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REPRODUCTIVE PERFORMANCES OF FOGERA CATTLE AT METEKEL CATTLE BREEDING AND MULTIPLICATION RANCH, NORTH WEST RTHIOPIA

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ORIGINAL ARTICLE

ABSTRACT: *The study was conducted to evaluate the reproductive performance and to asses non-genetic factors affecting the reproductive performance of Fogera cattle breed kept at Metekel ranch. For this purpose data collected from 1996 to 2008 in the ranch were used. The data were analyzed using the general linear model procedures of statistical analysis system. The effect of mating system, parity of dam, year of birth and calving, season of birth and calving, sex of calf, and sire breed were considered as fixed effects for evaluating different reproductive parameters. The overall least square means for number of services per conception (NSP), age at first calving (AFC), calving interval (CI), gestation length (GL) and days open (DO) were 1.28±0.06 and 50.8±0.36 months, 587±5.44, 282±0.26 and 285±4.3 days, respectively. The number of services per conception was significantly (P<0.05) affected by mating system. Age at first calving was affected significantly (P<0.05) by year of birth. Calving interval was significantly influenced by parity of dam and season of calving (P<0.05) and year of calving (P<0.01). Gestation length was significantly affected by season of calving and breed of sire (P<0.01) and parity of dam (P<0.05) but not affected by sex of calf (P>0.05). Days open was significantly (P<0.01) affected by year of birth. From the present study, it can be concluded that the non-genetic factors had exerted significant effects on the reproductive performance of Fogera Cattle breed kept at ranch. Thus, to improve reproductive performance of the Fogera cattle breed, great effort should be made towards mitigating negative impacts of those non-genetic factors.*

Keywords: *Age at first calving, calving interval, days open, Fogera cattle, gestation length*

INTRODUCTION

Cattle are very important livestock species in the traditional mixed crop livestock production systems of Ethiopia by providing mainly drought power, a small amount of milk, meat usually when they retire and manure. The cattle population of Ethiopia, estimated at 47.57 million (CSA, 2008), are well adapted to the tropical environment producing and reproducing under stresses of high degree of temperature, high disease prevalence and low level of nutritional status. However, they are said to be low in milk and meat production. The Fogera cattle are among the 27 recognized indigenous cattle breeds in Ethiopia and it is found distributed around Lake Tana in south Gonder and west Gojjam zone of Amhara region, Ethiopia (Addisu et al., 2010). Though there is no objective data confirming their utility, they are called triple use; drought, milk and meat (Addisu et al., 2010). The population of Fogera cattle was estimated to be around 800,000 in 1980s (Alberro and Haile-Mariam, 1982) and 15,000 heads in 2000s (Gebeyehu et al., 2004). Phenotypicaly, they are characterised as large size and tall animals with long legs. Their identifiable coat color being white with black spots or

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pure white, have small horns, very large dew-lap, pendulous naval flap and preputial sheath, and they are docile. The hump is small and cervical or cervico-thoracic in position representing the sanga influence. These cattle are as intermediate zebu-sanga type, the so-called zanga (Alberro and Haile-Mariam, 1982).

Fogera cattle breeding and multiplication ranch was established on the aim of conserving and improving the breed for its milk yield. Reproductive parameters are among the most important traits affecting progress in selection. This paper reports some reproductive performance traits and non-genetic factors affecting it of Fogera cattle kept in government cattle breeding and multiplication ranch.

MATERIALS AND METHODS

Description of the study area

Metekel cattle breeding and improvement ranch is found in Agew-Awi zone of the Amhara national regional state, Ethiopia. Metekel is located at 10º55´ North latitude and 36º26´ East longitude. It has an elevation ranging between 1500 and 1680 m a.s.l and it is rimmed by hills reaching up to 2000 m a.s.l high (MOA, 1988).The climate of the area can be classified as sub-humid, characterized by contrasting very wet and very dry seasons. Metekel has a bi-modal distribution of rainfall receiving the highest amount of precipitation from May to October (*Kiremt*) while the short rainy season (*Belg*) is between February and April. The dry season is from November to January. The mean annual rainfall is 1615 mm. Average temperature ranges from 12 to 27ºC, with monthly mean minimum and maximum occurring in December (7.9ºC) and in April (31.2ºC), respectively (ENMA, unpublished).

