

Participatory on Farm Evaluation and Demonstration of 25% Crossbred (Boer x Woyito-Guji) Goats in Benatsemay District of South Omo Zone, SNNPR, Ethiopia

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Abstract

The study was carried out in Bena-Tsemay district of South Omo zone. The objective of this study was to evaluate performance of the F1 cross (25%) of Boer-WG goats at on farm level in selected areas of Benatsemay district. Based on interest of pastoralists three peasants association in the first phase and three in the second phase were selected and in each PA one farmers group formed. Selection of farmers was carried purposively and the selected farmers contributed 6 female goats, a total of 30 goats per each group of farmers. Data were analyzed using the mean comparison method of SPSS. Mean (\pm SD) was used to describe the effect of sex and birth year on birth, three, six and yearly weight of the crosses. The result indicated that the overall birth, three month, six month and yearly weight (Mean \pm SD) of Boer-WG 25% cross goats was found 2.89 \pm 0.38, 10.39 \pm 1.86, 13.90 \pm 2.19 and 19.05 \pm 3.51kg respectively. The result regarding to the effect of birth year was assessed and birth year has an effect on the growth rate only for third month weight (weaning weight) and the first phase kids attained higher weaning weight that the second year. Also the effect of sex was assessed and the result indicated that male goats had higher body weight than females. From the study it was concluded that Boer-WG crossbred goats have a better birth weight which can be exploited for a better growth performance under improved management system which should be done with integrated efforts combining the feed, breeding and nutritional aspects of production.

Keywords: Agro-pastoral, Benatsemay, district, 25% crossbred goats, South Omo, Boar x Woyito-Guji,

1. Introduction

Ethiopia is believed to have the largest livestock population in Africa with estimated amount of more than 28 million goats in the country (CSA, 2013/14) of which 99.99% are indigenous breeds. The Southern Nation, Nationalities, and People's Region (SNNPR) of Ethiopia with an estimated area of 112,343.19 square kilometers, possess about 4,953,588 goats (CSA, 2013/14). From these region, South Omo zone account more than 57% (around 2,843,777) of the share of goat breed populations with its great variation in climate and topography as well as multi-ethnic diversity, represents a good reservoir of goat genotypes. Sheep and goats, kept in the vast geographical locations, diverse socioeconomic and cultural settings and a range of farming practices in the SNNPR play an immense role in the livelihoods of pastorals and rural farms (SARI, 2012?).

According to Tekleyohannes *et al.* (2012), goats in the pastoral and agro-pastoral districts of South Omo are indigenous genotypes and households in the district consider reproductive and growth performances of the individual and its relatives when selecting animals for replacement and 50 to 60% of the households also borrow or share bucks from their neighbors for its good appearance and character. Goats in these areas are kept for milk, meat, skins and manure production. Woyto-Guji (WG) goats inhabit a wide area extending from South Omo to southern Sidama and Wolayita. Woyto-Guji goats are also found in trypanosomiasis affected areas in and along the Gelo valley to the south of Lake Abaya and other adjacent areas and important for some social functions of the community (FARM Africa, 1996). In spite of their large numbers and well adapted goats in the region, their overall productivity is by and large marginal, this can be attributable to slow rate of growth, late maturity and exceptionally high mortality among the kids and the adults (SARI, 2012).

Crossbreeding is a way of realizing quicker genetic improvement matching genotype with the environment and benefiting from complementarity of breeds involved (Ahuya *et al.*, 2004). The combining of desirable morphological characteristics and production performance of two or more breeds in livestock had stimulating interest in the breeding of meat goats for marketable production (Shrestha and Fahmy, 2007). Indigenous breeds have been crossed with exotic breeds to combine the high productivity of the latter with adaptive attributes of the former (Philipsson *et al.*, 2011). Only then will it be viable to increase food production without further increasing the number of animals with the subsequent effects of land degradation. There are many goat crossbreeding programmes in Africa which have been implemented with success (Ayalew, 2003). Kassahun *et al.*, (1989) observed higher crossbred birth weight and weaning weight of Saanen-Adal goat kids than Adal goats in Ethiopia, Selamawit *et al.*, (2015) for Boer-Arsi Bale kids and Shumuye *et al.*, (2014) for Boer-Abergelle F1 kids.

