On-farm Lamb Birth Weight and Growth Performance of Indigenous Sheep Breeds in Burie District, North Western Ethiopia

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Abstract

This study was conducted in Burie District in North Western Ethiopia. The objectives of the study were to assess the on-farm birth weight and growth performance of indigenous sheep lambs. Three kebeles were selected for this study in Burie District. From each kebele 20 farmers having 5 or more breeding ewes were selected randomly. This study was conducted for 6 months. Farmers fed their breeding ewes on grazing lands and crop aftermath. The breeding ewes were supplemented with Atella (a residue of local alcoholic beverage) and food leftover. On average, there were 7.6 (SD =2.58) and 8.0 (SD = 3.50) heads of sheep per household at the beginning and at the end of the study, respectively. The birth weight of male lambs (2.6 kg) was greater ($p<0.001$) than the birth weight of female lambs (2.1 kg). The birth weight of Washera lambs (2.8 kg) was greater than the birth weight of Horro lambs (1.8 kg). There was no difference on the mean growth rate of male and female lambs. In addition, there was no difference on growth rate between Washera and Horro lambs. Generally, Washera lambs were heavier at birth than Horro lambs. There was no difference in body weight and growth rate between the two sheep breed lambs at 112 days of age. The results of this study indicated that Horro lambs had a lower birth weight than Washera lambs, but Horro lambs had similar body weight and growth rate with Washera lambs at 112 days of age when the two sheep breeds are compared within their respective breeding environments. To confirm the current results further studies should be conducted involving more animals and comparing the two breeds within the same environmental conditions.

Key words: Birth weight, Ethiopia, growth rate, Horro, sheep, Washera

1. Introduction

Ethiopia has currently 25.5 million heads of sheep (CSA, 2011). Female sheep are primarily kept for breeding purpose in the country. Among the sheep kept age two years and older, about 49.6% are kept for breeding and about 3% for mutton production. Generally, small flock sizes predominate in the highlands of the country and relatively larger flock sizes are found in the lowlands of the country (Solomon *et al.*, 2010).

The sheep population in Ethiopia is genetically diverse. According to Solomon (2008), there are nine sheep breeds in the country. These are Simien, Short-fat-tailed, Washera, Gumz, Horro, Arsi-Bale, Bonga, Afar and Black-head-Somali. The indigenous sheep breeds of Ethiopia are not studied adequately (Markos, 2006). There is lack of information on genetic variability for growth on indigenous sheep breeds in the country.

Lamb growth at early stage is affected by breed, sex of lamb, litter size, season of birth as a reflection of seasonal fluctuation on feed availability and milk yield (Markos, 2006). Research results on birth weight and growth rate of indigenous lambs are very important in sheep production. This information helps in breed improvement activities in the country. There is limited information on birth weight and growth rate of indigenous sheep lambs on-farm in Ethiopia. This study was conducted to assess the on-farm birth weight and growth performance of indigenous sheep lambs in the North Western part of Ethiopia.

2. Materials and Methods

2.1 Description of the study area

Burie district is located between 10˚15′N and 10˚42′N and between 36˚52′E and 37˚7′E in Amhara National Regional State, Ethiopia. It has an estimated area of 838.9 square kilometers with altitude range of 713 – 2604 masl (BOFED 2008; IPMS 2007). The rainy season in Burie is from May to September with a monomodal pattern and a mean annual rainfall of 1386 – 1757 mm (IPMS, 2007). According to IPMS (2007), the long term annual temperature of Burie ranges from 14 °C to 24 °C. As the district has different ecological settings, it is suitable for different crops and livestock species production. The farming system, livestock production and livestock population of the district is adequately described in IPMS (2007).

According to IPMS (2007), in Burie District about 46.6% of the total area is cultivated and average household cultivated landholding is about 1.6 ha. Human population of the district is estimated at 174,957, of which 143,558 (82%) live in rural areas (BOFED 2008) organized into 22 rural kebeles and 2 town associations. The main cereal crops grown in the district include maize, wheat, *tef*, finger millet and barley.