The soil at the ranch can be broadly classified as red, brownish-red and dark brown, derived from basaltic rocks and characterized by moderate drainage. The vegetation is mostly composed of perennial grasses. Few scattered trees (5%) are also present. The range condition varies from poor to fair due different environmental and human factors. According to MOA (1988) the vegetation is divided in to three (less desirable, desirable and undesirable) based on their nutritional importance to the cattle. The less desirable species prevail in the pasture and their proportion is around 35%. They are mainly represented by *Digitaria abyssinica, Cynodon dactylon, Sporobolus natalensis, Setaria pumila, Kullinga odorata,* and *Digitaria ternata.* Among the desirable species (25%) the most representative ones are *Paspalum orbiculare, Setaria sphacelata* and *Hyperrhenia* species. Undesirable species which accounts to 30% are *Coreopsis* species, *Borreria* species, *Guizotia scabra.* Scattered bushes not grazed by animals such as *Argyrolobium* species, *Clemtis hirsuta, Leonotis* species are also found (MOA, 1988).

Management practices

Cattle breeding and management

The breeding program has two components, selection and crossbreeding. In the selection program, Fogera bulls used to run with Fogera cows with a ratio of one bull per 50 cows to which the bull could be changed when it loses condition. The heifers were allowed for mating for the first time when they are two years of age. Mating was seasonal and confined to the months from June to October. However, since June 1995 a year round mating scheme has been introduced. Replacement bull calves and female calves were selected based on their physical characteristics, growth performance and health status. For the crossbreeding program, Fogera cows were artificially inseminated with Friesian semen throughout the year.

Cattle were herded based on breed, sex and age groups. During the day time, animals graze on natural pasture. The main sources of water are year-round rivers; namely Ardi and Dura bounding the ranch and also tap-water for lactating Fogera cows, crossbred stock and sick animals.

As to the herd health management, there was vaccination against blackleg, pasturellosis, and anthrax in every 6 to 8 months and once per year for Contagious Bovine Pleuro Pneumonia (CBPP). Deworming was practiced twice a year, at the beginning and end of the rainy season. To control external parasites, Fogera cattle were sprayed once in every two weeks when infestation is high, usually during March to October and once in a month in November to February, when infestation was low. Crossbreds were treated every week in peak season and once in two weeks when infestation was low.

Data source and management

Data collected from 1996 to 2008 at Metekel cattle breeding ranch was used for the study. The data were extracted and compiled from records kept on each individual animal record and field books. Records had date of entry, calving date, identification number, sex of animal, date and reason of exit, weight records with calving date, calf number, dam and sire number, birth and weaning weight and date, service date and calving date. Data were entered and managed using Excel spread sheet.

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Number of services per conception (NSC) was calculated for heifers and cows that are successfully conceived either from natural mating or artificial insemination. Those which didn't conceive were excluded. Days open (DO) and calving interval (CI) were estimated from all Fogera cows having more than one normal calving while gestation length (GL) was estimated for cows with proper parturition. Ages at first calving was calculated for cows born in the ranch and have full information about their breeding performances. Gestation length was evaluated by subtracting the date of conception from the date of parturition. Similarly, days open was calculated from date of last parturition to the next successful conception mating date and calving interval was calculated by adding gestation length and days open.

Statistical analysis

Data were analyzed using the general linear model procedures (GLM) of SAS (2003). The fixed effects considered in the model were parity of the dam, sex of calf, year and season of calving and mating system. Probability of differences was used to determine any significance differences between the means.