According to Erasmus (2000), the improved Boer goat is a remarkable small-stock ruminant that possesses distinctive qualities enabling it to excel as an efficient red meat producer. It is early maturing, reaching a mean maximum weight of 62 kg at 3.5 years of age on natural pasture under extensive grazing conditions. It was concluded that through crossbreeding of local and selected improved goat types, resource poor farmers will improve productivity of their indigenous goat breeds (Assan, 2013). Based on these, the crossbred (F1) of Boer and WG (Boer-Woyito Guji) can get important traits from their parents that enable them to resist disease such as trypanosomiasis, better production potential and cope up harsh environments. Therefore; the objectives of this study was to evaluate performance of the F1 cross (25%) of Boer-WG goats at on farm level in selected areas of Benatsemay district.

2. Material and method

2.1. Description of the study area

The study was carried out in Bena-Tsemay district of South Omo zone. South Omo zone is one of the 13 zones found in the SNNPR State of Ethiopia. Benna-Tsemay (Key-Afer) is located at about 739 km from the capital city of Ethiopia, Addis Ababa with a total land area of 3,754 Km². Geographically, it is found at 5°01'-5°73' N Longitude & 36°38'-37°07' E latitude and at an altitudinal range of 1436-1553 meters asl. The maximum and minimum monthly average temperature of the area is 28.9 °c and 17.3 °c respectively with a total mean annual rainfall of 1167 mm. It is characterized by highly sloppy land features even more than 17 % (SOFEDB, 2014). The woreda have 33 peasant association (PA) including three city PA administrations. The district has a population of 59,262 and an area of 2,922.76 sq.km with 20.3 people per sq. km. The sheep and goat population in Benatsemay was 89,000 and 305,000 respectively (SOFEDB, 2014).

The study area is characterized by semi arid and arid climatic conditions, with mean annual rainfall increasing from the extreme south lower part, with some 350 mm, to the upper part where it ranges to 838 mm. The rainfall is bimodal, with the long rain season from April to June and the small rains in September and October. In general, the study area has an erratic, variable rainfall and high ambient temperature ranging from 26-35°C. The vegetation cover of the study area is a mixture of *Acacia*, *Boswellia* and *Commiphora* woody species and short grasses type with varying density of woody vegetation (Alemayehu and Tezera, 2002).

2.2. Experimental material and designs

a) Selection of PAs and Farmers:-Based on interest of pastoralists three peasants association in the first phase and three in the second phase were selected. From this pastoral research groups which consist of the five pastoralists in each group per kebele were established with active participation of Woreda Pastoralists Affair experts, researchers and Kebele Development Agents.

b) Selection of local Female goats: - Each farmer was contributed 6 female goats, a total of 30 goats per each group of farmers. The goats body weight taken and ear tagged for identification.

c) Introduction of 50% Boer-WG crosses:- at the end of the breeding season of the first phase in September 2013 and in the second phase of October 2014, one 50% Boer-local cross for each PA (group) were provided. The buck stays for one month in each farmer group.

c) Data collection:- Growth data of the goats were collected regularly.

e) Trainings and Field days: - training on goat production and marketing were given by researcher. At the end of the mating season the pastoralists field day were arrange b/n pastoralists' research groups , Non-pastoralists research group and other important stakeholders.

2.3. Data Management and Analysis

Data were analyzed using the mean comparison method of SPSS (16.0). Mean (\pm SD) was used to describe the effect of sex (two levels: male and female) and birth year (two levels: 2014 and 2015) on birth, three, six and yearly weight of the crosses.

3. Results and discussion

3.1. Growth performance of Boer-WG crosses

The result pertaining to the overall birth, three month, six month and yearly weight (Mean \pm SD) of Boer-WG 25% cross goats was found to be 2.89 \pm 0.38, 10.39 \pm 1.86, 13.90 \pm 2.19 and 19.05 \pm 3.51kg respectively. The observed mean birth weight for crossbred kids in the present study was higher than the value of 1.5 kg for Mid Rift Valley kids (Tucho *et al.*, 2000) and 2.01kg reported by Deribe and Taye (2013a) for Central Highland kids. It was also higher than the value for Boer X Central Highland goats (2.68kg) by Belay *et al.*, (2015) and comparable to the value of 2.84kg for Boer-Arsi Bale kids (Selamawit *et al.*, 2015).

