Int.J.Curr.Res.Aca.Rev.2021; 9(01): 95-102

EXCELLENT PUBLISHERS

International Journal of Current Research and Academic Review

ISSN: 2347-3215 (Online) Volume 9 Number 01 (January-2021)

Journal homepage: http://www.ijcrar.com

doi: https://doi.org/10.20546/ijcrar.2021.901.009

Dairy Cattle Genetic Improvement and Breeding Practice in Gacho Baba Woreda Gamo Zone, Southern Ethiopia

Bekele Aysheshim Belay*

Arba Minch University, College of Agricultural Sciences, Department of Animal Science, Ethiopia

**Corresponding author*

Abstract

The study was conducted in Gacho Baba Woreda, Gamo Zone with the aims to assess dairy cattle breeding practices of the communities. A total of 80 households were selected purposively by setting the criteria of having dairy cattle. In the study area 70.6% of the respondents practices natural free mating. Around 26% of the respondents practice natural controlled mating. The remaining 3.4% of the sampled household use AI technology trough AI technicians. natural mating (77.5%) was the common practice of mating in the study area followed by both (natural mating and artificial insemination) (12.5%)methods. irrespective of the agro ecologies, most of the respondents depended on bulls (60%) reared by their neighbors/friends. The primary problem identified by respondents was lack of AI Technicians skill, AI Equipment's, Management problem, and Lack of AI were reported to be the most limiting factors to cattle breeding practices with index value 0.283, 0.237, 0.259, and 0.219 respectively.

Article Info

Accepted: 08 December 2020
Available Online: 20 January 2021

Keywords

Breeding, Cattle, Constraints, Dairy.

Introduction

Background of the study

Agriculture is the major economic activity in Ethiopia. Among the agricultural activities, livestock sector plays a significant role in the economic, social and cultural development of the agrarian community. Cattle comprise the majority of the livestock population and are reared across all the agro-ecologies. As indicated in a report by CSA (2014) most of the cattle in the country reared by the agrarian community are of native breeds/ecotypes (98.71%). The distribution of native cattle populations across the different agro-ecologies of the country provide various options for tangible and non-tangible use of livestock products to the smallholder farmers and pastoral communities (CSA, 2014).

Cattle are reared for various tangible commodities like, milk, meat, hide and draft power and intangible commodities for social prestige and savings for the readers. However, the productivity of the native cattle is low due to their genetic makeup, low level of inputs, and traditional husbandry practice besides environmental stress (Azage *et al*., 2010).

Despite the importance of this subsistence sector, scanty information is available on the status of the national dairy cattle genetic improvement program that guide policy makers, development planners and breeders to redesign appropriate breeding programs that respond to

the current scenarios in Ethiopia (Kefena *et al.,* 2011). These native cattle are well adapted to in their place of origin and hence preferred by the keepers. They are low yielders but they have adaptive traits for disease resistance, heat tolerance, ability to utilize poor quality feed and soundly fit with farmers farming condition, which they have acquired through natural selection via countless generations (Tadesse *et al.,* 2014). After cattle were domesticated, specialized breeds were developed with in improved dairy or beef production. Domestic animal production has proven to be good sources of food all over the world. And a rapid growth in milk and dairy consumption has been seen in many developing countries over the last years (FAO, 2002).

In dairy cattle breeding most of the dairy farmers in the highland, midland and lowland areas of Ethiopia used natural mating by using indigenous bulls. But cross-bred bulls in the highland and island agro-ecologies were used for service. Some farmers used Artificial Insemination (AI) along with natural mating in highland and midland areas. Some of the farmers also preferred seasons for mating for their dairy cattle. They mate their cows in such a way that the calving falls during the wet season to take the advantage of abundant feed supply which promotes better milk production and hence a better chance of survival of calves (Testa, 2009). Conformation traits have been known to have medium to high heritability (Kistemaker and Flugauya, 2006) and often can be recorded in a single assessment, which make them reliable and relatively cheap traits that can be included in selection indices for several purposes. In some parts of Ethiopia, farmers exercise selection for dairy cows depending on the appearance of some conformation traits and milk production history of the ancestor (Zewdu, 2004 and Takele, 2005).