The model used to analyse the data was,

$Y_{ijklm} = \mu + M_i + P_j + R_k + S_l + Z_m + e_{ijklm}$

Where: Y_{ijklm} = observation on NSC, DO, CI, AFC and GL

μ = overall mean

M_i = effect mating system (i = Natural, AI) only for NSC

P_j = effect parity of the dam (j = 1, 2, ..., ≥7)

R_k = effect sex of calf on gestation length (k = Male, Female) only for GL

S_l = effect season of calving (l = Main rain, Dry, Short rain)

Z_m = effect year of service, calving (m = 1996, 1997, ..., 2008)

e_{ijklm} = random error

RESULTS AND DISCUSSION

Number of services per conception

Number of services per conception is the number of services (natural or artificial) required for successful conception. The number of inseminations required to produce a live calf is one of the most useful parameters of reproductive efficiency which mainly depends on the breeding system used. It is higher under uncontrolled natural breeding than hand-mating and artificial insemination.

The overall least squares mean NSC obtained in the present study was 1.28±0.06 (Table 1). Usually, according to Mukassa-Mugrewa (1989), values of NSC greater than 2 are regarded as poor. This estimated value is higher than the value, 1.11, reported for Barka cattle (Haile-Mariam and Mekonen, 1996). However, it is less than the indigenous cattle breeds' performance reported for highland zebu (Adebabay, 2009), 1.54 for Fogera cattle (Giday, 2001; Gebeyehu et al., 2005), 1.81 for Ethiopian Boran (Haile-Mariam and Kassamersha, 1994).

Among the fixed effects considered, only mating system showed significant effect (P<0.05). Cows that were mated by natural mating had lower number of services per conception than cows artificially inseminated (1.27±0.04 vs. 1.38±0.03). This might be due to the inefficiency of artificial insemination operations as reported by Enyew (1992) and/or might be because of insemination resulting from improper heat detection by herds men. The same result was observed in previous studies by Negussei et al. (1999) at Assella and Fisseha (2007) at Allage for Holstein Friesian cows.

Days open

The overall least squares mean of days open (DO) was found to be 285±4.3 days (Table 1) which is in comparison with the findings of Giday (2001) with 280±3.4 days for the same breed at Andassa cattle breeding ranch. On the other hand, Haile-Mariam and Mekonnen (1987) reported a mean DO of 151±13 days for the same breed which was significantly lower than the present study. In addition, Azage (1981) reported 215 days and 250 days of DO for highland and lowland zebu cows, respectively. Factors like delayed resumption of ovarian activity after calving, longer interval to first oestrus and a brief shorter duration of oestrus along with its silent symptoms, scarcity and deterioration of available feeds, might have contributed to difficulty in heat detection and timely insemination of the cows resulting in prolonged DO. In addition, allowing calves to suckle their dams up to weaning may interfere with ovarian function (Giday, 2001).

Year of birth showed significant (P<0.01) influence on DO. The lowest DO (183±15.1 days) was recorded in the year 2008, while the highest (311±16.2 days) was recorded in 2000. In general, the trend of DO over the years was inconsistent showing a variation of up to 128 days within a breed. The increased DO observed in the years might be because of inconsistency in the level of management related to shortage of supplementary feed in dry period, poor

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oestrus detection, insufficient AI services, absence of regular follow up of breeder cows and other related technical problems. Similar effect of year of birth on DO was also reported by Giday (2001) on the same breed in another location. Season of birth showed no significant (P>0.05) effect on days open. Similar results were also reported in the literature (Haile-Mariam and Mekonnen, 1987; Agyemang and Nkhonjera, 1990; Asheber, 1992). On the other hand, significant effects of season were also reported by Azage (1981), Rao et al. (1984) and Giday (2001).

Parity of dam had no significant (P>0.05) effect on DO which agrees with the reports of Haile-Mariam and Mekonnen (1987) and Agyemang and Nkhonjera (1990). In contrast, Asheber (1992), Enyew (1992) and Giday (2001) found significant influence on DO.

