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Cross Breeding Effect on the Performance of Indigenous Cattle: Challenges and Opportunities

Addis Getu*, Goshu Biru and Derb Arbse

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Department of Animal Production and Extension, Faculty of Veterinary Medicine, University of Gondar, Ethiopia.

ABSTRACT

This cross sectional study was conducted from February 2014 to April 2014. The aim of the study was to evaluate productivity and reproductive performance and identify challenges and opportunities of crossed bred dairy cow in Gondar town, Amhara regional state, Ethiopia. A total of 54 small-scale dairy farm owners were randomly selected using semi-structure questionnaire to obtain information on the productive and reproductive performance of cross dairy cows. Mean daily milk yields for the first, second and third stage of lactations were 7.01±2.73, 5.5± 2.83 and 3.50±1.64 liters per cow per day, respectively. The study indicated that milk yield was lower in the third stage of lactation than that of first and second stage of lactation. Data reveled from the interviewed respondents' stated that mean milk yield per day/cow as well as per lactation /cow was 5.35±1.23 and 2042.11 litres, respectively. The overall average lactation length was about 11.5 months. The mean age at first service and first calving, days open till conception, calving interval and number of services per conception were 24.5 months and, 3 years, 4 month, 21.5 months and 3, respectively. The respondents reported that age at first calving was affected by shortage of feed (37%), feeding and disease (35.2%) and the season (27.2%). The main constraints which were frequently mentioned by the respondents were shortage of feed, (68.5%) and interaction of nutrition, health, housing and management level (31.5) were major problems affecting milk production. The present study showed that productivity and reproductive performance of crossbred cows owned by small-scale dairy producers in Gondar town was low. Thus, there is a need to improve feed supply, health care and services, access to artificial insemination, proper breeding management and supply of improved genotypes in order to improve the performance of dairy cows in the study area.

Key words: Cross Breeding, Productive and Reproductive Performance, Gondar Ethiopia.

*Corresponding author. E-mail: addisgetu2002@yahoo.com.

INTRODUCTION

Ethiopia is the largest in cattle population in Africa. From the total livestock species cattle includes oxen, cows, calves and heifers. Such cattle species play important socio-economic role by generating additional cash income and religious and cultural value. Due to this effect, almost all rural and many peri-urban people keep small herd grazing cattle. In Ethiopia the livestock population was estimated about 22 million goats, 25 million sheep and 52.13 million heads of cattle (which contributes 40% to the annual agricultural output and

15% total gross domestic product) (CSA, 2012). Such cattle population produced a total of 1.5 million tons of milk and 0.331 million tons of meat annually (FAO, 2005). Although, the livestock sector has a significant contribution to the national economy by resistance to drought, disease, parasite, poor quality feed and local environment production per animal is extremely poor. Whereas disease, drought or shortage of feed, scarcity of water, climatic constraints, poor market structure, wasteful production practice, inappropriate breed usage (local breed) are other different constraints (Damron, 2006). Therefore they are under estimated, neglected and little attention was given to put them from research and developmental agenda. Aynalem et al. (2009) reported that the average lactation milk productions of the indigenous cows were ranged from 494 to 850 kg under optimum management level. Thus the above report indicated that the performance of the local breeds was poor when comparing to cross and exotic breeds. To meet the ever-increasing demand for milk, milk products and their contribution to economic growth, genetic improvement through crossing of the indigenous cattle has been proposed as one of the options (Aynalem et al., 2009). Genetic improvement of the indigenous cattle, basically focusing on crossbreeding has been practiced for the last five decades. Therefore, the present study was focused on the productive and reproductive performance of crossbreeding cattle. Since the livestock sector plays vital role in the national economy of country of the Ethiopia like food supply through provision of meat, milk and blood (CSA, 2012). In addition to this, they are the sources of income, accumulating capital, fulfilling cultural obligation, manure, investment and foreign currency.