In Ethiopia, the human and animal populations are very much affected by nutritional problems; primarily due to lack of high nutritional value feed (Gebrekidan, *et.al*, 2012). In order to address this problem and upgrade the nutritional status of the population, actions should be taken to improve animal production so as to ensure better supply of animal protein of high nutritive value (Lebir, 1992). Among animal protein, milk is the one whose demand continues to increase and plays a very important role in feeding the rural and urban population of Ethiopia (Asaminew, 2007). Therefore, in order to meet this demand, it is essential to improve the potential milk production status of dairy cattle through selection and breeding of cows by conformation traits.

Artificial insemination (AI) is a proven bio-technique, which is used globally to improve the genetic makeup of the cattle and thereby improve their production and reproduction traits (Noakes, 2009). However, the overall impact of AI can only be achieved when it is coupled with proper animal husbandry practices. Over the years, there have been efforts to improve the productivity of native breeds through the introduction of AI program with improved exotic dairy breed (Ali *et al.,* 2013). However, the success of such programs so far is far from satisfactory due to numerous factors, which includes substandard nutrition, poor management and infrastructure status. Thus, dairy producers have been complaining about poor reproductive performance in cattle, which were exposed to AI (Lemma and Kebede, 2011).

The efficiency of reproduction is influenced by several genetic and non-genetic factors with major roles being played by both growth and the management of the animal (Jones and Hennessy, 2000). The efficiency of the AI service in Ethiopia is one of the lowest among the developing countries, this might be attributed to poor heat detection, improper timing of insemination and embryonic mortalities besides inadequate infrastructure, managerial, and financial constraints (Shiferaw *et al.*, 2003). One of the ways to overcome the challenges of low conception rates and less efficient AI service is by using hormones for estrous synchronization thus facilitating the practical use of artificial insemination and this can positively influence the productive and reproductive efficiency of dairy cattle (Murugavel *et al.*, 2010). Use of reproductive hormones can help in planning of AI in away that it coincides with planned parturitions in a specific period. The farmers in and around Gacho Baba Woreda practice natural breeding system of dairy cattle, they are not aware of the benefits of artificial breeding clearly and properly. And in-depth research work has not been done regarding the Breeding Practices and the existing problems that hinder the efficiency of AI service in the area. So, this study is aimed to assess those problems and put more advance information for dairy cattle owners on the challenges of production.

Objectives

- To identify dairy cattle breeding activities of the community in the study area.
- To identify major traits particularly used by small holder in the selection of better dairy cow.

- To identify the major constraints of Breeding Practices in the study area.

Materials and Methods

Description of the study area

The study was conducted in Gacho Baba Woreda, which is located at a distance of 36 km from Arba Minch town. Its elevation 2400-2800 m.a.s.l. and has three agro-ecologies that highland, Midland and Lowland 72.7, 20.3 and 7% respectively. The total population were 85922 from which 38970 and 46952 males and females respectively. and the total households were 10495 from which 10019 and 476 males and females respectively. The livestock population in the study woreda was 61407 cattle, 28051 sheep, 5751 goats, 36317 chickens, 459 donkeys, 1548 mules, and 3810 horses.

The study or the selected (Zigiti Baqolle) was located 8km to the North East Woreda Gacco Baba. and also located to the North of ZigitiPerassoKebele, to the south of Ganta Bonke kebele, to the East of Arba Minch Zuria Woreda kebele Ganta Mecce, and to the West of Koddokebele. The total population of the study kebele is 11431 of which Male accounts for 5615 and the rest 5816were females. The total households 1608 of which male accounts for 1556 and the rest 59 were females. The annual temperature 16-28C^0, rainfall 800-1500mm and Elevation from 1200-2800m.a.s.l. (Gacco Baba Agricultural Development office, 2019).The agroecological classification was 65%, 33% and 2% Highland, Midland and Lowland respectively. The livestock population is 8926 cattle, 5246 sheep, 1418 goat, 7822 chickens, 55 horse, 100 mule and 127 donkeys.

