Research Article

Production Objectives, Breeding Practices and Rate of Inbreeding in Dairy Cows at Alefa and Quara Districts of North Gondar Zone, Amhara National Regional State, Ethiopia

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Abstract

The aim of this study was to identify breeding practice, production objectives, selection and culling criterias of farmers for dairy cows in Alefa and Quara districts of North Gondar Zone Amhara National Regional State Ethiopia. 376 households (208 households from Quara and 168 households from Alefa) were selected by using systematic sampling procedure. Data were collected by using structured questionnaire and the collected data were analyzed by using statistical package for social science (SPSS Version 20). The main production objectives of farmers in Quara district were for milk production (0.43), draught purpose (0.32), and selling purpose (0.2). While in Alefa district it was 0.34, 0.36 and 0.27 for milk production, draught and selling purpose respectively. The main selection criteria for dam and sire in both districts were reproductive performance, body conformation and coat color. Most farmers in both districts were decided to cull the herd when they showed long AFS with index value of (0.38) and (0.3) for Quara and Alefa districts, respectively. About 208 (100%) of respondents in Quara were using natural breeding system. While bout 148 (88.1%), 11 (6.5%) and 9 (5.4%) of respondents in Alefa district were used natural, both natural and AI technology and AI only, respectively. About 44.4, 25, 23.2, and 7.7% of respondents in Alefa district were used breeding bull from a neighbor, communal grazing land, own and rent bull, respectively. While the majority (47.1%) of respondents in Quara district were used own bull. Under uncontrolled random mating effective population size and rate of inbreeding for Quara district was 9.0 and 0.05, respectively. While for Alefa district it was 3.2 and 0.15, respectively.

Introduction

Livestock production is one of the most important means to achieve better living standards in many regions of the developing world. The national economies and the livelihood of rural communities in sub-Saharan African countries are largely depended on livestock production. The total cattle population of Ethiopia is estimated to be about 57.83 million. Out of this total cattle population, the female cattle constitute about 55.38 percent and the remaining 44.62 percent are male cattle [1]. According to CSA survey result, about 98.59 percent of the total cattle in the country are local breeds, the remaining are hybrid and exotic breeds that accounted for about 1.22 percent and 0.19 percent, respectively. Of the total livestock population, dairy cows are estimated to be around 6.74 million and milking-cows are about 11.33 million heads [1]. Breeding objective of the community is better to obtaining milk yield. Farmers' trait preferences is mostly includes higher milk off-take, faster growth rate, adaptability to local feed conditions, diseases, breeding ability, traction and butter fat yield of the cattle. Fogera cattle breed is preferred by most communities, due to better expression of the dairy traits. Among the selection criteria of farmers for indigenous dairy cows, navel size, udder, teat size and pelvic width are commonly stated and hold the first three ranks of selection by farmers [2]. Farmers' trait preferences and production objectives are very important in genetic improvement programs. There is little or no documented information on farmers' breed and trait preferences, purpose of dairy farming and breeding practices in Ethiopia [3].

Amhara National Regional State is one of the potential areas in the country for dairy production. In this area cattle types like, Semen, Dembia, Wogera, Fogera, Qocherie, Mahbre Silasie composite, Gojam highland zebu, Wollo highland zebu and Raya Sanga are the major milk source of the communities [4]. However, its productivity is declining time to time, because of different problems like, high inbreeding rate, shift of grazing lands to crop production, absence of well defined breeding objectives, selection and culling strategies [5].

North Gondar is a part of Amhara national regional state, which dairy production is a common way of life for the communities. Dembia and Qocherie cattle types are found in North Gondar zone

and these cattle type are used for dairy production. Even though, its contribution in terms of milk production to the community is high, comprehensive baseline information about production objectives, breeding practice, selection and culling criterias were not identified. Therefore, assessing of dairy production objectives, selection and culling criterias of farmers in North Goner Zone and documenting it for other researchers as well as policy makers was vital. Thus, the objective of the study was to identify breeding practices, production objectives, selection and culling criteria's of farmers in the study areas.