Table 1- Least square mean and standard error (LSM±SE) of number of service per conception, days open and calving interval of Fogera cattle

Parameter	Number of services per conception		Days open (days)		Calving interval (days)	
	N	LSM±SE	N	LSM+SE	N	LSM+SE
Overall	1410	1.28±0.06	378	285±4.3	536	587±5.44
Mating system		*				
Natural	756	1.27±0.04[b]				
Artificial Insemination	654	1.38±0.03[a]				
Parity		NS		NS		*
1	364	1.29±0.03	78	271±8.4	181	599±7.5[a]
2	340	1.31±0.03	90	286±7.7	137	581±8.8[ab]
3	277	1.27±0.04	81	288±8.4	101	559±9.8[b]
4	173	1.38±0.05	63	285±9.3	59	572±12.8[ab]
5	140	1.36±0.05	41	287±11.2	32	564±17.2[b]
6	74	1.28±0.07	19	275±16.3	20	561±21.6[b]
7	42	1.42±0.09	6	316±28.4	6	536±38.4[c]
Year		NS		**		**
1999	26	1.35± 0.12		-	40	566±16.9[ab]
2000	25	1.57±0.12	20	311±16.2[a]	57	581±14.6[ab]
2001	75	1.41± 0.07	22	297±15.6[ab]	21	551±21.6[b]
2002	71	1.31± 0.08	20	305±16.8[ab]	62	606±13.7[a]
2003	223	1.30± 0.04	12	310±20.6[a]	31	586±17.9[a]
2004	139	1.30± 0.05	67	298±9.9[ab]	125	588±10.2[a]
2005	166	1.23± 0.04	43	306±11.3[ab]	153	571±9.8[ab]
2006	283	1.30± 0.03	61	276±9.9[b]	47	492±14.5[c]
2007	359	1.27±0.03	110	295±7.8[ab]		-
2008	43	1.22±0.09	23	183±15.1[c]		-
Season				NS		*
Main rain			194	287±7.2	275	577±9.06[a]
Dry			69	292±9.7	125	567±10.47[ab]
Short rain			15	281±8.1	136	558±10.58[b]

[ab] Means in a column with different superscripts are significantly different; NS: Non-significant (P>0.05); *:p<0.05; **:P<0.01; N: Number of observations

Calving interval

The overall mean calving interval (CI) obtained in the present study was 587±5.44 days (Table 1). The value obtained is lower than the value from previous findings (780 days) of Mukasa-Mugerwa (1989), for traditionally managed Ethiopian highland zebu but higher than the reports of Getinet et al. (2009) 492±13.2 days for Ogaden cattle, 534±17.6 days and 479 days for Boran breed (Azage 1981 and Ababu 2002) and Giday (2001) for Fogera cattle.

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The longer calving interval obtained than the ideal value might be due to too long days open emanated from difficulties in heat detection and overall managerial activities. In addition, occurrence of silent and night heats and short heat periods are common phenomena among zebu cows (Trail et al., 1985).

Season of calving had a significant (P<0.05) effect on calving interval. Short CI was observed for cows which calved during the short rainy season than those calved during dry and long rainy season. This could be due to the availability of adequate pasture during this and the coming main rainy season which may enable the cow in good condition during and after calving for re-conception in the following breeding season. On the contrary, cows calved during the main rainy season had the longest CI. This might be because of lack of green pasture and supplementary feed in the coming dry season and due to the incidence of skin disease (Demodex) during main rainy season. Significant effect of season of birth on CI was also reported by Haile-Mariam (1987), and Ababu (2002) working on Boran, Asheber (1992), Addisu (1999) and Giday (2001) on Fogera cattle.

The CI was affected significantly (P<0.01) by year of calving. However, there was no clear trend of effect of year. The possible reason might be the differences in nutritional and management aspects between years. This significant effect of the year is in agreement with other findings (Enyew, 1992; Haile-Mariam and Mekonnen, 1996; Addisu, 1999; Giday, 2001; Getinet et al., 2009).

Parity of the dam was an important source of variation (P<0.05) on calving interval. The general trend obtained was calving interval decreases as parity increased. The longest and shortest calving intervals were recorded at the first and seventh parities, respectively. The longer calving interval in younger cows might be due to higher nutrient requirement for growth in addition to milk production and maintenance thus delays the onset of postpartum heat. Similar effect of parity is reported by other scholars (Rege et al., 1994; Addisu, 1999; Giday, 2001; Ababu, 2002; Getinet et al., 2009). However, others (Agyemang and Nkhonjera, 1990; Haile-Mariam and Mekonnen, 1996) reported non-significant effect of parity on CI.