Sample size and sampling techniques

Purposely, one PAs or kebele (Zigiti Baqolle) found in Gacco Baba were addressed to select the sample households who have dairy cattle. That makes the total households were 80 for the study. The households were selected purposively by setting the criteria of having dairy cattle. The research team interviewed the selected households to generate data on cattle breeding practices in the area.

Data collection

Data were collected by using primary and secondary data sources. The data were collected primarily by preparing questionnaires. The secondary data was collected from sources like Agricultural Development offices for the breeding system of dairy cattle.

Data analysis

The data collected from the households were entered in Microsoft excel, analyzed and organized by using descriptive statistics like mean, frequency and percentage. Ranking index was used to express the data, like purpose of keeping the dairy cattle, constraints of breeding practice, and the selection criteria to prefer the best dairy cow.In trait preference ranking method, index was computed using weighed averages and indexes were ranked using auto ranking with MS-Excel 2007.The following formula was used to compute index as employed by (Musa et al 2006):

$$\text{Index} = Rn \times C1 + Rn\text{-}1 \times C2 \ldots + R1 \times Cn / \Sigma (Rn \times C1 + Rn\text{-}1 \times C2 + \ldots + R1 \times Cn)$$

Where, Rn = the last rank (example if the last rank is 8th, then Rn = 8, Rn-1 = 7, R1 = 1).
Cn = Number of respondents in the last rank, C1 = Number of respondents ranked first.

Results and Discussions

Socio economic characters of the respondents

The general characteristic of the household in the study area is presented in Table 1. The study revealed that about 49.4% of the respondents were illiterate while 50.6% were educated. From educated respondents the individuals who have diploma were few, only2.5%. Concerning the gender of respondents 68.4% were male and 31.4% were female. Concerning their marital status, 85% were married. The percentages of single respondents in the study area were 15%.

Breeding practices and management

The Breeding Practices reported in the study area is generally a natural mating. AI is rarely practiced in the study area. Bulls can be used for two main types of natural mating, either free mating in the ranch or controlled mating. In the farmer system heat detection is carried out by the bull and cow. The bull and cow usually mate several times during each heat period. In controlled mating systems, heat detection is carried out by the farmer and each cow is mated once or twice during each heat period. In the study area 70.6% of the

respondents practice natural free mating, which means there was no selection of breeding bulls. Since the production system is extensive, cows can be mated easily at communal grazing lands. Around 26% of the respondents practice natural controlled mating, which mean bulls were selected and allowed to

Breeding objective

Breeding objective is defined as the reasons for which animals are specifically bred, assuming that farmers have made a deliberate choice to genetically improve the next generation of animals in terms of their performance in relation to their parent generation. The focus is therefore on one or more traits. The first important breeding objectives stated by the sampled producers were to obtain better milk yield which have an index value of 0.306. This is similar to the result of a previous study by Zewdu (2004). Milk was mentioned as one of the most important functions of the local cattle and one of the primary reasons for keeping indigenous cattle (Table 2).

An increase in milk yield will bring additional income from the sale of butter. More milk production also means better feed calves that will have better survival rates. These calves will also grow better, and hence reach puberty earlier than those reducing age at first calving (Zewdu, *et al*., 2006). Similarly, Piotr *et al*. (2004) also reported that recently the cattle breeding objectives are focused on the increase of milk yield, under the assumption that profit would increase with increased yield per cow. In addition to increasing milk production, obtaining of good breeding bulls, good mothering ability, and shortening of calving interval were aimed at the same time.

