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Productive and Reproductive Performance of Indigenous Milch Cows under Different Herd Structure of Gaushalas

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ABSTRACT

Background: The present investigation was carried out to study the "productive and reproductive performance" of Indigenous Milch Cows reared under Gaushalas. This study describes productive and reproductive performance of milch cows through onsite observation and interviews with structured questionnaires of 30 (no.) Gaushalas randomly selected from 10 districts of Haryana.

Methods: The total 30 Gaushala in 10 districts of Haryana were studied, which were rearing more than 34,279 indigenous cows (mostly Hariana and Sahiwal cow). These Gaushalas were divided into three categories based on the total number of animals present in Gaushalas as small (100-500 animals), medium (501-1000 animals) and large size Gaushalas (>1000 animals). To assess the productive performance of the milch cows, milk yield per day (MY/D), lactation length (LL) and lactation yield (LY) were utilized as indicator traits. In addition, age at first calving (AFC), service period (SP), number of services per conception (NSPC) and calving interval (CI) were considered as an indicator of the reproductive performance traits.

Result: It was observed that the average milk yield per day and lactation yield in large size gaushala were significantly ($P<0.05$) higher than the medium size Gaushalas and small size Gaushalas. Large Gaushalas had a significantly higher lactation length ($P<0.05$) than small size Gaushala. The average service period, number of services per conception and calving interval in large size Gaushalas were significantly ($P<0.05$) lower as compared to small size Gaushalas. From the above finding, it could be concluded that the productive and reproductive performance were better in large size Gaushalas.

Key words: Calving interval, Gaushalas, Lactation yield, Productive performance, Reproductive performance, Service period.

INTRODUCTION

As per 20th (2019) Livestock Census, India possesses 192.49 million cattle population and about 80% of cattle belonging to indigenous and non-descript breeds are low yielders, cattle contribute 48.0 per cent (Basic Animal Husbandry Statistics, 2021-22) of the milk production to the national milk pool, out of which 20.0 per cent from indigenous/non-descript). The huge and various cattle population, diverse and constructive agro-ecology for dairying, increasing demand for dairy products in urban and peri-urban areas, long-standing customs of dairy products consumption and favorable policies are indicators of the importance and potential of dairying in the country. However, productivity of dairy animals in general is inadequate. About 80 per cent of the total cattle in the country are local breeds and nondescript and their production potential is very low. However, much more is yet to be done to boost the dairy industry in the country to attain self-sufficiency in dairy products. This could only be achieved through exploitation of full genetic potential of the existing dairy animal resources, for which it is essential to understand the productive and reproductive performance of the dairy breeds and their crossbred in the country. The productive and reproductive performance depends on composite parameters to assess overall performance analysis of farms (Islam *et al*., 2002). The parameters which are economically important for reproduction and productivity are age at first calving, total milk yield, average milk yield per day, calving to first service interval and calving interval (Rushdi, 2015). Similarly, Duguma (2020) reported that the most important parameters to measure the farm economy are calving interval, age at puberty and service per conception among which calving interval is considered as probably the best index of a cattle herds to measure reproductive efficiency. Biologically, potential for milk production also depends on age at puberty,

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early first calving, number of parity and shorter calving interval (Islam *et al*., 2002).

MATERIALS AND METHODS

Out of these 420 Gaushalas only 30 Gaushalas were selected (by stratified random sampling) from 10 district which represents 83 per cent of the total Gaushalas present in Haryana and these were Sirsa, Hisar, Fatehabad, Bhiwani, Jind, Sonipat, Kurukshetra, Karnal, Kaithal and Panipat. These 30 Gaushalas were divided into three groups on the basis of number of animals present in Gaushala, the animal numbers range from 100-500 were categorize as small size Gaushala (n=10), while 501-1000 animals and >1000 animals are categorized as medium (n=10) and large size Gaushala (n=10) respectively. The data were collected from 34,279 animals (12.43%) represent as indigenous milch cow mostly Hariana and Sahiwal cow, in 30 Gaushalas from 10 districts during April, 2017 to February, 2018 through interview using a structural questionnaire and onsite observation on the productive and reproductive performance parameters, *i.e*. milk yield per day (kg), lactation length (days) and lactation yield (Liters), age at first calving (months), service period (days), services per conception (no.) and calving interval (days).