2.2 Data collection on lamb birth weight, lamb growth and sheep mortality

The study was conducted for 6 months in three representative kebeles of Burie district, namely, Woheni Durebeite, Woyenema Ambaye and Boko Tabo. From each kebele 20 households having 5 or more breeding ewes were selected randomly based on their residence proximity for data collection. Breeding female ewes in each households were identified and recorded in a data recording format including their colour, sex, age and breed together with their owner's data (name, sex, age, etc). In the selected households, lambs born, date of birth, their sex, colour, breed and type of birth were recorded. The body weight (BW) of lambs born was taken in the first 24 hours after birth and after that at 2 weeks interval during the study. Mortality of lambs and causes of mortality were recorded. In addition, the total number of sheep present in each household, sheep loses, causes of sheep loses, purchasing practices and feeding, disease control and housing practices of each farmer were recorded by data collectors every week during the study in each kebele.

2.3 Statistical analysis

The data were analyzed using SPSS (2003) statistical software. Data were summarized using descriptive statistics. Mean comparison was done using ANOVA.

3. Results and Discussion

3.1 Sheep management during the study period

Farmers' managed their sheep flocks traditionally during the study. The breeding sheep grazed during the daytime and local feed supplements were fed during the evenings based on each individual farmer's practice. The supplements given differ from household to household. Generally, most households supplemented their sheep with A*tella* (a residue from local alcoholic beverage) and food leftover. In addition, farmers treated their animals with anthelminitics

regularly during the study. Sick sheep was treated in their respective veterinary service areas. There was almost no supplement feed offered to the growing lambs during the study. The animals depended on their dam's milk mainly at the early stages of growth.

There were 458 sheep at the beginning of the study owned by the selected households for this study (Table 1). Among these, 366 were females and 92 were males. One household on average had 7.6 heads of sheep (n = 60, SD = 2.58) at the beginning of the study (Table 2). At the end of the study, one household had on average 8.0 heads of sheep (n = 60, SD = 3.50) per household. There was an increase in sheep number per household at the end of the study. Sheep number per household increased in Woheni Durebetie and Woyenema Ambaye kebeles, while in Boko Tabo kebele it decreased (Table 2). From the total number of sheep (458) at the start of the study, only 362 heads of sheep (79%) of the original sheep were present at the end of the study. About 63% of the male and about 83% of the female original sheep were present at the end of the study. From the 458 sheep present at the beginning of the study 71 heads of sheep (15.5%) were sold within the 6 months, 22 (5%) died due to diseases and 3 (0.7%) were slaughtered by their owners. During the study, there was no loss of sheep due to predators.

Within the 6 months, 2 sheep were bought and added as breeding females and 118 lambs were born. At the end of the study, there were 481 sheep present in the 3 kebeles owned by the selected households including the number of lambs born within the 6 months. From this total number of sheep, 104 heads (22%) were males and 372 (77%) were females. From the total 118 lambs born within the 6 months, 117 lambs have been measured and data collected. Data for one lamb was not taken. Among the 117 lambs born on-farm during the study, 46 lambs were males and 66 lambs were females. From the total lambs born (117), the sex of the 5 lambs was not recorded.

Table 1: Total sheep number per kebele at the beginning and end of the study in the study kebeles of Burie District

Total sheep number	Woheni Durebetie N = 20	Woyenema Ambaye N = 20	Boko Tabo N = 20	Total N = 60
Beginning of study	177	139	142	458
Male	33	26	33	92
Female	144	113	109	366
End of study	200	141	140	481
Male	46	37	21	104
Female	152	102	118	372

N = Number of households

Table 2: Mean sheep number per household at the beginning and end of the study in the study kebeles of Burie District

Sheep number per HH	Woheni Durebetie N = 20 Mean ±SD	Woyenema Ambaye N = 20 Mean ±SD	Boko Tabo N = 20 Mean ±SD	Total N = 60 Mean ±SD
Beginning of study	8.9±3.94	7.0±1.28	7.1±1.07	7.6±2.58
Male	1.7±1.18	1.3±0.92	1.7±0.67	1.5±0.95
Female	7.2±3.47	5.7±1.31	5.5±1.10	6.1±2.33
End of study	10.0±3.89	7.1±3.10	7.0±2.66	8.0±3.50
Male	2.3±1.46	1.9±1.57	1.1±1.1	1.7±1.45
Female	7.6±3.66	5.1±2.55	5.9±2.38	6.2±3.06

N = Number of households; SD = Standard deviation

3.2 Birth weight, growth rate and sex of lambs

The birth weight of male lambs (2.6 kg) was greater ($P<0.001$) than the birth weight of female lambs (2.1 kg). The mean BW of the two groups is given in Table 3. According to Kassahun (2000), a study conducted on Horro and Menz lambs, males are heavier at birth than females.