The mean weaning weight of crossbred kids was higher than the value of 6.32 kg reported for Abergelle kids, (6.8 kg) by Deribe and Taye (2013a), Arsi Bale (8.4 kg) by Woldu *et al.* (2005), Boran Somali kids (7.2 kg) by Tucho *et al.* (2000) and Boer X Central Highland goats (9.82kg) by Belay *et al.*, (2015). The mean weaning

weight obtained in this study was lower than the value (21.10kg) reported by Selamawit *et al.*, (2015) for Boer-Arsi Bale cross goats.

The mean weight of six month and yearling in the present study were comparable with 13.82±0.39 and 20.69±0.74 kg of central highland goats reported by Deribe and Taye (2013b) and 13.61±0.40 and 20.15±0.67 kg reported for the same breed at Debre Berhan area (Tesfaye *et al.*, 2006) and larger than that of Abergelle goats (9.1 and 14.2 kg) (Deribe and Taye, 2013b), 11 and 16 kg of Afar goats (Awgichew *et al.*, 1989).

The result was also comparable with the six month and yearling weight of Boer-Central Highland 50% cross goats which was found to be 14.06±0.26 and 19.93±0.37 kg respectively (Belay *et al.*, 2015).

3.1.1. Effect of year

The result pertaining to the growth of the crosses in relation to the year they born was indicated in the Table below. The result showed that the overall birth, three month, six month and yearly weight of the crossbred goats for the first phase was 2.97± 0.27, 11.09±1.61, 14.39±2.40 and 19.76±4.11kg respectively and second phase was 2.83±0.44, 9.69±1.86, 13.37±1.88 and 18.20 ±2.49kg respectively. Birth year has an effect on the growth rate only for third month weight (weaning weight) and the first phase kids attained higher weaning weight that the second year. The reason was that in the second phase there was a shortage of feed due to delayed rain at the district and goats of the area were highly affected by this.

Table1. Mean (±SD) Birth, three, six and yearly weight for the effect of birth year of buck mobilization data at Benatsemay woreda

Effect	N	Birth wt	N	Three month wt	N	Six month wt	N	Yearly wt
Overall (Range)	49	2.89±0.38 (2.20-3.6)	44	10.39±1.86 (6.9-14.2)	39	13.90±2.19 (9.3-19.4)	33	19.05±3.51 (14.0-32.3)
Year		NS		**		NS		NS
Year one (2014) (Range)	22	2.97± 0.27 (2.6-3.6)	22	11.09±1.61 (7.0-13.6)	20	14.39±2.40 (9.3-19.4)	18	19.76±4.11 (15.3-32.3)
Year two (2015) (Range)	27	2.83±0.44 (2.2-3.4)	22	9.69±1.86 (6.9-14.2)	19	13.37±1.88 (10.0-16.6)	15	18.20 ±2.49 (14.0-22.6)

NS= Non Significant (P>0.05), Values across the same column are significant at **= P<0.01, N; number of observations.

3.1.2. Effect of sex

The result pertaining to the effect of sex on weight of the crossbred goats indicate that male goat had higher body weight than their female counterparts. The mean (±SD) birth, three, six and yearly weight of male crossbred goats was 3.04±0.33, 10.74±1.80, 14.50±2.30 and 21.02±3.29 respectively. The corresponding values for the females were 2.71±0.37, 9.92±1.88, 13.19±1.90 and 16.38±1.43 respectively. As the result indicated that male goats had higher (P<0.01 for birth and P<0.001 for yearly weight) body weight than females. The result shows the effect of sex in favor of males than females in body weight was in line with other authors (Solomon, 2014; Lorato *et al.*, 2015).