Further many impotencies were reported in tropical countries that livestock production is the main sources of draught power; provide fertilization for crop production and means of transportation (CSA, 2012). The main objective of cross breeding of high performing cattle breeds with tropical breeds is to produce crossbreeds with an expected additive genetic merit being the mean of both parental breeds (King, 2000). In Ethiopia, cross breeding of indigenous breeds with the commonly used exotic dairy breeds was started in 1974 by the Institute of Agricultural Research (IAR). Through the establishment of an on-station dairy cattle cross breeding program, Friesian, jersey and Simmental sire that were crossed with the local Horro, Boran, and Barca dams with the aim of testing the productivity of cross breed dairy cow with different levels of exotic blood. According to Cunningham (1987) the cross between the temperate dairy cattle breeds and local cattle in the tropics combined the milk producing ability of the tropical breeds were increased. However, some of the results presented on the above were reported from the selected parts of the country might not reflect the actual effect of crossed breeding in Gondar town. Therefore, the present study was conducted to identify and evaluate the effect of cross breeding, challenges and opportunities of the cross breeding dairy cattle in Gondar town.

MATERIALS AND METHODS

Description of the Study Area

The study was conducted at Gondar town from February 2014 to April 2014. The study area is located 727 km North West of Addis Ababa and 35^0 7' N and 13^0 8' E and lies at an altitude of 2200 m within the mean annual rain fall of 1172 mm and average temperature of 18.7 -20.7 ^{o}C (CSA, 2012). North Gondar is one of the 11 Administrative Zones of Amhara National regional state with total area coverage of 5, 317,630 hectares and having a total population of 2,088,884 with 88.3 % and 11. 3% live in rural and urban areas, respectively. In cattle population North Gondar zone was ranked first from the other zones of the Amhara regional state (CSA, 2012). The same source indicated as the number of cattle in North Gondar town was estimated about 5, 200 heads. The cows are managed under semi-intensive management system and they have feeding trough in the house and sometimes especially at the time of milking the cows moves in to grazing places. The cows are fed separately in the trough to reduce computation among them. The feed in which the animal fed include natural pasture (cut and carry), hay, and Dashen beer by product, straw, oil cake and sometimes grazing pasture. The cows are hand milked twice per day . Animals are watered from pipe twice per day. Both natural mating and AI breeding systems are used for insemination of cows. There is no regular vaccination and spray (dipping) but farmers take their animal for treatment whenever disease occurs.

Sampling Procedure

Systematic simple random sampling technique was used to select interviewed farmers. A total of 54 dairy farms, small holder farmers, were randomly selected after simple systematic selection of dairy farm holders from the small scale dairy farm participants located at Gondar town.

Types of Data and Collection Methods

Types of Data

From the present investigation both qualitative and quantitative data were considered. Qualitative data

Table 1. Mean production and reproductive performance of crossbred dairy cows.

No	Variables			
1	Stage of lactation (Parity)	Morning mean milk yield ±SD (L)	Evening mean milk yield ±SD (L)	Over all Mean milk yield ±SD (L)
1.1	First	4.17±1.89	2.43 ±1.01	7.01 ±2.73
1.2	Second	2.84±1.18	2.25±0.95	5.55±2.83
1.3	Third	3.65 ±1.47	1.45±0.58	3.50±1.64
1.4	Total Mean	3.55 ±1.51	2.04 ±0.85	5.35±1.23
1.5	Milk Yield Per Lactation	1224.75±39.6	703.8±22.3	2042.11±32.25
1.6	Lactation length /day/			345 ±26.22
2	Reproductive performance	Mean	Minimum	Maximum
2.1	Age at 1st service (month)	24.5	13	36
2.2	Age at 1st calving (year)	3	2	4
2.3	Calving interval (month)	21.5	13	30
2.4	Lactation length (month)	11.5	9	14
2.5	Days open (month)	4	2	6
2.6	Service per conception	2	1	3

included management system, production constraints, breeding objectives and breeding practices whereas quantitative data included performance of crossed dairy cattle.

Collection Methods

A single rapid exploratory field survey and semi-structure questionnaire technique was used to obtain data on the productivity and reproductive performance of crossbred dairy cows (Table 1), challenges and opportunity associated to dairy cattle performance as identified by respondents.

Data Management and Analytical Technique

Data was managed using both in hard and soft copies. Any confused record was corrected immediately at the respondents' house. Data from personal observation and focus group discussion was simply summarized and synthesized. Simple descriptive statistics was used for data collected from semi-structure questionnaire and analyzed using SAS software version 9. The results were stated as means, frequency distribution and percentage as well.