Male and female lambs had a birth weight of 2.4 ± 0.03 and 2.2 ± 0.02 kg, respectively. The difference between this result and the current study may be due to environmental and genetic differences. According to another study, the birth weight of male lambs is higher than the birth weight of female lambs based on a study on Menz and Horro sheep breeds in Ethiopia (Markos, 2006).

Many factors affect lamb growth rate. The most important are feeding level, genotype, sex, health and management (Gatenby, 1991). According to Gatenby (1991), ram lambs grow faster than ewe lambs whether or not the diet is restricted. On a given diet, ewe lambs get fatter than ram lambs. The mean growth rate per day of male and female lambs up to 112 days of age in the current study is given in Table 3. There was no significant difference (P>0.05) in growth rate between the two groups at 112 days of age. According to Gatenby (1991), male lambs grow faster than female lambs.

Table 3: Mean birth weight and growth rate of male and female lambs in the study kebeles of Burie District

Sex of lamb	N	BW (kg) Mean±SE	N	Growth rate (g/ day)
Male	46	2.6±0.10[a]	12	109.3[a]±4.33
Female	66	2.1±0.09[b]	16	114.8[a]±2.95
Total	112	2.3±0.07	28	112.4±2.51

N = Number of lambs; BW = Body weight; g = Gram; SE = Standard error; Means with different superscript letters within a column are significantly different (P<0.001)

3.3 Birth weight, growth rate and breed of lambs

There was a difference in lamb birth weight between Horro and Washera breeds. Birth weight of Washera lambs (2.8 kg) was greater (P<0.001) than birth weight of Horro lambs (1.8 kg) (Table 4). This may be due to breed, environmental factors and/or type of birth effects. In addition, this difference may be due to the effect of genotype and nutrition of the dams during the study as the two breeds are found in different agro-climatic zones. In addition, Horro ewes give birth usually to twins but Washera ewes usually give birth to single lamb at a time. So, type of birth may have also contributed to this result. According to Markos (2006), there was a difference in birth

weight between breeds. According to this author's result, Horro lambs had higher birth weight than Menz lambs. In another study, Horro lambs had higher ($P<0.001$) birth weight (2.4 ± 0.03 kg) than Menz lambs (2.2 ± 0.03 kg) (Kassahun, 2000). According to Kassahun and Solomon (2008), Horro sheep weighs from 2.8 – 2.9 kg at birth and from 13 – 15 kg at weaning (90 days). According to the same source, Washera sheep weighs 2.8 kg and 13.8 kg at birth and at weaning, respectively. According to Kassahun *et al.* (1991), Horro lambs have an estimated birth weight of 2.9 kg. In addition, Horro lambs seem to be heavier at birth and keep their superiority over the Adal and Black Head Somali up to yearling age (Kassahun *et al.*, 1991).

There was no difference ($P>0.05$) in growth rate between Washera and Horro breed lambs (Table 4). The growth rate of Washera and Horro lambs was 108.9 g and 117.9 g per day during the first 112 days of age, respectively. This result indicates that Horro lambs had low birth weight when compared with Washera lambs, but Horro lambs had similar growth rate with Washera lambs during the first 112 days of age (Table 4). According to Markos (2006), Horro lambs grow faster than Menz lambs during the pre-weaning and post-weaning periods. During the pre-weaning period Horro, and Menz lambs have a growth rate of 78.0 g and 72.6 g per day, respectively. According to Kassahun (2000), there is no significant difference between Horro and Menz lambs from birth up to weaning (90 days). But birth type, dam parity and season of birth had significantly affected ($P<0.001$) on pre-weaning body weight gain. According to Kassahun *et al.* (1991), Horro lambs have a body weight of 2.9 kg and 15.0 kg at birth and at weaning, respectively. In addition, the breed on average has a weight gain of 134 g per day from birth up to weaning. This difference from the current result may be due to nutrition of the dam or other environmental factors during the studies.