The details on the production performance were recorded by observation and information from head of the Gaushalas and available herd data book. The productive performance was assessed by average daily milk yield, lactation length and lactation yield. The average daily milk yield recording was carried out on the day of visit in the selected Gaushalas. All milch cows were apparently healthy and their feeding practices differed for small, medium and large size Gaushalas (Chandra *et al*., 2022). The milk recording was done in the morning and evening. Information on milk yield and lactation length was collected from the head of the Gaushalas and available herd data book.

The reproductive performance parameters were assessed by the age at first calving (months), service period (days), services per conception (no.) and calving interval (days). Age at first calving, service period, services per conception and calving interval were recorded based on available records and information provided by the veterinary doctor in the Gaushalas.

The collected data were scored, compiled, tabulated using Microsoft Excel, 2010 and the data were subjected to analysis of variance (ANOVA) and comparison between treatment groups was made by Tukey 'test using SPSS 22 (SPSS version 22, SPSS Inc. Chicago, Illinois) as per procedure described by Snedecor and Cochran (1994).

RESULTS AND DISCUSSION

Milk yield per day

The data on average daily milk yields (kg) of milch cows at small, medium and large Gaushalas is presented in Table 1. The average daily milk yield in large Gaushalas was significantly (P<0.05) higher than the average daily milk yields in small and medium size Gaushalas and there was no significant difference (P<0.05) in average daily milk yield production between the small and medium size Gaushalas. The difference in average daily milk yield among small, medium and large size Gaushalas may be attributed to the difference in management practices followed and feeds and fodders (Chandra *et al*., 2022) offered to the milch cows in these Gaushalas. The findings of the present study are in general agreement with the findings of Kumar *et al*. (2005) who reported the average milk production per day of indigenous cattle in Gaushalas. Similar results were also reported by M' hamdi *et al*. (2012), the milk production varies as per feeding practices, milking system, health programs, breeding system and management. Verkerk and Hemsworth (2010) reported that this significantly increases milk production with increasing herd-size.

Lactation length

Data pertaining to the present study of the lactation length for milch cows at small, medium and large size Gaushalas is presented in Table 1. The lactation length of large size Gaushalas was significantly (P<0.05) greater than that of small size Gaushalas and no significant difference (P<0.05) was observed between the small and medium size Gaushalas and in the medium and large size Gaushalas.

Higher average lactation duration among large size Gaushalas was attributed to the best feeding (Chandra *et al*., 2022) and management practices compared to small size Gaushalas. Finding of lactation length in this study was in general agreement with the findings of Khanna *et al. (*1979) reported in Hariana and Sahiwal cow. Lactation length was mainly influenced by the parity of lactation. Singh *et al.* (2011) has reported the positive correlation between the parity of lactation and lactation length.

Lactation yield

The lactation milk yield of the dairy animals has positive correlation with the overall performances of an animal. It is conceptualized as the average total quantity of milk produced by an animal in its lactation period. The data on lactation yield for milch cows at small, medium and large size Gaushalas is presented in Table 1. The average

Table 1: Means (±SE) of productive parameters of cattle in different sized Gaushalas.

Parameters	Size of Gaushalas			
	Small	Medium	Large	Overall
Milk yield/day(kg)	2.88^{b}±0.40	3.17^{b}±0.29	4.17^{a}±0.27	3.41±0.32
Lactation length (day)	222^{b}±10	243^{ab}±12	258^{a}±13	241±12
Lactation yield (kg)	684.33^{b}±79	771.22^{b}±99	1034.67^{a}±68	830.07±82

Means bearing different superscript in a row differ significantly P<0.05.

lactation yield in large size Gaushalas was found to be substantially higher (P<0.05) than the average lactation yield in small and medium size Gaushalas and no significant difference (P<0.05) was observed between small and medium size Gaushalas. Higher lactation length in large sized Gaushalas was attributed to the better feeding of green fodder and concentrate mixture and better genetic makeup of animals. *i.e* the better breeding management. The findings of the present study are in general agreement with the findings of a study conducted by the ICAR through Network Project (1999) on Deoni cattle.