Age at first calving

The least squares mean age at first calving (AFC) obtained in the present study is presented in Table 2. The reported value (50.83±0.36 months) is comparable with the value obtained for Ogaden cattle (Getinet et al., 2009). However, it is relatively higher than the values reported for Boran cattle (Swensson et al., 1981; Kassa and Arnason, 1986), for *Bos indicus* cattle *(*Mukasa-Mugerwa, 1989) and for Fogera cattle (Adissu, 1999). On the contrary, it is lower than values reported for Fogera cows at Andassa (Giday, 2001).

Year of birth had a significant (P<0.01) effect on AFC to which heifers born in 1997 calved at younger age than heifers born in the preceding years. In general, AFC increased as year goes from 1996 to 2004. Significant effect of year of birth on AFC is reported in the literature (Kiwuwa et al., 1983; Haile-Mariam, 1987; Asheber, 1992; Haile-Mariam and Mekonnen, 1996; Adissu, 1999; Gebeyehu, 1999; Giday, 2001; Getinet et al., 2009).

Season of birth had no significant (P>0.05) influence on AFC. This may be for the reason that the time gap between birth and AFC is long enough to mask the effect of season of birth. This was similar to finding of researchers (Azage, 1981; Saeed et al., 1987; Asheber, 1992; Haile-Mariam and Mekonnen, 1996; Adissu, 1999; Giday, 2001; Getinet et al., 2009) while disagrees with Haile-Mariam (1987) who reports significant effect of birth season on age at first calving.

Gestation length

The overall least squares mean gestation length (GL) in the present study was 283±0.26 days (Table 3) which is in comparison to the report of Azage (1981) for lowland local pure Zebu and Barka cattle, Ababu (2002) for Boran cattle, Giday (2001) for Fogera cattle. However, the figure is higher than the finding of Enyew (1992) reported for Arsi cattle.

In the present study, sex of the calf had no significant (P>0.05) influence on GL. Non significant effect of sex of the calf on GL was also reported by Taylor et al. (1984), Asheber (1992), Haile-Mariam and Mekonnen (1996), Addisu (1999) and Giday (2001). On the contrary, Getinet et al. (2009) found significant influence of sex of the calf on GL.

Season of calving had a significant influence (P<0.01) on GL that cows calved in the main rainy season had longer GL than those calved in the dry and short rainy seasons. This finding is in agreement with the reports of Asheber (1992) for Fogera cows, Enyew (1992) for Friesian-Arsi crosses, Haile-Mariam and Mekonnen (1996) for Boran and Barka breeds and Addisu (1999) for Fogera cattle breed.

Parity also affected (P<0.05) gestation length. Longer gestation length was observed in the seventh parity while shorter gestation length in the second parity showing that older cows carried their calves for longer days than younger cows because of relatively larger uterus. Similar result was observed by Hafez (1980) and Haile-Mariam and Mekonnen (1996). Breed of sire had significant (P<0.01) effect on gestation length. Cows mated to pure Fogera bulls carried their calves for 6.2 days longer than those artificially inseminated with Fresian semen. Similarly, Addisu (1999) observed that cows mated to Fogera bulls carried their calves longer than cows inseminated artificially with Friesian semen on the same

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breed. Similar result was reported by Haile-Mariam and Mekonnen (1987). This might be due to the reason that the birth process is initiated at earlier stage of gestation among fast growing breeds than among slow growing breeds (Bourdon and Brinks, 1982). It is also a well-established fact that gestation length is influenced by paternal genotype but not by maternal genotype.