Table 4: Mean birth weight and growth rate of lambs by breed in the study kebeles of Burie District

Breed of lamb born	N	Birth Weight (kg) Mean±SE	N	Growth rate (g/ day) Mean±SE
Washera	56	2.8 ± 0.07^{a}	17	$108.9^{a}\pm3.66$
Horro	56	1.8 ± 0.09^{b}	11	$117.9^{a}\pm2.29$
Total	112	2.3±0.07	28	112.4±2.51

N = Number of lambs; kg = kilogram; g = Gram; SE = Standard error; Means with different superscript letters within a column are significantly different ($P<0.05$)

4. Conclusion

Birth weight of male lambs (2.6 kg) was greater (P<0.001) than female lambs (2.1 kg). However, there was no difference in growth rate between male and female lambs when the two groups are compared at 112 days of age. Washera lambs had heavier (P<0.05) birth weight (2.8 kg) than Horro lambs (1.8 kg). Nevertheless, there was no difference (P>0.05) in growth rate between Washera (108.9 g) and Horro lambs (117.9 g) when the two breeds are compared at 112 days of age. In addition, there was no difference (P>0.05) in body weight between the two sheep breeds at 112 days of age (15.2 kg vs 14.7 kg). These results indicated that Horro lambs had a lower birth weight than Washera lambs, but Horro lambs had similar growth rate with Washera lambs in the first 112 days of age when the two breeds are compared within their respective environments. To confirm the current on-farm birth weight and growth performance of lambs further studies are needed involving more animals and comparing the two breeds within the same environmental conditions.

References

BOFED (Bureau of Finance and Economic Development) (2008). The Amhara National Regional State Bureau of Finance and Economic Development 2006/ 2007 Budget Year Annual Statistical Bulletin. Bureau of Finance and Economic Development, Bahir Dar.

CSA (Central Statistics Authority) (2011). Federal Democratic Republic of Ethiopia Central Statistical Authority. Agricultural Sample Survey 2010/2011 (2003 E.C.). Volume II, Report on Livestock and Livestock Characteristics (Private Peasant Holdings).

Gatenby, R.M. (1991). Sheep. Macmillan education LTD, London and Basingstoke, The Technical Centre for Agricultural and Rural Co-operation (CTA). 154p.

IPMS (Improving Productivity and Market Success of Ethiopian Farmers) (2007). Burie pilot learning woreda diagnosis and program design: Final draft. 95p.

Kassahun, A. (2000). Comparative performance evaluation of Horro and Menz sheep of Ethiopia under grazing and intensive feeding conditions. A PhD thesis presented to Humboldt University of Berlin. 130p.

Kassahun, A., Getachew, G., Zelalem A., Negussie A. and Fletcher, I. (1991). Small ruminant production in Ethiopia: Constraints and future prospects. Pp. 37 – 48. Proceedings of the third national livestock improvement conference. Addis Ababa, Ethiopia. 24 – 26 May

1989, Institute of agricultural Research.

Kassahun, A. and Solomon, A. (2008). Breeds of sheep and goats. Pp. 5 – 26. In: Alemu Yami and R.C. Merkel (eds). Sheep and goat production handbook for Ethiopia. Ethiopian sheep and goat productivity improvement program.

Markos, T. (2006). Productivity and health of indigenous sheep breeds and crossbreds in the central Ethiopian Highlands. PhD thesis, Swedish University of Agriculture, Uppsala. 76p.

Solomon, G. (2008). Sheep resources of Ethiopia: Genetic diversity and breeding strategy. A PhD Thesis Presented to Wageningen University. 145p.

Solomon, G., Azage, T., Berhanu G. and Hoekstra, D. (2010) Sheep and goat production and marketing in Ethiopia: Characteristics and strategies for improvement. IPMS (Improving Productivity and Market Success of Ethiopian Farmers Project) Working Paper 23. ILRI (International Livestock Research Institute), Nairobi, Kenya. 58pp.

SPSS (Statistical Package for Social Sciences) (2003). SPSS 12.0 for Windows, SPSS Inc.