Reproductive performance

Age at first calving

The data on average age at first calving (AFC) at small, medium and large size Gaushalas is presented in Table 2. There was no significant (P<0.05) difference observed in the average AFC among small, medium and large size Gaushalas. The findings of the present study were found contrary to the findings of Mathur and Chahal (1997) and Koul (1987) they had reported in Hariana cow. AFC is the reflection of the feeding and management strategy of that farm and also depends on the management of heifer replacement (Enevoldsen *et al*., 1996). AFC mainly depends on the nutrition which is offered from birth to calving, apart from that the management practices *i.e*., housing system, estrus detection, insemination by natural service or by AI and quality of bull or semen use in AI *etc*. It has been reported that in many studies the proper nutrition and feeding management plays a major role for attaining early puberty and age at puberty can be reduced by adequate and balance feeding (Bhatti *et al*., 2007; Ciccioli, *et al*., 2005; Shiferaw *et al*., 2003; Chaudhry *et al*., 1988).

Service period

The data on average service period at selected small, medium and large size Gaushalas is presented in Table 2. The average service period in large size Gaushalas was found significantly (P<0.01) lower than the average service period in small size Gaushalas and there was no significant (P<0.05) difference observed between the average service period in small and medium size Gaushalas, as well as medium and large size Gaushalas. Results of the present study are in line with the earlier finding reported by Soof and Singh (1970) in Hariana cattle. Significantly (P<0.05) higher service period at small size Gaushalas indicated poor reproductive efficiency, attributed to suboptimal [H1] management like concentrate feed, green fodder and poor microclimatic protection measures. Good management practices and proper estrus (heat) detection may improve the reproductive efficiency of milch cows (Laben *et al*., 1982). Service period of animals may be influence by management factor like sensitivity and specificity of estrus detection, voluntary waiting period, semen storage and deposition of semen in the uterine tract of estrus cows (Westwood *et al*., 2000).

Services per conception

The data on average number of services per conception at small, medium and size large Gaushalas is presented in Table 2. The average number of services per conception in large size Gaushalas was found significantly (P<0.05) lower than the average number of services per conception in small size Gaushalas and no significant difference (P<0.05) was observed between the average number of services per conception in small and medium size Gaushalas, as well as medium and large size Gaushalas. Contrary finding had been reported by Islam *et al*. (2002) in Sahiwal cow, it was higher than the present finding. Variation in the number of services per conception among small, medium and large size Gaushalas were may be attributed to the better feeding of green fodder and concentrate mixture and better breeding *i.e*., breeding with natural mating by selected bull. The higher number of services per conception in small size Gaushalas (breeding of estrus cows with non-selected bulls or any available bulls *i.e*., 70.00%) which indicate the suboptimal management of the milch cows. Kumar *et al*. (2014) reported that the number of services per conception is influenced by availability of feed and fodders and environmental temperature.

Calving interval

The data on average calving interval at selected small, medium and large size Gaushalas is presented in Table 2. It was found that the average calving interval in large size Gaushalas was significantly (P<0.05) lower than the average calving interval in small size Gaushalas and no significant difference (P<0.05) was observed between the small and medium sized Gaushalas, nor between medium and large sized Gaushalas. The average calving interval results are in line with Singh and Nivsarkar (1998) for Hariana cows. According to Allendorf and Wettemann (2015) longer calving interval may be a matter of careless heat monitoring or poor fertility management.

Table 2: Means (±SE) of reproductive parameters of cattle in different sized Gaushalas.

Parameters	Size of Gaushalas			
	Small	Medium	Large	Overall
Age at first calving (months)	38.80±1.44	37.50±1.35	36.20±1.41	37.50±1.40
Service period (days)	166.00^{Cb}±9.54	156.50^{Ab}±12.07	135.50^{A}±6.08	152.67±9.23
Services per conception	2.80^{b}±0.25	2.40^{ab}±0.27	2.10^{a}±0.18	2.43±0.23
Calving interval (days)	455^{b}±18.55	442^{ab}±15.36	420^{a}±9.00	439±14.30

Means bearing different superscript in a row differ significantly P<0.05 (small letter), P<0.01 (capital letter).

CONCLUSION

Large size Gaushalas showed better reproductive and productive performance as compared to small and medium size of Gaushalas in terms of service period, number of service per conception, calving interval, lactation yield as well as average daily milk production. The changes in the management practices, such as in breeding, feeding and health care affect the productive and reproductive parameters in all the three types of Gaushalas.

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Conflict of interest

None of the authors have any conflict of interest.

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