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Productive and Reproductive Performance of Holstein-Friesian Cows under Farmer's Management in Hossana Town, Ethiopia

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ABSTRACT

The study was conducted on 154 Holstein-Friesian (HF) cows maintained under farmer's managemental system in Hossana city (Ethiopia). A total of 80 HF owners were randomly selected and interviewed with structured questionnaire to assess the productive and reproductive performance of Holstein-Friesian cows. The results of the study showed that the mean milk yield/day/cow was 8.38±0.47 L, lactation length was 252.25±5.31 days, peak yield was 11.39±0.58 L and lactation milk yield was 2149.19±143.80 L, number of services per conception was 1.8±0.09, age at first calving was 36.48±0.55 month, calving to first service interval was 212.70±18.12 days and calving interval was 462.87±19.48 days for HF cows. The constraints of dairy production in the study areas including feed shortage (1st), high feed cost (2nd), disease (3rd), scarce information about feeding (4th), high medicament cost (5th), scarcity of timely veterinary services (6th), lack of capital (7th), low price of milk (8th), heat detection (9th) and inefficient AI services (10th) were found to be the top challenges for dairy practice in the area. Therefore, strategies designed to solve the existing problem should be important by involving all stakeholders in the formulation and implementation of improvement strategies.

Key words: Holstein-Friesian, Hossana city, productive, reproductive performances

INTRODUCTION

Ethiopia is believed to have the largest livestock population in Africa. This livestock sector has been contributing considerable portion to the economy of the country and still promising to rally round the economic development of the country. The total cattle population for the country is estimated to be about 53.99 million. Out of this total cattle population, the female cattle constitute about 55.48% and the remaining 44.52% are male cattle (CSA., 2013). On the other hand, the results obtained indicated that 98.95% of the total cattle in the country are local breeds. The remaining are hybrid and exotic breeds that accounted for about 0.94 and 0.11%, respectively (CSA., 2013).

Recent decades have seen a rapid increase in the demand for milk throughout the world, particularly in developing countries and the demand has been met by increased production (Ranawana, 2008). The annual per capita consumption of milk in the developed countries (200 kg or more) is much higher than in developing countries (average 40 kg) (Ranawana, 2008). Per capita/year milk consumption in the country is about 16 kg year^{-1}, which is much lower than African and world per capita average.

The reproductive performance of the breeding female is probably the single most important factor that is a prerequisite for sustainable dairy production system and influencing the productivity (Kiwuwa *et al*., 1983). The size of the calf crop is all important for herd replacement

and the production of milk depends on heavily on the cow reproductive activity (Kiwuwa *et al*., 1983). Age at first puberty is an important determinant of reproductive efficiency (Mukasa-Mugerwa, 1989). Productive and reproductive traits are crucial factors determining the profitability of dairy production (Lobago *et al*., 2007). The performance of dairy animals is also affected by many environmental factors. These environmental factors may suppress the animal's true genetic ability and create a bias in the selection of animals (Lateef *et al*., 2008). The success of dairy production in general and crossbreeding programmes in particular needs to be monitored regularly by assessing the productive and reproductive performance under the existing management system. However, information is limited about the productive and reproductive performance of dairy cows in small holder urban and peri-urban dairy farms in the tropics, particularly in Ethiopia (Lobago *et al*., 2007). The periodical evaluation of factors affecting productivity of animals is very important for future planning and managemental strategies to develop the sector. The purpose of the present study was to determine the reproductive and productive performance of Holstein Friesian cow and constraint affecting these traits under farmer management system in Hossana town, Hadiya zone of Ethiopia.

MATERIALS AND METHODS

Description of the study area: The study was conducted in Hossana city that is located, at a distance of 232 km from Addis Ababa capital city and 212 km from Hawassa regional city. Regarding the climate of the city, the area receives an average annual temperature and rainfall ranges from 15.1-20°C and 1001-1200 mm, respectively.

Sampling techniques: A total of 80 farmers were interviewed randomly with scheduled questionnaire which was mainly based on the productive and reproductive performance of HF cows. A total of 154 Holstein-Friesians (HF) cows were included in this study were maintained under farmer's management system, located in Hossana city (Ethiopia). The questionnaire was developed in accordance with the objectives of the study and designed in a simple manner to get accurate information from the dairy owners. Each respondent was given a brief description about the nature and purpose of the study and the responses were recorded directly on the survey schedule.

Data collection: Data was collected like average milk production/day/cow, Lactation Length (LL), peak milk yield and Lactation Milk Yield (LMY) as productive performance and Number of Services per Conception (NSC), Age at First Calving (AFC), Calving to First Service Interval (CFSI) and Calving Interval (CI) as measures of reproductive performance.

Statistical analysis: All collected data were entered into Microsoft Excel 2007 and descriptive statistics such as mean, frequency and percentage were used to analyze the data using SPSS software for statistical analysis (version 20.0 Armonk, NY. IBM corp.).