Materials and Methods

Description of the study areas

The study was conducted between December and April to assess the production and reproduction performance of indigenous cattle breeds in Quara and Alefa districts of North Gondar zone. Detail descriptions are as follows:

Quara District: Quara district is located in North Gondar Zone. It is bordered from the south by Benishangul-Gumuz Region, from the west by Sudan, from the north by Metemma, from the East by Takusa and Alefa District and from the southeast by Agew Awi Zone. The administrative center of this District is Gelegu with other settlements include Tewodros Ketema. The district is 360 Km far from Bahir Dar, which is the capital city of Amahara National Regional State, and 284km from Gonder town. It lies between 11047′ and 12041′ N latitude and 35016′ and 36030′E longitude coordinates and at an altitude that ranges from 530 to 1900 meter above sea level, while the temperature ranges from 26°C - 42°C with annual average rainfall 800 mm. The rainy season begins in early May and ends in early October. It has 19 kebeles with area coverage of 858588 hectares. From this; 262104.18 hectare is used for cultivated land, 97870.04 hectares is grazing land, 33756.55 hectares are covered by river and valley, and 157399.24 hectares are accounted by forest. One third (266570 hectare) is covered by Altash national park, 7795.96 hectares is villages and 33091.41 hectares for others. About 70% of the district is covered by low land with vertisoil and the rest 30% is covered by mild altitude nitosol dominant. Mixed crop-livestock is one of the most common practices for the community way of life, which sesame, sorghum, maize, and teff are the most common crop types. Its livestock composition includes 46427 oxen, 59333 cows, 37465 heifers 117672 goats 10981 donkeys 151 mules, 571 camels, 179174 poultry and 12788 bee colonies [6].

Alefa District: Alefa district is bordered from the southwest by the Agew Awi Zone, from the west by Quara, from the north by Takusa, from the east by Lake Tana and from the southeast by the West Gojjam Zone. The administrative center of Alefa is Shawra. It is 80 km far from Bahir Dar, which is the capital city of Amhara region, and 144 Km from North Gonder zone. It lies between 11045′ and 12030′ N latitude, and 370 10′ and 360 30′E longitudes coordinate, respectively, and at an altitude that ranges from 750 to 2250 meter above sea level. Its temperature ranges from 25-38°C and annual rainfall of 950mm-1500mm, its rain begins in early May and extended up to early November. Its heavy rainy seasons are June, July and August. Its cattle populations are accounts 244405. Of the total cattle population 44782 accounts dairy cows and its covers area of 531285ha with 25 Kebeles. The district is dominated by vertisoil and nitosol type. The district is known by its transhumant livestock production

system with its common crop cultivation of Teff, Sorghum, Maize, Bea and pea [7] (Figure 1).

Sampling procedure

Multistage purposive sampling technique was used based on the potential of dairy cattle production in the zone. To locate the distribution of dairy cattle production, rapid preliminary survey was done prior to the actual survey was done. Discussion was held with zonal, district agricultural experts and development agents about the distribution of dairy production potential. Based on this information two districts (Quara and Alefa) were selected. Then three Kebeles from each district, a total six Kebeles were selected through purposive sampling procedure using similar fashion. Finally, farmers who had at least one lactating cow were selected for interview through systematic random sampling method. The total household heads included in the study were determined by the formula given by [8] with 95% confidence level;

$$n = N/1 + N(e)^2$$

Were n= Sample size

N= population size

e = the desired level of precision

Accordingly, from a total of 6750 population size which have lactating dairy cows of six representative Kebeles, 376 households 208 households from Quara district with a population size of 3750, and 168 households from Alefa district with a population size of 3000 were selected.

