

**Original Article****Production and Reproduction Performance of Simada Cattle
Population in Three Districts of North-Western Ethiopia****Melkam Tsega¹, Yosef Tadesse² and Mengistu Urge³**¹Injibara university department of animal science, Ethiopia^{2,3}Haramaya University, Dire Dawa, Ethiopia**ABSTRACT**

The study was conducted to assess production and reproduction performance of Simada cattle population in three districts of North-Western Ethiopia. Data were collected through semi-structured questionnaire, focus group discussions and field observations. A total of 180 households 60 from each district and 15 from each kebele were randomly selected to fill the structured questionnaire. Overall, average lactation length and milk production per cow per day was reported to be 8.67 ± 1.062 months and $1.59 \pm .17$ liters, respectively. The overall age at which male first serve a female, age at first mating of female, age at first calving and calving interval of Simada cattle were estimated to be 38.56 ± 5.17 , 45.60 ± 4.78 , 57.74 ± 4.76 and 17.89 ± 2.03 months, respectively. In general, from the current study it could be concluded that Simada cattle are the sole source of breeding and milk production in the study area, and they have potential for greater contribution through better feeding, health management and genetic improvement.

Keywords: Production, Reproduction, Simada cattle.

INTRODUCTION

Livestock products in Ethiopia are often used for household consumption and/or sold to finance the purchase of basic household commodities such as coffee, salt, cooking oil, sugar, etc, (CSA, 2015). According to the report of the same source, out of the total annual livestock products, 46.36% of milk, 59.24% of butter, 79.89% of cheese, 41.22% of honey, 44.13 % of wax and 26.84 % of egg was used for household consumption. In Ethiopia dairy production mainly depends on indigenous livestock genetic resources; more specifically on cattle that covers the largest contribution (81%) of the total national annual milk yield (Belay, 2016). About 98.59 % of the total cattle in the country are local breeds, the remaining are hybrid and exotic breeds that accounted about 1.22 % and 0.19 %, respectively (CSA, 2016). Indigenous livestock breeds in Ethiopia are a valuable source of genetic material because of their adaptation to harsh climatic conditions, their ability to better utilize the limited and poor

Corresponding Author: Melkam Tsega < tsegamelkam83@gmail.com >

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quality feed resources and their tolerance to a range of diseases found in these regions (Fasil and Workneh, 2014).

Simada breeds are said to have good performance in its natural environment (Getie *et al.*, 2015). Simada cattle population adapts to harsh climatic conditions, known for its ability to better utilize the limited and poor quality feed resources and their tolerance to a range of disease found in the production areas (Zewdu, 2004).

However, despite the significant contribution of cattle to the area, little research has been done so far to identify the overall productive and reproductive performances of Simada cattle population in the area. The work done by Getie *et al.*, (2015) which is focused on Breeding Practice and Productive Performance of Simada Cattle in Tach Gayint District suggested further studies to identify the indigenous cattle population and general characteristics of the production system of the breed to design conservation and improvement strategy.

With these background and justification, the current study was envisaged with the following objectives:

- ✓ To assess the production performances of cattle production in the study areas.
- ✓ To assess the reproduction performances of cattle production in the study areas.

MATERIALS AND METHODS

Description of study areas

Lay Gayint district

The district lies within the geographical grid coordinates of 11°32'-12°16' N latitude and 38°12'-38°19' E longitude. It is 175 km away from the regional capital Bahir Dar and 739 km from Addis Ababa. The elevation ranges approximately from 1200 to 4235 meters above sea level. The topography is characterized by 11.97, 5, 8, 75 and 0.03% of the lands are plain, mountain, valley, plateau and water, respectively. The maximum and minimum mean annual temperature is 20 and 8°C, respectively. The annual rainfall is between 600 and 1200 mm.