Table 2 - Least square mean and standard error (LSM±SE) of age at first calving and gestation length of Fogera cattle

Parameter	Age at first calving (months)		Gestation length (days)	
	N	LSM±SE	N	LSM±SE
Overall	406	50.8±0.36	1264	282±0.26
Season		NS		**
Main rain	195	49.6±0.33	656	284±0.25[a]
Dry	78	50.0±0.49	260	282±0.36[b]
Short rain	133	50.6±0.38	348	282±0.31[b]
Year of birth		**		
1996	20	47.0±0.93[c]		
1997	21	46.9±0.91[c]		
1998	30	48.8±0.76[bc]		
1999	43	52.6±0.63[a]		
2000	82	50.7±0.47[ab]		
2001	91	52.5±0.44[a]		
2002	68	52.1±0.52[a]		
2003	39	49.6±0.66[b]		
2004	12	50.6±1.20[ab]		
Sex of calf				NS
Male			654	283±0.26
Female			610	282±0.26
Parity				*
1			321	282±0.32[b]
2			310	281±0.31[c]
3			246	282±0.35[b]
4			161	283±0.43[b]
5			124	283±0.49[b]
6			65	283±0.68[ab]
7			37	284±0.89[a]
Sire breed				**
Fogera			663	286±0.29[a]
Friesian			601	279±0.25[b]

[ab] Means in a column with different superscripts are significantly different; NS: Non-significant (P>0.05); *: p<0.05; **P<0.01; N: Number of observations

CONCLUSSION

The reproductive performance of Fogera cattle are within the range of values reported for other tropical and particularly Ethiopian cattle breeds. Almost all the non-genetic factors considered affected the traits considered indicating the importance of improving the factors on the performances of productivity. Similarly, the present study implies the decline of management as compared to previous reports made which needs due attention.

In general, to improve the reproductive performance, follow up and continuous evaluation of herd reproductive performance needs to be taken to identify the major environmental factors that affect the herd fertility and devise management strategies for improved performance.

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REFERENCES

Ababu D (2002). Evaluation of performance of Boran cows in the production of crossbred dairy heifers at Abernosa ranch Ethiopia. MSc Thesis. Alemaya, Ethiopia.

Addisu B (1999). Evaluation of reproductive and growth performance of Fogera cattle and their F_1-Friesian crosses at Metekel Ranch, Ethiopia. MSc Thesis Alemaya University, Alemaya, Ethiopia.

Adebabay K (2009). Characterization of Dairy Production Systems, Marketing and On- Farm Evaluation of the Effect of Feed Supplementation on Milk Yield and Composition at Bure district, Ethiopia. MSc Thesis Bahir Dar University. Bahir Dar, Ethiopia.

Agyemang K and Nkhojera LP (1990). Productivity of crossbred cattle on smallholder farms in southern Malawi. Tropical Animal Health Production 22: 9-15.

Alberro M and Haile-Mariam S (1982). The indigenous cattle of Ethiopia. Part-I. World Animal Review, No. 41: 1-2.

Asheber S (1992). Evaluation of the reproductive and preweaning growth performance of Fogera cattle and their F_1 Fresian crosses at Andassa cattle breeding station. MSc Thesis, Alemaya University. Alemaya, Ethiopia. 47p.

Azage T (1981). Reproductive performance of pure zebu cattle and their crosses with temperate breeds in Ethiopia. MSc Thesis, Alemaya University. Alemaya, Ethiopia.

Bourdon RM and Brinks JS (1982). Genetic, environmental and phenotypic relations among gestation length, birth weights, growth rates and age at first calving in beef cattle. Journal of Animal Science 53: 543-553.

CSA (2008). Federal Democratic Republic of Ethiopia, Central Statistical Agency (CSA) Agricultural Sample Survey. Addis Ababa, Ethiopia.

Enyew N (1992). Reproductive performance of local and crossbred dairy cattle at the Asella livestock farm. MSc Thesis, Alemaya University. Alemaya, Ethiopia. 58p.

Fisseha M (2007). Reproductive and productive performance of Holstein Friesian cattle at Alage, Southern Ethiopia. MSc Thesis Alemaya University. Alemaya, Ethiopia.

Gebeyehu G (1999). Reproductive and productive performance of Friesian-Boran crossbred cattle at Cheffa State farm, Wello, Ethiopia. MSc Thesis, Alemaya University, Ethiopia.

