined into the shed. The genotype used for Artificial Insemination was 13 pure Sahiwal cattle frozen semen transferred from National Dairy Research Institute (NDRI), Karnal, Haryana, India. The lactations affected by disease, resulting from premature deaths or abortions were excluded from the study.

Traits Considered

The data on lactation productive traits (milk yield, lactation length, peak yield, dry period) and reproduction traits (body weight at birth, age at puberty, age at first calving, service period and calving interval) were analyzed to estimate the performance of Sahiwal cattle at Kaljharani research centre of Punjab. Fat percentage and Solid not fat (S.N.F) were also estimated daily in these cattle but were analyzed collectively on monthly basis. Fat was estimated by use of Gerber Centrifugation technique (IS: 1224, Part 1-2009) and Automatic Milk Analyzer STV-1 and S.N.F content of milk by using lactometer (Sandhu, 2003) after applying formula:

$$S.N.F = \frac{CLR}{4} + (0.2 * \text{Fat } \%) + 0.29$$

Where CLR is Corrected Lactometer Reading

Feeding

All animals were kept under same environmental conditions with similar managemental practices. The climate corresponds to semi-arid with highest summer temperature of 49°C and average annual rainfall of 421 mm being highest in July-August-September months. About 12 acres of land was a source for seasonal fodder production at the centre. Green fodder along with wheat straw was supplied as a basal diet with water *ad libitum* during the period of observation. Silage was provided during the lean period (December to February) along with available green fodder. Concentrate mixture of rice polish, wheat bran, mustard oil cake, black gram, common salt etc. were given two times @ 2 kg per cattle in morning and afternoon per day. After seven months of pregnancy, they were kept in calving pen and were allowed 0.5 kg of concentrate feed in addition to the above-mentioned quantity.

Routine Heath Care

All animals were treated regularly for endo and ectoparasites at least after three months. Routine vaccination was done against Foot and Mouth disease, Hemorrhagic Septicemia and Brucellosis.

Statistical Analysis

Mean and Standard error for lactation production and reproductive traits in Sahiwal cattle were expressed as Mean ± SE. Statistical analysis was conducted by using IBM SPSS statistics 21.0 windows.

Results and Discussion

Production Efficiency Traits

After the retrospective analysis of pooled data extending over a period of five years, a total of 89 lactations from purebred Sahiwal cattle selected from Regional Research Training Centre, Kaljharani were used for determining the production performance. Mean ± S.E. data regarding production efficiency traits viz., 305-day milk yield, total milk yield, lactation length, peak yield, days to reach peak yield and dry period in Sahiwal cattle is depicted in Table 1 (a).

In the present study, 305-Day and total milk yield recorded was 1923.54±280.27 and 1985.07±420.00 kg, respectively. These findings were in accordance with previous studies (Bajwa *et al.,* 2004; Ilatsia *et al*., 2012; Dhawan *et al.,* 2015) those also revealed no definite trend for milk yield over periods. In contrast, a lower total milk yield of 1823.35 ± 51.76 kg was reported by Maurya and Saraswat (2002). The differences in the lactation milk yield observed may also be due to variations in the managemental practices and the prevalent climatic conditions (Ahmed *et al.,* 2015; Sinha *et al.,* 2017). More calvings during winter months and adequate availability of green fodder along with feeding silage, in the present study, could have resulted into higher total milk yield (Rehman and Khan, 2012). Lactation length is the most important trait that depicts for how long the animal can produce milk. On an average, cattle produced milk for 275.81±53.28 days (Table 1a) was similar to the findings of Ilatsia *et al*. (2012). Most of the data collected from cattle in their first lactation could be the reason for shorter lactation length. Moreover, lactation length of 275.81 days gives benefit by allowing the rest of about 60-65 days prior to carrying another pregnancy (Farooq *et al.,* 2010).

In the present study, mean Peak Yield in Sahiwal cattle was 12.04±4.55 kg in 40.05±28.70 days. However, lesser peak yield of 6.11 ± 0.62 kg at 55 days was reported by Chakravarthi *et al.* (2017). In the present study, the extended dry period of 98 days during previous lactation and improved feeding practices (Dhawan *et al.,* 2015) followed at the centre could have resulted in achieving greater peak yield at lesser number of days.