Simada district

It is located at 11°3'-11°38' north latitude and 38°3'-38°40' east longitude. The district found at about 205 km away from the regional capital Bahir Dar and at 770 km distance from Addis Ababa. The physiographic setting is characterized by 10, 20, 20, 40 and 10% of valleys, mountainous, plateau/plain/, hills and others. Its elevation ranges from 1500 to 4000 m.a.s.l. About 11, 42 and 47% of the area is occurring in highland, midland and lowland, respectively. Also the average annual rainfall amount varies between 1000 to 1500 mm and average annual temperature is 23°C.

Tach Gayint district

It is located 200 km north east of Bahir Dar town, the regional capital and at 780 km to the North of Addis Ababa. The district lies between 11° 22' - 11° 4' N Latitude and 28°19' - 28° 43' E longitudes. It has an altitude range of 1500-2800 meters above sea level; mean minimum and maximum annual temperature ranges from 13°C to 27°C. The mean minimum and maximum annual rainfall ranges from 900 to 1000 mm per annum.

Site selection and sampling technique

Before deciding on the survey areas, discussions were held with the district experts of the rural and agricultural development office and the farmers' representatives about the distribution of local cattle of the area and area dominated by Simada cattle population.

Multistage sampling techniques were employed for this study. At the first stage the three districts are taken purposively based on distribution of Simada cattle population, and mobility

of these cattle. In the Second stage four *kebeles* from each district were selected purposively based on their suitability for cattle production, accessibility, and willingness of the farmers to participate in the study. Finally sample cattle owners were selected randomly using systematic sampling procedure. Farmers were interviewed with semi-structured questionnaire on production and reproductive performance of cattle in the study area. A total of 180 households 60 from each district and 15 from each *kebele* were selected for the interview. Sampling of households was undertaken by setting criteria; having at least one cattle and willingness to participate in the study. For focused group discussion, a total of 8-10 household heads (HH) were involved in each *kebele*.