RESULTS AND DISCUSSION

Socio-economic characteristics of respondents: The general characteristics associated with households respondents were distributed by sex, age, marital status, experience in dairy keeping and educational status was presented in Table 1. From the total interviewed respondents (N = 80), the majority of the (73.8%) respondents were male while the remaining (26.2%) were female. The majority age of the respondents in the study area ranges between 30-45 years (53.8%). This result

showed that people in the most productive age are actively engaged in dairy activities. Of the total households interviewed, 92.5% are married. Concerning to level of education, the highest percentage (31.1%) of the respondents had diploma and above 15% of those respondents had not attended any formal or informal education. A 46.2% of the respondents had 4-7 years experience in dairy keeping.

Productive performance: Descriptive statistics of different productive and reproductive traits of Holstein Friesian cow are summarized in Table 2.

Milk yield and peak production: The mean milk yield and peak milk yield in the present study was found to be 8.38±0.47 and 11.39±0.58 L per cow days, respectively (Table 2). The mean milk yield in the present study is in accordance with the findings of Kebede (2009) and who reported that the average daily milk production of crossbred cows was 8 L in Ethiopia. The mean peak yield in the present study was more or less in accordance with 12.30±0.16 kg and 12.15±0.82 L in HF crossbred dairy cows maintained under farmers' management system as reported by Kumar *et al*.

Table 1: Characteristics of the sample households

Category and variables	Frequency	Percent
Sex		
Male	59	73.8
Female	21	26.2
Age (years)		
<30	9	11.2
30-45	43	53.8
46-60	23	28.8
>60	5	6.2
Marital status		
Married	74	92.5
Single	5	6.2
Widowed	1	1.2
Educational level		
None	12	15.0
Basic education	2	2.5
Primary education	24	30.0
Secondary education	17	21.2
Diploma and above	25	31.2
No. of cow/HH		
<3	61	76.2
3-5	19	23.8
Experience in dairy keeping		
1-3	7	8.8
4-7	37	46.2
8-11	20	25.0
>12	16	20.0

HH: Household

Table 2: Productive and reproductive performance of HF cows under farmer management in Hossana city

Variables	Mean±SE	Minimum	Maximum
Milk production/day/cow (L)	8.38±0.47	2	27
Lactation length (day)	252.25±5.31	150	380
Peak milk yield (L)	11.39±0.58	3	27
Lactation milk yield (L)	2149.19±143.8	420	6300
Calving interval (day)	462.87±19.48	240	1080
Age at first service (day)	212.70±18.12	40	540
Age at first calving (month)	36.48±0.55	28	48
Service per conception	1.80±0.09	1	5

(2014) in India and Ethiopia respectively. Most cows achieve peak milk 45-90 days in milk and slowly lose production over time until dry-off. In this study, the main reasons for low daily milk production as indicated by the respondents were shortage of feed and the interaction of poor health and management. Variation in milk production is mainly due to genetic and various non genetic causes (Kumar *et al*., 2014).

Lactation Milk Yield (LMY): The mean LMY in the present study was found to be 2149.19 L (Table 2). The mean lactation milk yield observed in the present study is lower than the mean of 3710 L for crossbred cows in Ethiopia reported by Tadesse *et al*. (2010), 5519 L reported by Kollalpitiya *et al*. (2012) in Sri Lanka, 2772.76 L reported by Sattar *et al*. (2005) for Holstein Friesian cows in India, 5152 kg reported by Jairath *et al*. (1995) for HF cow in Canada and 5905 kg/cow in Tunisian HF cow Ajili *et al*. (2007). These lower LMY of HF cows in the present study might be indicative of poor adaptation of this exotic breed to climatic and management condition in the study area.

Lactation Length (LL): The mean LL in the present study was found to be 252.25±5.31 days (Table 2). The mean LL in this study was smaller than the mean value of 344 days in India, 291.86±6.55 days in Pakistan and 333.9 days for crossbred cows in North Showa zone, Ethiopia reported by Juneja *et al*. (1991), Sattar *et al*. (2005) and Ayalew and Asefa (2013) respectively for Holstein Friesian cows. The lactation length in the present study shorter than the optimum value of 305 days required to maintain the optimum calving interval of 12-13 months. The shorter lactation length may be due to factors such as improper feeding regimes, inadequate dry period and prevalence of diseases.

Calving to First Service Interval (CFSI) or age at first service: The mean CFSI of 187.05±13.61 days obtained in this study is higher than the values of 115±1.7, 111, 142, 170, 90.22±55.21 and 84±23 days for Holstein Friesian cows in Ethiopia, Turkey, Tanzania, Tunisian and Sri Lanka respectively as reported by Tadesse *et al*. (2010), Cilek (2009), Shiferaw *et al*. (2003), Asimwe and Kifaro (2007), Ajili *et al*. (2007) and Kollalpitiya *et al*. (2012) respectively. Similarly, the result obtained from the present study was higher than the optimum (idea) value of 60-90 days (Berry *et al*., 2003) this could be attributed to different factors. Most researchers suggest that the reason for the delay in interval to first service is greater negative energy balance in modern dairy cows. Negative energy balance delays the continuation of ovarian activity.