RESULTS AND DISCUSSION

Demographic Information of the Respondents

Respondents' characteristics of the interviewed farmers are presented in Figure 1. The results indicated that about 85% of interviewed households were fully involved in the participation for dairy production. Dairy was the main source of income for immediate expenses of smallholder. The majority of the respondents in this study area (64.82%) were males. Smaller female respondents might be due to lack of female approaching to outsider. The respondents were fully educated and can read and write. The respondents reported that dairy farms require high business, educated man that can detect heat period, feeding properly and manage carefully and comfortable climate. This study was dissimilar with other researcher report such as Belay Duguma (2012) who stated that educational back grounds of the respondents about 60.5 % of the average interviewed dairy farm of small holder were illiterate while 39.5 % can read and write. Thus, lower educational background obtained in the small holders might be associated with inability to go to school. Finally, educational status of the illiterate who can read and write interviewed in this study were not similar to northern Ethiopia (63.8 % and 14.9 %, respectively) (Asaminew and Eyasu, 2009).

Productive and Reproductive Performances of Crossbred Cows

The present study showed that the productivity and reproductive performance of cross breed dairy cows in the study area was focused on milk yield based on lactation stages, age at 1st service, age at1st calving, calving interval, lactation length, days open and service per conception. The average daily milk yield was 7.012±2.73, 5.55±2.83 and 3.50±1.64 litters for the 1st, 2nd and 3rd stages of lactation, respectively with an overall average yield of 5.35±1.23 liters per day. Respondents said that the milk production was lower in 3rd than 1st and

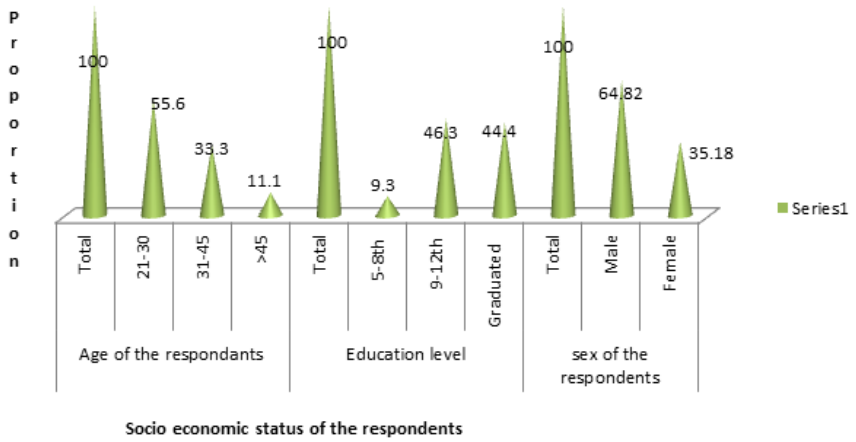

Figure 1. Socio-economic status of the respondents**.**

2nd stage of lactation stages. In this study average milk yield per lactation was estimated to be 2042.11 litters in lactation period of approximately 345±26.22 days. The mean lactation milk yield observed in the present study was lower than the mean of 2333.63 litters reported for cross breed cows (Belay, 2012). It was observed that there was a difference in morning and evening milk yield for the three stage of lactations for the respective lactation stages.Cows produce more milk in the morning than in the evening because the milking time interval was higher than evening.