Data collection procedure

Questionnaires was designed, translated to local language, pretested and administered to address the description of socio-economic condition of the community, dairy cows husbandry practices, family size, and major sources of income. Type of livestock reared by the community in the study area, including their composition and number was assessed using questionnaires. In addition to herd composition and number, information breeding
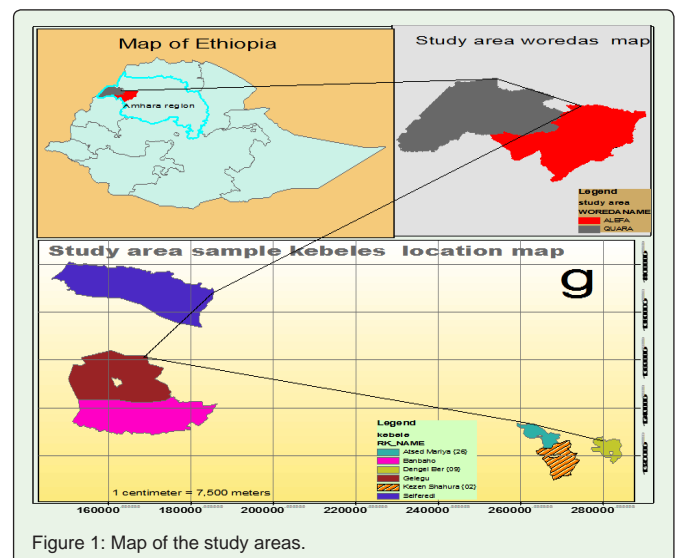

Figure 1: Map of the study areas.

Table 1: Summary of sampling procedure.

Districts	Kebeles	Representative Sample size	Number of groups Discussion held
Quara	Gelegu	69	1
	Banbaho	70	1
	Selferedi	69	1
Alefa	Kezenshahura	56	1
	Astedemarim	56	1
	Dengelber	56	1
Total	6	376	1

practices, production objectives, selection and culling criterias were collected from each selected household.

Focus group discussion was held in two districts with the recommended group size of 8-10 households that were encompassed from different social segments. As shown in table 1, the participant segments consisted of district experts, developmental agents (DA's), model farmers, and village leaders, elderly female and male members of the society who are known to have better knowledge on the present and past social and economic status of the area to strength the reliability of a survey.

Statistical data analysis

The collected data were entered Microsoft Excel (2007) computer software program, analyzed using statistical package for social science (SPSS Version 20) and was described by using descriptive statistics for various parameters. Analysis of Variance (ANOVA) was used for quantitative variables like family size, land holding pattern and herd number per households.

Table 2: Livestock composition per household's level.

An index was used to calculate the overall ranking for qualitative data, such as production objectives, selection and culling criterias of dairy animals and the constraints of dairy cattle production according to the following formula;

Index = Σ of [3 for rank 1 + 2 for rank 2 + 1 for rank 3] given for particular qualitative variables divided by Σ of [3 for rank 1 + 2 for rank 2 + 1 for rank 3] for all qualitative variables considered [9].

The rate of inbreeding from effective population size for a randomly mated population was calculated as;

$Ne = 4NmCNf/(Nm+Nf)$

Where; Ne = Effective population size,

Nm = Number of breeding males and

NF = Number of breeding females.

The rate of inbreeding (DF) was calculated from Ne as;

$\Delta F = 1/2XNe$

Results and Discussion

Livestock Composition

As result is illustrated in table 2 except poultry and mule, livestock numbers in both districts were significantly different (p <0.001). There was higher herd number in the lowland (Quara) than mid land (Alefa) district. Availability of open grazing lands, productive performance of the herd, selling or culling strategies and experience of livestock keeping as the main source of income in Quara district than Alefa district might be the probable reason for herd number differences. The average number of cattle in Quara district was 4.69±0.39, 4.32±0.31, 9.77±0.83, 7.36±0.57, 8.71±0.99 and 5.84±0.42 for Oxen, Bulls, Cows, and Lactating cows, Calves and