In the present work the mean value of dry period was 98.90 ± 34.30 days in Sahiwal cattle that was similar as documented by Rehman *et al.* (2006). In contrary, Javed *et al.* (2000) reported higher mean value of dry period (221.68 ± 5.20 days) in Sahiwal cattle as compared to our study. Thus, considering the biological limits and economics of the dairy farm, 98 days as an optimum dry period was set to improve the herd and wet average in the present study. Milk from Sahiwal cattle contained fat percentage of 4.25±0.81. This was much lower (5.10) as reported by Islam and Bhuiyan (1997). On the other hand, S.N.F was higher (8.16±0.19) in the present study as compared to only 7.8-7.9 by Islam and Bhuiyan (1997). This could be due to variation in sampling, different quality

of feed supplied and different stages of lactation.

Reproduction Efficiency Traits Associated with Sahiwal Cattle of Punjab

Mean ± S.E. data regarding reproduction efficiency traits viz., body weight at birth, age at puberty, age at first calving, service period, calving interval and post-partum heat period in 89 Sahiwal cattle is depicted in Table 1 (b). In the present study, average body weight at birth was recorded to be 24.50±2.89 kg. These findings were comparatively lesser than the values reported by Manoj *et al*. (2012) that could be primarily due to the managemental practices and feeding schedule followed in different regions of the country. The age at puberty in Sahiwal cattle recorded to be was 1139.30±420.28 days with overall age at first calving averaged 1444.79±305.56 days among herd of cattle in the present study. These findings were similar to previously reported (1292±48.46 days) in Pakistani Sahiwal cattle (Rehman *et al*., 2008). In contrary, smaller age at first calving (1112±58.41 days) for Sahiwal herd in Kenya was reported by Rege *et al.* (1992). Longer age at puberty and calving reflects Sahiwal as late maturing animal as compared to exotic breeds. However, reduction in age at calving and puberty may be achieved through better feeding, management, disease control and timely heat detection (Rege *et al.*, 1992).

The service period in Sahiwal cattle averaged 141.13±34.29 days. Maximum service period was 175 days in the present study similar to Rehman *et al*. (2008). In contrary, Farooq *et al.* (2010) observed smaller service period of 121 days due to more calvings of cattle in summer season during the study. However, in the present study, the longer service period was due to more calvings during winter season. The calving interval is defined as the period between two successive calvings. In the present study, it was found to be 449.74±110.45 days. It was similar as observed by Zafar *et al.* (2008); Rehman and Khan (2012). Though in the present study PPHP is equally normal (73.29±17.34 days), it is thus imperative for more heat detection aids at the farm. Calving interval must be decreased so as to produce more number of calves thus improving performance of Sahiwal cattle. Post-partum heat period after calving in most of the cattle was 73.29±17.34 days. In contrary, Islam and Bhuiyan (1997) reported longer PPHP of 120 days due to improper heat detection, nutrition and reproductive problems. In the present study, heat detection was proper by daily visit of Veterinary officer and Livestock Assistant-Inseminator. Moreover, lesser effects of environment and milk production on reproduction of Sahiwal cattle (Monalisa *et al*., 2010) resulted to smaller PPHP.

Table 1: Average values of various lactation production and reproductive traits in a herd of Sahiwal cattle

(a) Productive traits	Mean ± S.E. values	(b) Reproductive traits	Mean ± S.E. values
305-day milk yield (Kg) (n=89)	1923.54±280.27	Body weight at birth (Kg) (n=89)	24.50±2.89
Total milk yield (Kg) (n=89) **	1985.07±420.00	Age at puberty (Days) (n=89)	1139.30±420.28
Lactation length (Days) (n=82) *	275.81±53.28	Age at first calving (Days) (n=89)	1444.79±305.56
Peak yield (Kg) (n=89)	12.04±4.55	Service period (Days) (n=89)	141.13±34.29
Days to reach peak yield (n=89)	40.05±28.70	Calving interval (Days) (n=82) *	449.74±110.45
Dry period (Days) (n=89)	98.90 ± 34.30	Post-Partum heat period (Days) (n=89)	73.29±17.34

***Data collected from Total of 89 Sahiwal cattle reared at Regional Research Training Centre, Kaljharani, Bathinda; *7 cattle with long lactation length and calving interval were excluded from the study*

Conclusion

The Sahiwal cattle, being an excellent heat tolerant and tick-resistant breed, needs attention of the government, veterinarians and researchers to enhance its production through provision of veterinary health cover and better marketing facilities. In the present study, better feeding resulted in higher total milk yield, peak yield and days to reach peak yield but calving interval, lactation length, body weight and age at puberty needs to be improved yet. Emphasis should be given to select the animals on the basis of their genetic level and higher persistency of lactation (Javed *et al.*, 2004; Nisha *et al.*, 2017). Not just culling based on performance would be helpful, selection protocols and present seasonal effects also needs to be looked into.

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Conflict of Interests

There is no conflict of interest.

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