The birth weight of male Boer-WG goats was comparable with Boer-Arsi Bale kids and higher than their female counterparts in Gedeo zone of Southern Ethiopia which was found 3.02 for male kids and 2.41kg for female kids (Selamawit *et al.*, 2015).

Table2. Mean (±SD) Birth, three, six and yearly weight for the effect of sex of buck mobilization data at Benatsemay woreda

Effect	N	Birth wt	N	Three month wt	N	Six month wt	N	Yearly wt
Overall (Range)	49	2.89±0.38 (2.20-3.6)	44	10.39±1.86 (6.9-14.2)	39	13.90±2.19 (9.3-19.4)	33	19.05±3.51 (14.0-32.3)
Sex		**		NS		NS		***
Male (Range)	27	3.04±0.33 (2.4-3.6)	25	10.74±1.80 (6.9-13.6)	21	14.50±2.30 (9.3-19.4)	19	21.02±3.29 (17.2-32.3)
Female (Range)	22	2.71±0.37 (2.2-3.3)	19	9.92±1.88 (7.0-14.2)	18	13.19±1.90 (10.0-16.6)	14	16.38±1.43 (14.0-18.2)

NS= Non Significant (P>0.05), Values across the same column are significant at **= P<0.01, ***= P<0.001, N; number of observations.

4. Conclusion and recommendation

From the study it is possible to conclude that Boer-WG goats have a better birth weight which can be exploited for a better growth performance under improved management system which should be done with integrated efforts combining the feed, breeding and nutritional aspects of production which are very important to make use of the breed. The significant effect of sex at different ages indicates the potential of the breed for better

productivity in the existing pastoral and agro-pastoral district. As improved goats or offspring of local goats bred to exotic goat breeds, are likely to do better under the good intensive management production system with feeding management than the more free-grazing conditions, that should be considered in the district to obtain a good result. Moreover Continuous improvement in selection, feeding method, and routine management system may contribute to even a faster growing rate in Boer crosses in the future.