Districts				
Livestock Composition (Mean ±SE)	**Quara (N=208)**	**Alefa (N=168)**	**Overall N=376**	**P-value**
Oxen	4.69±0.39	2.33±0.08	3.64±0.22	0.000***
Bull	4.32±0.31	1.58±0.08	3.10±0.19	0.000***
Cows	9.77±0.83	2.14±0.10	3.36±0.501	0.000***
Lactating cows	7.36±0.57	1.51±0.06	4.74±0.348	0.000***
Calves	8.71±0.99	1.85±0.99	5.64±0.575	0.000***
Heifers	5.84±0.42	1.70±0.11	3.98±0.261	0.000***
Average cattle population	**6.78±0.59**	**1.85±0.24**	**4.32±0.42**	**0.000*****
Goats	9.69±0.92	2.90±0.38	6.66±0.56	0.000***
Sheep	7.37±0.86	3.38±0.36	5.59±0.51	0.000***
Average shoat population	**8.53±0.89**	**3.14±0.37**	**5.84±0.63**	**0.000*****
Donkey	1.77±0.12	0.65±0.09	1.01±0.08	0.000***
Camel	0.08±0.01	0	0.03±0.002	0.000***
Mule	0.10±0.02	0.14±0.03	0.11±0.02	0.23 NS
Poultry	8.38±0.49	7.63±0.57	8.04±0.37	0.321NS
Heaves	0.26±0.49	0.76±0.18	0.48±0.09	0.004**

N=Number of Respondent, SE= Standard Error, **= shows significant difference (p <0.01),

***= shows significant difference (p <0.001), NS= Not significant.

Table 3: Farmer's production objective, selection, and culling criteria's.

Parameters	Districts								Overall
	Quara				Alefa				
	Rank				Rank				
Breeding objective	1st	2nd	3rd	Index	1st	2nd	3rd	Index	Index
Milk production	6	202	-	0.34	95	73	-	0.43	0.38
Draught purpose	138	-	34	0.36	60	28	78	0.31	0.33
Fuel consumption	-	4	32	0.03	-	20	29	0.06	0.05
Selling purpose	64	2	142	0.27	13	47	61	0.2	0.24
Total	208	208	208	1.00	168	168	168	1.00	1.00

Heifers, respectively. The current result for number of cows, oxen and heifers in Quara district was higher than 2.55±0.27, 1.48±0.15 and 1.58±0.21 for cows, oxen and heifers in Bahirdar zuria district respectively [10]. In addition to this, the average livestock number in Alefa district was 2.33±0.078, 1.58±0.08, 2.14±0.10, 1.51±0.06, 1.85±0.90 and 1.70±0.11 for Oxen, Bulls, Cows, and Lactating cows, Calves and Heifers, respectively. The average cattle population in Alefa (1.85±0.24) was lower than 5.08±0.35 and 4.7±0.34 for urban and peri-urban regions of the mid rift valley, Ethiopia [11], however the average cattle population (6.78±0.59) in Quara district was higher than this value.

Breeding Practices

Farmers production Objective: Breeding objective is the choice of farmers to which animals are specifically bred for assuming to genetically upgrade the next generation of animals in terms of their performance in relation to their parent generation, and focusing on one or more traits is the principle of breeding objective [12]. Breeding strategies should consider the existing breeding practices, management systems, and trait preference of farmers. Exploring indigenous knowledge for managing the herd, setting of breeding objectives, and finally designing appropriate mating systems with full participation of farmers is paramount importance to achieve farmers breeding objective [13]. The main production objective of farmers in Quara district was for draught, milk production, selling purpose and fuel production with index value of 0.36, 0.34, 0.27 and 0.03, respectively (Table 3). Similarly, Addis and Godadaw, [12] in Northern Amhara Regional State noted that, the primary production objective of farmers were to produce milk followed by

obtaining superior breeding bull and draught oxen. On the other hand, production objective of farmers in Alefa district were for milk production, draught power production, selling purpose and for fuel production purpose with index value of 0.43, 0.31, 0.2, and 0.06, respectively (Table 3). The other research finding illustrious that, in mixed production system farmers were kept their cows for production of milk, draught power, purchase of fertilizer and for land acquisition purpose [14].