The farmers believed that good breeding bulls bring gross improvement through natural control mating system. Keeping desirable bulls can contribute to improve herd performance over time. Mothering ability of the cow is also taken into consideration. Docility of the dairy cows at the time of milking and any management aspect is also considered important. The sampled households are also keen to have more calves per cow. This is obtained through shortening of calving interval. They believe that shortening of calving interval is achieved by selecting for ancestors that have short calving interval. The Second objective the respondents to draft power which have an index value of 0.267which indicates the dairy cows contribute for crop production in this study. Most of the study community uses their cow for draught purpose (Table 3).

Selection practices

In all the study sites, selections for both male and female animals were practiced by most of the respondents. Selection takes place not only at the time of mating but also starts from the early age of the calf. In all study sites the first purpose was selecting a bull that is suitable for breeding purpose depending on good physical appearance, known desirable pedigree history in milk yield, good reproductive performance and tolerance for seasonal feed scarcity and disease challenges. The final reason for selection of male animals reported by the sampled farmers was market demand. In cattle markets buyers prefer male animals with attractive body color, good body condition and balanced physical posture.

Indigenous dairy cow selection criteria

All respondents reported that, selection of cows takes place by considering expected milk production potential. To achieve this, farmers apply their own selection criteria. This includes body conformation and the performance of history of their ancestors. All respondents indicated that conformation traits are used to select for good milking cows. Four conformational traits were identified and ranked by respondents. As the percentage index indicates the ranking order was the in-study sites. Udder size was ranked first for selecting breeding and lactating cow followed by body length, growth rate and teat size with the index value 0.297, 0.287, 0.213 and 0.202, respectively, were identified.

Mating systems and source of bull

The findings pertaining to the type of mating system and source of bull of the respondents were presented in Table 4. The result indicates that natural mating (77.5%) was the common practice of mating in the study area followed by both (natural mating and artificial insemination) (12.5%) methods. The study also revealed that only a few respondents use only AI system for their cattle breeding purpose. The results also indicated irrespective of the agro ecologies most of the respondents depended on bulls (60%) reared by their neighbors/friends (Table 5).

Major constraints in the study area

In the process of data collection, households were asked to list all problems that affect dairy cattle production in the study area (Table 6). The primary problem identified

by respondents was AI Technicians, AI Equipment's, Management problem, and Lack of AI were reported to be the most limiting factors to cattle breeding practices with index value 0.283, 0.237, 0.259, and 0.219respectively. Since permanent water source is not available around their villages, the farmers travel long distance from their residence in search of water for themselves and their livestock. Yet, they do not get clean water. The other problem recognized by respondents was the management problem. The farmers could not provide enough feed and water for the livestock and also the cattle were kept in very poor housing system. AI services in the study area were not successful to improve reproductive and productive performance of dairy cattle.

Table.1 Households character in the study area

No	Characters	Number	%
1	Gender		
	Male	55	68.4
	Female	25	31.6
	Total	80	100
2	Marital status		
	Married	68	85
	Single	12	15
	Total	80	100
3	Educational status		
	Illiterate	40	49.4
	Primary	30	38
	Secondary	8	10.1
	Diploma and above	2	2.5
	Total	80	100

Table.2 Reported frequency of weaning, castration and mating by study area

No	Management practice	Number	%
1	Weaning practice	80	100
2	Castration practice	80	100
3	Mating system		
	Controlled natural	21	26
	Uncontrolled	56	70.6
	AI	3	3.4
	Total	80	100

Table.3 Frequency of reported reason for breeding cattle in the study area

No	Purpose	Sum	Index	Rank
1	Milk	24	0.306	1
2	Draft	21	0.267	2
3	Income	18	0.219	3
4	Meat	17	0.207	4
Total		**80**	**1.00**	

Index=the sum of (4 times first order + 3 times second order +2 times third order + 1 times fourth order + n times fifth order) for individual variables divided by the sum of (4 times first order + 3 times second order +2 times third order + 1 times fourth order + n times fifth order) for all variables.