The overall milk production/cow/day from monitored cows was 11 litters (between 4 and 18 liters per day). In this study the main reasons for low daily milk production as indicated by the respondent were shortage of feed and the interaction of poor health, housing and management, small land size, and lack of market information. The average lactation length for the studied small holder farm was 11.5 months. The lactation length observed in the present study was shorter than the lactation length of 11.7 month reported in and central Ethiopia (Gebeyehu et al., 2005). Respondents reported that the mean age at 1st service was found to be 24.5 month. The mean age at 1st service revealed in this study is shorter than the mean of 36.8 month reported by (Gebeyehu et al., 2005). Whereas the other performance traits like sexual maturity, age at 1st calving, calving interval and days open may mean serious economical loss due to an additional none lactating and unproductive period of the cow over several month. The respondents said that productive and reproductive performance of cross dairy cattle (Table 3) was affected by season, shortage of feed and poor management systems. The present study showed that the average age at 1st calving (AFC) was 3 years which is shorter than AFC of 3.37 years reported by Asaminew and Eyasu (2009). In this study the average calving interval was 21.5 months. Almost similar result in regarding to mean calving interval was reported by Belay Duguma (2012) who stated that the mean calving interval was 21.36 month of crossed breed cows. In this study, the relative longer calving interval might be indicative of poor nutritional status, poor breeding management, lack of own bull and AI service, longer open days, poor veterinarian service and poor management practices. The respondents reported that the average service per conception was 2. The present result is higher than the service per conception of 1.7 reported by Lobago (2007). This might be indicative of lack of breeding management and lack of available feed. In this study the average days opens till conception was 4 months. Feed shortage, silent estrus and lack of proper heat detection might have contributed considerably to the longs open reported in this study.

Challenges and Opportunities of Crossbred Dairy Cattle

Challenges of Crossbred Dairy Cattle

As presented in Table 2, the respondents reported that age at 1st calving was affected by shortage of feed (37%), feeding and disease (35.2%) and the season (27.2%). The respondents reported that feed shortage (68.5%) and interaction of nutrition, health, housing and management level were major problems affecting milk production. Age at 1st calving was reported to be influenced by the onset of puberty, which itself affecting by environment, breed type, season and herd effects. The respondents said that calving interval was influenced

Table 2. Challenges for Milk Production, Age at 1st Calving and Calving Interval.

Variable	Frequency	Percent
Reason for low milk yield		
Feed shortage	37	68.5
Instruction of nutrition, health and management	17	31.5
Factor affecting age at 1st calving		
Feeding	20	37
Season	15	27.8
Disease	19	35.2
Factor affecting calving interval		
Feeding	4	7.4
Feeding, disease and breeding management	35	64.5
Season	2	3.7
Feeding and breeding management	9	16.7
Feeding and disease	4	7.4

Table 3. Opportunities for cross dairy cattle.

Opportunities	Frequency	Percent
Climate	14	26
Dashen beer by product	24	44.4
Increasing demand of population	6	11.11
Introduction of new technology	10	18.52

by the combined effect of feeding, disease and breeding management (64.8%), feeding (7.4%) and season (3.7%). Farmers reported that dry season feed shortage was the main reason for seasonal fluctuation of milk production. Poor nutrition increases the susceptibility of dairy cows to health problem and physiological stress which results in lower production, much longer calving interval, as well as problems infertility. This study reported that lack of land and marketing problem was the factor influencing the small holder dairy farms.

Opportunities of cross breed cows

As the respondents, climate condition of Gondar town was comfortable to crossbred of dairy cattle. The temperature ranges from 18.7-20.7 ^{o}C and have good rain fall. The presence of Dashen beer by product was the main sources of feed for dairy cattle. About 80% of respondents said that the milk production would be increased as the cattle are fed by Dashen beer by product than roughage feed like hay, straw, crop residue. As the population and income increase, the wiliness to consume livestock product would also increase. So increment in human population and their income have positive relationship on raring crossbred dairy cattle.

Conclusion

The result of the study revealed that productive and reproductive performance of cross bred cows in the study area was found to be low. Feed shortage (both in terms of quantity and quality), lack of access to land, disease prevalence, low level of management, lack of proper breeding management such as lack of accurate heat detection and timely insemination might have contributed considerably to delayed age at 1st service, long day open (post mortem anestrous), late age at 1st calving, long calving interval, short lactation length, and low milk production. This calls for planned technical and institutional intervention for improved support such as proper feeding, proper breeding program, improved cows and adequate veterinarian services.

RECOMMENDATIONS

Farmers in the study area were fully involved in semi-

intensive management of crossbred dairy cattle. However, the feasibility of intensive managements on performances of crossbred dairy cattle needs to be assessed.The government should encourage dairy owners by providing land, credit for new starter dairy farm and subsides for accidental purpose like death, disease, and also employed veterinarian service. Employed adequate veterinarian service.The small holder dairy farmers should be supplied food in sufficient quantity and quality for their cattle. They should use new technologies like AI technology and milking machine.

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