Dam and sire selection criteria

Dam selection criteria: Selection of superior breed is the key factor to obtain improved breeding practice and has a strong influence on reproductive performance of the herd [13]. Farmers were select breeds based on their production objectives to meet their desire. In the study area respondents were tending to select traits that they desired. As described in table 4, temperament (0.02) and horn orientation (0.02) were not strongly desired for dam selection criteria in Quara district by the farmers, however pelvic shape, udder and navel size, milk production performance and coat color were their main selection criteria with index value of 0.30, 0.30, 0.20 and 0.20 respectively.

Dam selection criteria in Alefa district were udder, navel, and pelvic shape (0.35) followed by milk production performance (0.32), reproductive performance (0.23), temperament and coat color (0.05) and horn orientation (0.003), respectively. It was similar with Addis and Godadaw [12] illustrious that, most farmers in developing countries were preferred traits related to productive performance, but some farmers are intended to large teat and udder size. Similarly, the current result is in line with Mekonnin et al., [15] reported that, growth rate, productive and reproductive performances of cows are the most preferable trait by Cattle keepers in Ethiopian. In addition

Table 4: Farmer's dam selection criteria's.

Breeding practice	Districts								Overall
	Quara				Alefa				
	Rank				Rank				
Dam Selection criteria	1st	2nd	3rd	Index	1st	2nd	3rd	Index	Index
Milk production performance	18	90	68	0.20	7	150	-	0.32	0.26
Reproductive performance	90	35	70	0.30	35	7	116	0.23	0.27
Coat color	30	51	7	0.20	-	3	43	0.05	0.13
Horn orientation	5	8	6	0.02	-	-	3	0.003	0.01
Udder, navel and pelvic shape	57	16	55	0.30	111	4	6	0.35	0.33
Temperament	8	8	2	0.02	15	4	-	0.05	0.04
Total	208	208	208	1.00	168	168	168	1.00	1.00

Table 5: Farmer's sire selection criteria's.

Districts								
Breeding practice	**Quara**				**Alefa**				**Overall**
	Rank				**Rank**				
Sire selection criteria	**1st**	**2nd**	**3rd**	**Index**	**1st**	**2nd**	**3rd**	**Index**	**Index**
Body conformation	96	112	16	0.42	129	38	-	0.46	0.44
Coat color	31	86	89	0.28	13	117	37	0.31	0.29
Horn orientation	81	2	31	0.22	26	-	15	0.10	0.16
Temperament		8	43	0.05	-	13	71	0.10	0.08
Growth performance	-	-	29	0.02	-	-	45	0.04	0.03
Total	**208**	**208**	**208**	**1.00**	**168**	**168**	**168**	**1.00**	**1.00**

to this economical trait, coat color and adaptability also traditionally acceptable by most cattle keepers.

Sire Selection criteria: Selection of good genetic dam may not effective, unless superior bull is selected. The most common sire selection criteria of respondents in Quara districts were body conformation, coat color and horn orientation with index value of 0.42, 0.28 and 0.22, respectively. However, farmers were less considered for temperament (0.05) and growth performance (0.02). Similarly, the major sire selection criteria of farmers in Alefa district were body conformation (0.46) followed by coat color, horn orientation, temperament and growth performance with index value of 0.31, 0.10, 0.10 and 0.04, respectively. Respondents were reject to select sires having black coat color, similarly results in lowlands of North-West Ethiopia revealed that, Milk yield potential, body condition, coat color, and temperament were used as a selection criterion for breeding bulls [16]. Farmers in Metema district were interested in rutana breed, due to its temperament, coat color and milk production efficiency [17]. In addition to this, respondents in Borana zone of the lowland and mid highland areas were select breeding sire based on size, color, growth rate, and age of sexual maturity, horn orientation, adaptability, pedigree, and ability of walk long distances. Especially farmers were emphasized on size, coat color, libido and pedigree of animals as first, second and third criteria for selection, respectively [9] (Table 5).