Table.4 Ranks of conformational traits used for selecting dairy cows in the study area

No	**Traits**	Sum	Index	Rank
1	Udder size	24	0.297	1
2	Body length	23	0.287	2
3	Teat size	16	0.202	4
4	Growth rate	17	0.213	3
	Total	80	1.00	

Index=the sum of (5 times first order + 4 times second order +3 times third order + 2 times fourth order + 1 times fifth order) for individual variables divided by the sum of (5 times first order + 4 times second order +3 times third order + 2 times fourth order + 1 times fifth order) for all variables.

Table.5 Prevalent mating system and source of bull in the study area

No	Parameter	N	%
1	Mating system		
	Natural mating	62	77.5
	Only AI	8	10
	Both natural & AI mating	10	12.5
	Total	80	100
2	Source of bull		
	Own	32	40
	From Neighbors	48	60
	Total	80	100

Table.6 Major constraints in the study area

No	Constraints			
		Sum	Index	Rank
1	AI Technicians	22	0.283	1
3	AI Equipment's	19	0.237	3
4	Management problem	21	0.259	2
5	Lack of AI service	18	0.219	4
	Total	80	1.00	

Index=the sum of (5 times first order + 4 times second order +3 times third order + 2 times fourth order + 1times fifth order) for individual variables divided by the sum of (5 times first order + 4 times second order +3 times third order + 2 times fourth order + 1 times fifth order) for all variables.

The problem is more aggravated by unorganized cross breeding program, absence of cross breeding policy, lack of record to evaluate the performance from lower farmer level and absence of incentives and rewards to motivate AI technicians and also same AI technicians do not provide AI service at the required time or during when the cow is in heat period.

Conclusions and recommendations are as follows

Natural mating was common practice; and bulls are available from their herd and neighbors. Obtaining selected or desirable breeding bulls for estrous cows during heat period is reported as difficult task. The breeding objectives in each study site were better milk yield, getting good bull for breeding and good mothering ability of cows. In general, selection for milking cows was reported to be based on conformation traits of the

cows and heifers, some background history of their ancestors. The four most useful traits used for selection of dairy cows were udder size, teat size, body length and growth rate. The major preferred traits in the study area were milk yield, growth rate, adaptation, and draft power. In all study area selection for both male and female animals was practiced by most of the respondents. Selection takes place not only at the time of mating, but also starts from early age of the calf. Bulls are selected for breeding purpose based on good physical appearance, known desirable pedigree history in milk yield, good reproductive performance and tolerance to seasonal feed scarcity and disease challenges.

The major constraints identified by the respondents were a disease locally named as trypanosomiasis "*gendi*," adequate provision of nutrition, in adequate water supply, management related problems and lack of AI service. All these problems are common to all the study sites.

Recommendations

Unorganized cross-breeding program, absence of cross-breeding policy and lack of record to evaluate the performance from small-scale farmers are some of the constraints and need immediate action to improve Breeding Practices in dairy cows.

To improve breeding practice, local animals must be safeguarded to maintain purity.

Record must be kept to evaluate best performing animals; and a breeding policy should be developed.

Improvement in environmental aspect and strengthening input supply systems for cross-breeding programs is a critical issue and should be given high consideration.

The productivity of dairy cows remains low in all study sites due to lack of animal health service, lack of nutrition and other management related problems. Hence, to reduce these problems, animal health service should be extended both in the town and the rural area and also training should be given to farmers how to prepare silage and use it during drought season.

In order to make farmers good users of AI service, they should be given training toget enough awareness and should be trained as AI providers.

Generally, agricultural extension agents should create awareness among farmer show to manage their livestock properly and to improve the product and productivity of their livestock.

References

Ababu Dekeba, Workeneh Ayalew and Zerihum Taddese, 2006. Performance of the Abernossa ranch in the production of Ethiopia Beranx cross Honsten cross bred dairyheifers in Ethiopia.