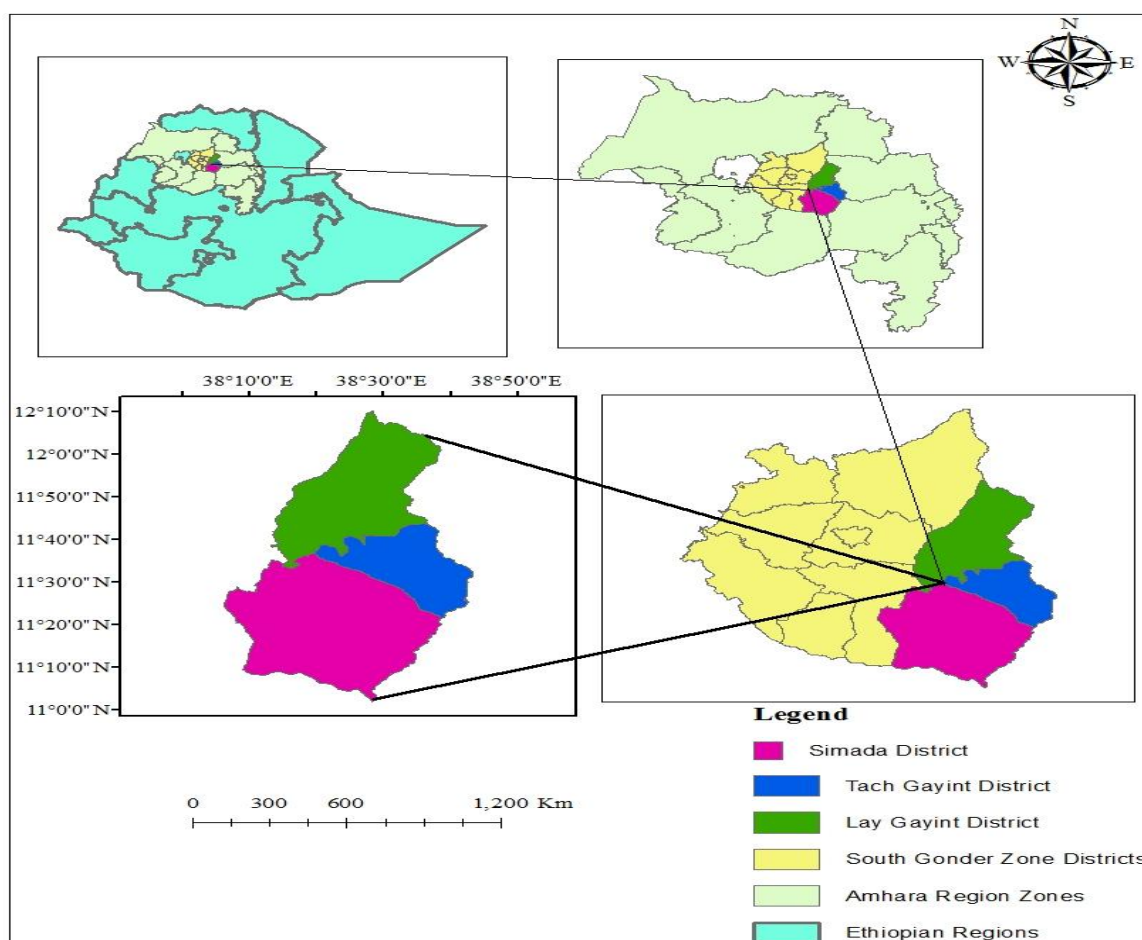


Figure 1: Map of study areas

Data Collection

Data were collected by administering a semi-structured questionnaire, individual interview, field observations, organizing group discussion and from secondary sources.

Questionnaire and group discussion

General information list of FAO (2012) was used as a checklist in designing the questionnaire. It is used to collect information on lactation length, milk yield, age at first service, calving interval and productive lifespan were collected. The questionnaire was pre-tested before administration and some re-arrangement, reframing and correcting in accordance with respondent perception was done.

Sets of open-ended questions were used to guide focus group discussions with key informants, local agricultural extension staffs, elders and socially respected farmers who are known to have better knowledge on the present and past socio-economic status of the study areas, to substantiate the information collected through individual farmer interview. Through group discussions information on current status of the breed and general production and reproduction performance were collected. Besides, secondary data on human and livestock population, agro-ecology were gathered from Zonal and Districts Agriculture and Rural Development offices.

Statistical Analysis

The SAS 9.1, version 2008 was employed to analyze the data.

RESULTS AND DISCUSSION

Lactation length and milk yield

Average daily milk yield and lactation length of Simada cattle population is shown in Table 1. Overall, average lactation length was reported to be 8.67 ± 0.079 months. The overall average milk production per cow per day was 1.59 ± 0.013 liters. The overall mean lactation length in this study was lower than the report of Solomon *et al.* (2014) in Metekel zone who reported that 9.81 ± 3.91 month of mean lactation length. However, the result in this study is consistent with the reports of Belay *et al.* (2012) in Dandi district who reported average lactation length of 8.96 ± 4.63 months. The overall average milk production per cow per day in this study was lower than Belay *et al.* (2012) who reported a mean daily milk production of 1.76 ± 0.89 liters per cow for indigenous cows in Dandi district of central Ethiopia. But the present finding was higher than national average of 1.37 liters/day per cow (CSA, 2013). The report of Demissu *et al.* (2013) indicated similar daily milk off take (1.5 liters) and longer overall lactation length (10.2 months) for Horro breed, in Horro villages surrounding Guduru Cattle Improvement and Research Center of Wollega University.