Culling

Farmers were used different culling criteria based on their trait preferences. Most farmers in both districts were decided to cull the herd when they showed long AFS with index value of (0.38) and (0.3) for Quara and Alefa districts, respectively. In addition to this, farmers in Quara district were culled low productive herds, if they have high NSPC (0.19), long CI (0.18), aggressiveness or low temperament (0.15), low milk production (0.05), low mothering ability (0.03) and age (0.02), respectively. On the other hand, culling criteria in Alefa district were, long CI (0.28), high NSPC (0.20), aggressiveness or low temperament (0.12), low mothering ability (0.05) and age (0.03) were their culling criteria. Similarly, farmers in Tach Gayint district were applying their indigenous knowledge in selection and culling criteria. Farmers common culling criteria were, low growth rate, long age of calving, low milk producer with low mothering ability and none docility [18] (Table 6).

Breeding system and adoption of synchronization

About 208 (100%) of respondents in Quara were using the natural breeding system. This implies that, no improved technology like Artificial insemination and synchronization were practiced. Respondents and office of animal health protection and production at district level noted that, the main problem to use improved breeding technology were absence of infrastructure, breeding materials (semen, insemination gun, liquid nitrogen), a skilled technician,

Table 6: Farmer's reason of culling their dairy cows.

Districts								
	Quara				**Alefa**				**Overall**
	Rank				**Rank**				
Reason of Culling	**1st**	**2nd**	**3rd**	**Index**	**1st**	**2nd**	**3rd**	**Index**	**Index**
Long AFS	91	76	50	0.38	39	90	-	0.30	0.34
Long CI	56	25	-	0.18	92	2	-	0.28	0.23
High NSPC	26	36	80	0.19	24	24	79	0.20	0.20
Low milk production	15	-	22	0.05	-	-	24	0.02	0.04
Low mothering ability	5	-	26	0.03	-	-	47	0.05	0.04
Temperament	5	71	30	0.15	-	52	18	0.12	0.13
Age	10	-	-	0.02	13	-	-	0.03	0.02
Total	**208**	**208**	**208**	**1.00**	**168**	**168**	**168**	**1.00**	**1.00**

Index = Σ of [3 for rank 1 + 2 for rank 2 + 1 for rank 3] given for particular qualitative variables divided by Σ of [3 for rank 1 + 2 for rank 2 + 1 for rank 3] for all qualitative variable considered, R1, R2 and R3= Rank1, Rank 2 and Rank 3.

Table 7: Breeding system and source of bull.

Descriptives	Quara		Alefa		Overall	
Breeding System	**N**	**Percent**	**N**	**Percent**	**N**	**Percent**
Natural	208	100	148	88.1	356	94.7
AI	-	-	9	5.4	9	2.4
Both	-	-	11	6.5	11	2.9
Synchronization						
Yes	-	-	28	16.7	28	7.4
No	208	100	140	83.3	348	92.6
Source of Bull						
Own	98	47.1	39	23.2	137	36.4
Neighbors	60	28.8	74	44.0	134	35.6
Rent	-	-	13	7.7	13	3.5
Communal grazing	31	14.9	42	25.0	73	19.4
Own and Neighbors	16	7.7	-	-	16	4.3
Own and Rent	3	1.4	-	-	3	0.8

AI= Artificial Insemination, N=number of respondents

farmers' perception, shortage of feed, water and absence of breeding policy were the most important challenges.