Service Per Conception (SPC): In this study the average service per conception was 1.8±0.0.09. The present result is in agreement with services per conception (1.81±1) reported by Tadesse *et al*. (2010) for Friesian cattle in Ethiopia. The mean services per conception obtained in this study was lower than services per conception of 2.0 reported in Holstein Friesian dairy cattle in Nigeria by Ngodigha *et al*. (2009) and 2.5 for Holstein Friesian in Iran Ansari-Lari *et al*. (2010) and higher than the results reported by Lobago *et al*. (2007), 1.6 for crossbred cows in the highlands of Ethiopia. The differences might be attributed to differences in management practices of the respective areas. Appropriate and in time heat detection and insemination could be attributed to lower or higher number of service of per conception Yifat *et al*. (2009). The findings of the present study on services per conception suggested comparatively better insemination services at the herds during the period of the study.

Age at First Calving (AFC): In the present study the Average age at First Calving (AFC) was 36.48±0.55 months, which is shorter than AFC of 43.03, 43, 40.44, 42.16 and 39.2 months reported by Chandrasiri *et al*. (2007), Weerasinghe *et al*. (2008) in Sri Lanka, Tassew and Seifu (2009), Fekadu *et al*. (2011) and Tadesse *et al*. (2010) in Ethiopia, respectively and higher than the value 33.27 and 29.28 months reported by Kollalpitiya *et al*. (2012) and Ajili *et al*. (2007) in Sri Lanka and Tunisian Holstein-Friesian cows respectively. The age at first calving in the present study is above the standard interval of 2 years expected in a well managed cross breed cattle. The long-lasting AFC of HF cows in present study might be attributed to factors such as poor nutrition and management practices at the time of mating the heifers.

Calving Interval (CI): The mean Calving Interval (CI) of 462.87±19.48 days obtained in this study is similar to the value (460±99 days) reported by Herath *et al*. (2002) in Sri Lanka. The mean calving interval observed in the present study was lower than the findings of previous studies reported by Fekadu *et al*. (2011), 561.3±18.9 for crossbred cows in different regions of Ethiopia. However, longer than the results reported by Ansari-Lari *et al*. (2010) of 403±86 days in Iran for Holstein dairy cows and 421 days obtained by Moges and Baars (1998) in Holstein Frisian breed in Ethiopia under research station. The calving interval in the present study is above the standard interval of 365 days expected in a well managed farm. This longer calving interval might be related to environmental factors, mismanagement practices like poor housing, poor nutrition or failure to detect heat by the farmer.

Constraints of dairy production in the study area: Each respondents involved in the study was requested to prioritize the challenges of dairy practice. Accordingly, the most important constraints of dairy production in the study areas were feed shortage (1st), high feed cost (2nd), disease (3rd), scarce information about feeding (4th), high medicament cost (5th), scarcity of timely veterinary services (6th), lack of capital (7th), low price of milk (8th), heat detection (9th) and inefficient AI services (10th) were found to be the top challenges for dairy practice in the area (Table 3). The present study was comparable with the findings of Sintayehu *et al*. (2008) who reported that the availability and costs of feeds were noted as major constraints in Shashemene-Dilla area, South Ethiopia. Inadequate animal feed resources as one of the important challenges of Ethiopian dairy sector was also reported by Yilma *et al*. (2011). In addition to the above problem the farmers also face other constraint that is shortage of space to remove dairy manure.

Table 3: Constraints of dairy farming in the study area

Constraints	No. of HH	HH (%)	Rank
Feed shortage	40	50.0	1
High feed cost	30	37.5	2
Scarce information about feeding	14	17.5	4
Disease	18	22.5	3
High medicament cost	14	17.5	5
Scarcity of timely veterinary services	15	18.8	6
Lack of capital	14	17.2	7
Inefficient AI services	22	27.5	10
Low price of milk	16	20.0	8
Heat detection	20	25.0	9

HH: Household

CONCLUSION

The present study showed that Lactation Length (LL), Lactation Milk Yield (LMY), Calving to First Service Interval (CFSI) and Calving Interval (CI) was below the standard. However, the number of service per conception is within the normal that expected from commercial dairy herd. Shortages as well as high cost of feed, occurrence of disease, scarce information about feeding and high medicament cost were the main constraints which might have contributed considerably to delayed age at first service, late age at first calving, long calving interval, short lactation length and low milk production. Therefore, strategies designed to solve the existing problem should be important by involving all stakeholders in the formulation and implementation of improvement strategies.

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