Gebeyehu G, Asmare A and Asseged B (2005). Reproductive performances of Fogera cattle and their Friesian crosses in Andassa ranch, Northwestern Ethiopia. http://www.cipav.org.co/lrrd/lrrd17/12/gosh17131.htm

Gebeyehu G, Tegegne A, Mulugeta T, Agide A (2004). Preliminary report on the distribution of *Fogera* cattle around Lake Tana, Ethiopia. Addis Ababa, ESAP. Proceedings of the 11th annual conference of the Ethiopian Society of Animal Production (ESAP), Addis Ababa, Ethiopia, 203-207.

Getinet M, Workneh A and Hegde BP (2009). Growth and reproductive performance of Ogaden cattle at Haramaya University, Ethiopia. Ethiopian Journal of Animal Production 9(1):13-38.

Giday YE (2001). Assessment of calf crop productivity and total herd life of Fogera cows at Andassa ranch in North-western Ethiopia. MSc Thesis, Alemaya University, Alemaya, Ethiopia.

Hafez ESE (1980). Reproduction in Farm Animals, 4th edn, Lea and Febiger. Philadelphia, U.S.A., 627.

Haile-Mariam M (1987). Evaluation of growth and reproductive performance of Borana cattle and their crosses with Friesian at Abernossa, Shoa, Ethiopia. MSc Thesis, Alemaya University. Alemaya, Ethiopia. 59p.

Haile-Mariam M and Kassamersha H (1994). Genetic and environmental effects on age at first calving and calving interval of naturally bred Boran (zebu) cows in Ethiopia. Animal Production, *58*: 329-334.

Haile-Mariam M and Mekonnen G (1987). Reproductive performance of Fogera cattle and their Friesian crosses. Ethiopian Journal of Agricultural Science 9(2): 95-114.

Haile-Mariam M and Mekonnen G (1996). Reproductive performance of Zebu, Friesian and Friesian-Zebu crosses. Tropical Agriculture 72 (3): 142–147.

Kassa A and Arnason T (1986). Non-genetic factors affecting growth in Boran cattle. World Review of Animal Production 22: 45-55.

Kiwuwa GH, Trail JCM, Kurtu MY, Worku G, Androson FM and Durkin J (1983). Crossbred dairy cattle productivity in Arsi region, Ethiopia. ILCA Research Report No.11. ARDU and ILCA, Addis Ababa, Ethiopia.

MOA (Ministry of Agriculture) (1988). Metekel Cattle Breeding and Improvement Ranch. Project Document, Addis Ababa, Ethiopia.

Mukasa-Mugerwa E (1989). A review of reproductive performance of female *Bos indicus* Zebu cattle. ILCA Monograph. Addis Ababa, Ethiopia. 6: 45-64.

Rao KB, Sivaiah K and Rao LS (1984). Some reproductive traits among three breed crossbred heifers. Indian Journal Animal Science 54: 201-203.

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Journal homepage: http://www.ojafr.ir

Rege JEO, Aboagye GS, Ahah S and Ahunu BK (1994). Crossbreeding Jersey with Ghana Short horn and Sokoto Gudali cattle in a tropical environment: additive and heterotic effects for milk production, reproduction and calf growth traits. Animal Production 59: 21-29.

Saeed AM, Ward PN, Light D, Durkin JW and Wilson RT (1987). Characterization of Kenana cattle at Um Banein, Sudan. pp12 - 23. Research Report No.16. ILCA, Addis Ababa, Ethiopia.

Swensson C, Schaar J, Brännäng E and Meskel CB (1981) Breeding activities of the Ethio-Swedish integrated Rural Development Project. World Animal Review. No. 37- 40: 31-36.

Taylor CM, Singh A and Singh BN (1984). Gestation period in Malvi cattle. Indian Veterinary Journal 61: 490-495.

Trail JCM, Sones K, Jibbo JMC, Durkin J, Light DE and Murray M (1985). Productivity of Boran cattle maintained by chemoprophylaxis under trypanosomiasis risk. ILCA Research Report. No.9. ILCA, Addis Ababa, Ethiopia.

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Journal homepage: http://www.ojafr.ir