The current result is close to previous studies, which was conducted by Assefa et al., [18] at Tach Gayint District, North Gondar Zone noted that, 97.2% of respondents in the area were used natural breeding system. There was a similar problem in Kucha district getting on Artificial insemination service [19]. About 148 (88.1%), 11 (6.5%) and 9 (5.4%) of respondents in Alefa district were used natural, both natural and AI technology and AI only, respectively. In addition to AI service about 16.7% of respondent in Alefa district were used hormonal synchronization while the majority (83.3%) of respondents was not used hormonal synchronization. This revealed that breeding practice in Alefa district was slightly better than Quara district, the reason was opportunity of AI service, awareness of farmers and availability of infrastructures in Alefa district was better than Quara district.

Source of breeding bull

About 44.4, 25, 23.2, and 7.7% of respondents in Alefa district were used breeding bull from a neighbor, communal grazing land, own and rent bull, respectively (Table 7). While the majority (47.1%) of respondents in Quara district were used own bull. The rest was used neighbor (28.8%), communal grazing bull (14.9%), own and neighbor (7.7%), and own and rent bull (1.4%). Most farmers were used uncontrolled breeding system, since respondents were used communal grazing bull and unselect breeding bull. This result was in line with Debir [13] reported that, natural matting system was the main breeding practice in Ethiopia. Similarly, Dejene [9] reported that, majority of farmers in low land areas of Borana zone were used breeding bull at communal grazing land.

Effective population size and level of inbreeding rate

Inbreeding is the mating of individuals, organisms that are genetically close related. It can increase the chances of offspring being

Table 8: Effective population size and level of inbreeding rate.

Districts	Nm	NF	Ne	ΔF
Quara	2.80	9.60	9.0	0.05
Alefa	1.20	3.30	3.2	0.15

NB: Ne = (4Nm × NF) / (Nm + NF); Where Ne = effective population size, Nm = number of breeding males and NF = number of breeding Females. The rate of inbreeding (ΔF) was calculated from Ne as, ΔF = 1/2Ne.

affected by recessive or deleterious traits, decreased biological fitness, and disease resistance and growth performance of the population (https://en.wikipedia.org/wiki). In this independent districts, under uncontrolled random mating (Ne and ΔF) for Quara district was 9.0 and 0.05, respectively. While Ne and ΔF for Alefa district was 3.2 and 0.15, respectively. This revealed that, the danger of inbreeding was higher in Alefa (midland) than Quara (low land) areas.

The probable reason for this result might be, the availability of effective breeding bulls in Quara district were enough comparing with Alefa district. Because most farmers in Alefa (midland) were castrated the bull to use as a drought power and cattle herds were kept separately in their private grazing land will decrease the chance of breeding cows to mate with different bulls. On the contrary, the livestock production system in Quara district was dominated by extensive system and it gives probability for cows/ heifers to serve by different bulls. This result was consistent with finding of Dejene [9], in lowland and midland. Agroecologies of Borana zone noted that, there was a less inbreeding effect in lowland than the midland area of Borana zone (Table 8).

Conclusion

The main production objective of farmers in Quara district was for draught, milk production, selling purpose and fuel production with index value of 0.36, 0.34, 0.27 and 0.03, respectively. On the other hand, production objective of farmers in Alefa district were for milk production, draught power production, selling purpose and for fuel production purpose with index value of 0.43, 0.31, 0.2,

and 0.06, respectively. The main selection criteria for dam and sire in both districts were reproductive performance, body conformation and coat color. Most farmers in both districts were decided to cull the herd when they showed long AFS with index value of (0.38) and (0.3) for Quara and Alefa districts, respectively. About 208 (100%) of respondents in Quara were using the natural breeding system. while about 88.1, 6.5 and 5.4 of respondents in Alefa district were used natural, both natural and AI technology and AI only, respectively. Majority (44.4%) of respondents in Alefa district were used breeding bull from a neighbor, while the majority (47.1%) of respondents in Quara district were used their own bull. The danger of inbreeding was higher in Alefa district than Quara district.

Recommendations

Farmers shall have modern breeding objective to precede the livestock sector in to commercialization than consumption.

There shall be improved breeding technologies in the study areas like artificial insemination and Synchronization.

Farmers shall be used selected bulls to decrease inbreeding rate in the study areas.

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