Table 1: Milk production of cattle across districts

Variables	Districts			
	Lay Gayint	Tach Gayint	Simada	Overall
	LSM \pm SE			
Lactation length (mo)	8.80 ± 0.138	8.70 ± 0.139	8.50 ± 0.133	8.67 ± 0.079
Milk yield per head/day	1.62 ± 0.023	1.54 ± 0.05	1.60 ± 0.022	1.59 ± 0.013

LSM = Least Square Mean; SE = standard Error; mo = months

Table 2: Frequency of milking and use of milk and its product

Frequency of milking	Districts							
	Lay Gayint		Tach Gayint		Simada		Overall	
	N	%	N	%	N	%	N	%
Twice a day	60	100.0	60	100.0	60	100.0	180	100.0
Milking difference between seasons								
Yes	59	98.3	58	96.7	54	90.0	171	95.0
No	1	1.7	2	3.3	6	10.0	9	5.0
Use of milk and its product								
For home consumption only	38	63.3	46	76.7	42	70.0	126	70.0
Home consumption and source of income	22	36.7	14	23.3	18	30.0	54	30.0

N = number of respondent's

Age at first mating

Reproductive performance of Simada cattle population is shown in Table 3. The age at which male Simada cattle first serve a female was estimated to be 38.56 ± 0.38 months or 3.21 years; whereas age at first mating of female cattle was 45.60 ± 0.35 months. The age at first mating of male Simada cattle showed significant difference ($P < 0.05$) between Lay Gayint (36.48 ± 0.91) and the other two districts Tach Gayint (39.85 ± 0.36) and Simada (39.35 ± 0.52). This difference is due to availability of feeds, in Lay Gayint district majority of respondents practice improved forage cropping than the two districts. The age at which male Simada cattle first serve a female is lower than the report for Kereyu cattle (45.7 months) in pastoral area (Shiferaw, 2007). However, this result is higher than the report for Abigar cattle (36.5 months) under pastoral management condition (Nakachew, 2009) and Gojjam Highland Zebu cattle (36 months) under crop livestock production system (Fasil and Workneh, 2014).

Age at first calving

Age at first calving is closely related to the rearing intensity and in a breeding program has impact on generation interval and response to selection (Kelay, 2002). The overall mean age at first calving (AFC) of Simada cattle was 57.74 ± 0.35 months. There is significant difference between Lay Gayint and Simada districts on AFC because of differences in management and availability of feeds in the area. The present study is higher than that reported by Takele (2005) who reported 54.1 months for Sheko breed whereas, Solomon (2010) reported 55.5 months for Borena breed, Zewdu (2004) reported 54.7 months for Wegera. However, this result lower than Fasil and Workneh (2014) who reported 62.5 months for Fogera breed, but the present result is in harmony with Endashaw (2010) who reported 4.79 years or 57.48 months for Mursi cattle.

Calving interval

Overall reported mean age of calving interval for Simada cattle in the study area was 17.49 ± 0.15 months. In traditional production systems, breeding is often uncontrolled and heifers are not bred at the first opportunity. This frequently results in longer subsequent calving intervals. Calving interval is found relatively similar with Boran breed (17.8 months) under ranch management (Ababu *et al.*, 2006); Ogaden cattle breed (492.86 days) under on station management (Getent, 2005); Kereyu cattle breed (18 months) under pastoral management (Shiferaw, 2007); However, it is longer than the report of Endashaw (2010) for Mursi breed (14.3 months) and Borena breed (15.3 months) in pastoral and agro-pastoral management (Solomon, 2010) and calving interval (15.6 months) for Sheko cattle (Takele, 2005). The lower CI is an indicator to cows' better fertility rate. Ayantu *et al.*, (2012) reported 21.84 months of calving interval for Horro cattle at Horro district.

Productive lifespan

The mean productive life time of female Simada cattle was 13.38 ± 0.11 years. Whereas, the mean number of calves born per female per productive life time was estimated to be 6.96 ± 0.08 calves. However, the number of calves (7.1) per life time of Kereyu cattle is similar with present result and better than (4.4) per life time of Horro breed (Gebrezgaber *et al.*, 2006) and 4.5 of Fogera breed (Fasil and Workneh, 2014) but the productive life span of female Simada cattle is less than Mursi cattle (14.1 years) in pastoral production system (Endashaw, 2010) and productive lifespan of Sheko cattle (14.7 years) (Takele, 2005). It is superior to Horro breed (Gebrezgaber *et al.*, 2006). Male Simada cattle reproductive life span was estimated to be 6.18 ± 0.05 years.