5. References

- Abebe, G., R.C. Merkel and T. Sahlu. 2000. Enhancing food security and income generating potential of families in Southern Ethiopia through improved goat production and extension: A progress report of an ALO-funded project. In: R.C. Merkel, G. Abebe and A.L. Goetsch (eds.). *The Opportunities and Challenges of Enhancing Goat Production in East Africa*. Proceedings of a conference held at Debub University, Awassa, Ethiopia from November 10 to 12, 2000. E (Kika) de la Garza Institute for Goat Research, Langston University, Langston, OK pp. 113-117.
- Assan, Never 2013. Crossbreeding as a strategy to increase productivity in resource poor goat keepers in the rural areas of Zimbabwe. *International Journal of Science and Knowledge*. Vol. 2; No. 1; 52-56 (2013). ISSN: 2322-195X.
- Awgichew, K., Y. Yacob and I. Fletcher, 1989. Productivity of Purebred Adal and Quarter Bred Saanen x Adal Goats in Ethiopia. In: *African Small Ruminant Research and Development*, Wilson, R.T. and A. Melaku (Eds.). International Livestock Centre for Africa, Addis Ababa, Ethiopia, pp: 510-523.
- Belay Deribe, Mokonen Tilahun, Mesfin Lake, Nigus Belayneh, Asres Zegeye, Misganaw Walle, Desalegn Ayichew, Solomon Tiruneh Ali and Solomon Abriham, 2015. On Station Growth Performance of Crossbred Goats (Boer X Central Highland) at Sirinka, Ethiopia. *Asian Journal of Animal Sciences* 9 (6): 454-459, 2015.
- CSA (Central Statistical Agency) 2013/14. Federal democratic republic of Ethiopia Central Statistical Agency, Agricultural Sample Survey 2013/14 Volume II, Report on livestock and livestock characteristics (private peasant holdings), Addis Ababa, Statistical bulletin 573, pp13. August 2014.
- Deribe, B. and M. Taye, 2013. Evaluation of growth performance of abergele goats under traditional management systems in sekota district, Ethiopia. *Pak. J. Biol. Sci.*, 16: 692-696.
- Deribe, B. and M. Taye, 2013. Growth performance and carcass characteristics of Central Highland goats in Sekota district, Ethiopia. *Agric. Adv.*, 2: 250-258.
- J.N.B. Shrestha, M.H. Fahmy (2007). Crossbreeding and formation of composite population. *Small Ruminant Research* 67 (2007) 93–112.
- J.A. Erasmus (2000). Adaptation to various environments and resistance to disease of the Improved Boer goat. Free State Department of Agriculture, Private Bag X01, Glen 9360, South Africa. *Small Ruminant Research* 36 (2000) 179±187.
- K. Marshall (2013). Optimizing the use of breed types in developing country livestock production systems: a neglected research area. *The International Livestock Research Institute, Nairobi, Kenya. J. Anim. Breed. Genetic.* 131(2014) 329-340.
- Lu, C. D. and M. J. Potchoiba. 1988. Milk feeding and weaning of goat kids. *Small Ruminant Research*. 1:105-112.
- Philipsson J., Rege, J.E.O., Zonabend E. and Okeyo A.M. 2011. Sustainable breeding programmes for tropical farming systems In: *Animal Genetics Training Resource*, version 3, 2011. Ojango, J.M., Malmfors, B. and Okeyo, A.M. (Eds). International Livestock Research Institute, Nairobi, Kenya, and Swedish University of Agricultural Sciences, Uppsala, Sweden.
- SARI (South Agricultural Research Institute) 2012. Southern Nations, Nationalities and People Region (SNNPR) sheep and Goat Productivity Improvement and Capacity Building Project. SARI, Hawassa, Ethiopia.
- Selamawit Debele, Matiwos Habta, Assmamaw Yinessu and Birhanu Admassue (2015). Pre weaning growth performance of Boer cross with local goat in Gedio zone, Ethiopia. *International Journal of Agricultural sciences and Veterinary Medicine*. Vol. 3, No. 3, August 2015
- Shumuye Belay, Gebresslassie Gebru, Guesh Godifey, Minister Brhane, Mulalem Zenebe, Hailay Hagos and Tsegay Teame (2014). Reproductive performance of Abergelle goats and growth rate of their crosses with Boer goats. *Livestock Research for Rural Development* 26(1) 2014.
- SOFEDB (South Omo zone Finance and Economy Development Bureau) 2014. *Zonal Statistical Abstracts 2014 (2006 E C)*, Jinka, Ethiopia.
- Tekleyohannes Berhanu, Jamroen Thiengham, Sayan Tudsri, Girma Abebe, Asrat Tera and Somkiert Prasanpanich (2012). Purposes of keeping goats, breed preferences and selection criteria in pastoral and agro-pastoral districts of South Omo Zone. Southern Agricultural Research Institute, P. O. Box 06, Hawassa, Ethiopia. *Livestock Research for Rural Development* 24 (12) 2012.
- Tesfaye, G., L. Sisay, T. Dereje, M. Abebe and G. Solomon, 2006. Growth and reproductive performance of

- central highland goats in North Shoa and South Wollo. Proceeding of the 1st Annual Conference on Completed Livestock Research Activity, August 14-17, 2006, Amhara Region Agriculture Research Institute, Bhar Dar, Ethiopia.
- Tucho, T.A., A. Regassa and L. Fita, 2000. Preliminary Production and Reproduction Performance Evaluation of Mid Rift Valley and Borana Somali Goats. In: *The Opportunities and Challenges of Enhancing Goat Production in East Africa*, Merkel, R.C., G. Abebe and A.L. Goetsch (Eds.). Debu University, Awassa, Ethiopia.
- Woldu, T., H. Dadi, M. Guru and D. Gelashe, 2005. Productivity of Arsi Bale goat types under farmers' management condition: A case of Arsi Negelle. *Proceedings of the 13th Annual Conference of the Ethiopian Society of Animal Production (ESAP)*, August 25-27, 2004, Addis Ababa, Ethiopia, pp: 67-71.
- Yaekob Lorato, Kirman Manzoor Ahmed & Birhanu Belay 2015. Morphological Characterization of Indigenous Woyto Guji Goat Breed in Loma District, Southern Ethiopia. *American-Eurasian Journal of Scientific Research* 10 (2): 58-67, 2015.