Alemayehu Lemma, 2010. Factors Affecting the Effective Delivery of Artificial Insemination, and Veterinary Services in Ethiopia.

Asaminew Jassew, 2007. Production handling, Traditional processing practices and Quality of milk in Bahir Dar milk Shed Area, Ethiopia. M.Sc. Thesis, Alemaya University, Ethiopia.

Asheber Swale, 1992. Evaluation of reproductive and preening growth performance of Fogera and their Fl Fresian crosses at Andassa cattle breeding station, Ethiopia M.Sc. Thesis, Alemaya University, Ethiopia.

Aynalem Haile, 2006.Genetic and Economic Analysis of Ethiopian Borena cattle and their crosses with Holstein Fresian in central Ethiopia.

Aynalem Haile, Worknesh Ayalew. Azage Tegegne and Singh A, 2009. Genetic evaluation of Borana cattle and their crosses with Holstein Friesian in central Ethiopia.

AzageTegen, Kassa J and Mukassa- Mugerwa E, 1995. Aspects of bull production with emphasis on cattle in Ethiopia.

Bekele Taddesse, 2005. Calf sex ratios in artificially inseminated and natural mated female crossbred Dairy herd.

Desalegn Gebremedhin, 2008. Assessment of problem Associated with artificial insemination service in Ethiopia. MSc. Thesis. Addis Ababa University, Ethiopia.

Desalegn Gebremedhin, Mersa Bekana and Kelay Belihu, 2009. Status of artificial insemination service in Ethiopia.

Desalegn Gebrmedhin, 2011. Performance of artificial insemination, challenges and opportunities presented by Desalegn G/medhin Ethiopian Meat and dairy technology institute work shop.

Ethiopian Agricultural research organization (EARO), 2001.Livestock breeding policy. A working paper January, 2001. ESAP (Ethiopian society of Animal production, 2009 commercialization of livestock agriculture in Ethiopia.

Falconer D.S, 1952. The problem of environment and selection.

FAO (food and agriculture organization of the united nation (2002 FAO agricultural database system website.

FAO (IAEA, 2009 selection and breeding of cattle in Asia: strategies and criteria for improved breeding.

Gebrekidan Tesfaye, Zeleke Mekuriaw and Aklilu Hailemichael, 2012. Socio-economic characteristics and purpose of keeping dairy cattle in central zone of Tigray, northern Ethiopia.

Gibson J. P and Smith C, 1989. The incorporation of biotechnology in to animal breeding strategies.

Heins BJ, LB Hansen and A J seykora, 2006 a. production of pure Holsteins versus crossbreeds of Holstein with Normand.

Heins BJ, LB Hansen and AJ seykora 2006b calving difficulty and stillbirths of pure holestin versus crossbreds of Houston with Normande.

Himanen A and Azage Tegeagn, 1998.A proposal for establishment of National milk recording and herd registration scheme in Ethiopia.

Kefene Effa, Tadelle Dessre and Aynalem Haile, 2011. Genetic and Environmental trends in the long-term dairy cattle genetic improvement programs in the central tropic highland of Ethiopia.

Kistemaker G and Huapaya G, 2006. Parameter estimation for type traits in the Holstein, Ayrshire and Jersey breeds.

Mohamed Aliy, 2003. Estimates of genetic parameters of birth weight, age at first calving and milk production traits in Holstein Frisian daily herds kept in three state forms.

Webb D, 2003. Artificial insemination in dairy cattle series of Animal science department, Florida cooperative extension service.

How to cite this article:

Bekele Aysheshim Belay. 2021. Dairy Cattle Genetic Improvement and Breeding Practice in Gacho Baba Woreda Gamo Zone, Southern Ethiopia. *Int.J.Curr.Res.Aca.Rev.* 9(01), 95-102.
doi: https://doi.org/10.20546/ijcrar.2021.901.009