Table 3: Reproductive performance of Simada cattle population across districts

Reproductive traits	Districts			
	Lay Gayint	Tach Gayint	Simada	Overall
	LSM \pm SE			
Age at First Mating for male (months)	36.48 \pm 0.91 ^a	39.85 \pm 0.36 ^b	39.35 \pm 0.52 ^b	38.56 \pm 0.38
Age at First Mating for female (months)	44.80 \pm 0.79	45.62 \pm 0.44	46.38 \pm 0.56	45.60 \pm 0.35
Age at First Calving (months)	56.75 \pm 0.73 ^a	57.72 \pm 0.38 ^{ab}	58.77 \pm 1.39 ^b	57.74 \pm 0.35
Reproductive lifespan of cow (Years)	13.35 \pm 0.23	13.50 \pm 0.18	13.30 \pm 0.18	13.38 \pm 0.1
LTCP (number)	7.23 \pm 0.13 ^a	6.98 \pm 0.14 ^{ab}	6.67 \pm 0.13 ^b	6.96 \pm 0.08
Calving Interval (months)	17.18 \pm 0.23	17.70 \pm 0.28	17.60 \pm 0.27	17.49 \pm 0.15
Male Reproductive lifespan (year)	6.28 \pm 0.08	6.12 \pm 0.09	6.13 \pm 0.09	6.18 \pm 0.05

LSM = Least Square Mean; SD = Standard Error; LTCP = life time calf production; ^{a, b, ab} Means on the same rows with different superscripts within specified class variable, are significantly different ($p < 0.05$)

CONCLUSIONS

Simada cattle are kept in a mixed crop-livestock production system and they play multi-functional roles in this production system. The current study result indicated that Simada cattle production and reproductive performance in the current environmental condition are comparable with other indigenous breeds and have potential for improvement. In general, from the current study it could be concluded that Simada cattle are the sole source of breeding and milk production in the study area, and they have potential for greater contribution through better feeding, health management and genetic improvement through selection and cross breeding.

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REFERENCES

- Ababu Dekeba, Workneh Ayalew, P.B. Hedge and Zerihun Taddese, 2006. Performance of the Abernosa Ranch in the Production of Ethiopian Boran X Holstein Crossbreed Dairy Heifers in Ethiopia. *Ethiopian Journal of Animal Production*. 6(1): 33-53.
- Ayantuu Mekonnen, Aynalem Haile, Taddele Dessie and Yosef Mekasha. 2012. On farm characterization of Horro cattle breed production systems in western Oromia, Ethiopia. *Livestock Research for Rural Development*. Volume 24, Article #100.
- Belay DL. 2016. A Review on Dairy Cattle Breeding Practices in Ethiopia, South Agricultural Research Institute (SARI), Hawassa Agricultural Research Center, Hawassa, Ethiopia. *Journal of Biology, Agriculture and Healthcare* 6: 121-128.
- Belay Dugma, Azage Tegegne and Hedge, BP. 2012. Smallholder livestock production system in Dandi district, Oromia Regional State, central Ethiopia. *Global Veterinaria*, 8 (5): 472-479. IDOSI publications.
- CSA (Central Statistical Authority). 2016. Survey on livestock number in Ethiopia, the National Agricultural Statistics Service (NASS).
- CSA (Central Statistical Authority). 2015. Crop and livestock product utilization. Agricultural sample survey (September – January, 2014/2015); volume VII

- CSA (Central Statistical Authority). 2013. Agricultural sample survey, report on livestock and livestock characteristics for the year 2013. CSA, Addis Ababa, Ethiopia, 194 pp.
- Demissu Hundie, Fekadu Beyene and Gemedu Duguma. 2013. Dairy Productive Potential, Challenges and Production opportunities of Horro and their F1 Jersey Crossbred Cows: A Case of Guduru Livestock Production and Research Center and Its Surroundings, West Oromia, Ethiopia. *Science, Technology and Arts Research Journal*, 79-84.
- Endashaw Terefe. 2010. Characterization of Mursi Cattle Breed in its Production Environment in Salmagado Woreda, South West Ethiopia. M.sc. Thesis. Haramaya University, Haramaya, Ethiopia.
- FAO (Food and Agricultural Organization). 2011. Molecular genetic characterization of animal genetic resources. *FAO Animal Production and Health Guidelines*. No. 9. Rome (available at <http://www.fao.org/docrep/014/i2413e/i2413e00.htm>).
- Fasil Getachew and Workneh Ayalew. 2014. On-farm phenotypic characterization of indigenous cattle populations of Awi, East and West Gojjam Zones of Amhara Region, Ethiopia. *Research Journal of Agriculture and Environmental Management*. Vol. 3(4), pp. 227-237, April, 2014. Available online at <http://www.apexjournal.org>.
- Gebregziabher Gebreyohannes and Mulugeta Kebede, 2006. Herd Life and Lifetime Calf Crop Production in Relation to Age at First Calving in Indigenous and Crossbred Cows at Bako, Ethiopia. *Ethiopian Journal of Animal Production*, Volume 6, No: 1, Addis Ababa, Ethiopia, 2006. Pp 56-59.
- Getie, A., H/ Meleket, M., Taye, M., Wuletaw, Z. and Tesfa, A. 2015. A Survey on Breeding Practice, and Productive Performance of Simada Cattle in Tach Gayint District, Ethiopia. *Journal of Life Science Biomedication* 5 (6): 171-180.
- Getinet Mekuria, 2005. On-station Ex-situ Characterization of Ogaden Cattle Breed at Haramaya University. M.sc.Thesis. Haramaya University, Haramaya, Ethiopia.
- Kelay Belihu, 2002. Analysis of dairy cattle breeding practices in the selected area of Ethiopia. PhD dissertation, Humboldt University, Berlin. 35-45pp.
- Shiferaw Garoma. 2007. In-situ Phenotypic Characterization of Kereyu cattle type in Fentale district of Oromia Region, Ethiopia. M.Sc. Thesis. School of Graduate Studies. Haramaya University.
- Solomon Takele. 2010. On Farm Phenotypic Characterization of Borena Breed in Dire District of Oromiya Region, Ethiopia. M.sc.Thesis. Haramaya University, Haramaya, Ethiopia.
- Solomon Zewdu, Binyam Kassa, Bilatu Agza, Ferede Alemu and Gadisa Muleta. 2014. "Smallholder cattle production systems in Metekel zone, Northwest Ethiopia," *Research Journal of Agricultural Environment Management*, vol. 3, no. 2, pp. 151-157, 2014.
- Solomon Zewdu, Binyam Kassa, Bilatu Agza, Ferede Alemu and Gadisa Muleta. 2014.
- Takele Taye, 2005. On-Farm Phenotypic Characterization of Sheko Breed of Cattle and Their Habitat in Bench Maji zone, Ethiopia. M.sc.Thesis. Haramaya University, Haramaya, Ethiopia.
- Takele, T. Workneh, A. and Hegde, B.P. 2011. Breed and trait preferences of Sheko cattle keepers in southwestern Ethiopia. *Tropical Animal Health Production* (2011) 43:851–856.
- Zewdu Wuletaw, 2004. Indigenous cattle genetic resources, their husbandry practices and breeding objectives in North-western Ethiopia. An MSc Thesis, Haramaya University., Haramaya, Ethiopia.