

PRE-WEANING GROWTH PERFORMANCE OF SEKOTA SHEEP BREED IN WAGHIMRA ZONE, ETHIOPIA

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ABSTRACT: Pre-weaning growth performances of Sekota sheep breed was studied at Sekota district of Amhara National Regional State, Ethiopia under traditional crop-livestock production systems which is characterized by extensive, low-input low-output system. Two hundred thirty one lambs were monitored from birth to weaning age. Data on growth performances were collected and analyzed using the general linear model procedures of Statistical analysis system software. The least squares mean birth weight, three months weight and average daily weight gains from birth to three months age were 2.73 kg, 11.9 kg and 101 gm, respectively. Parity and type of birth were significant sources of variation for birth weight. Location had an effect of three months weight. The results obtained revealed the potential of the breed for meat production in the prevailing environment. The effect of parity on birth weight indicates special care for lambs from maiden ewes. Management options like integrated health care and supplementation of feed for sheep during the dry season help farmers to benefit from their sheep.

ORIGINAL ARTICLE

Key words: Growth Performance, Pre-Weaning, Sekota Sheep, Daily Weight Gain

INTRODUCTION

Small ruminant production is an important agricultural enterprise in Ethiopia. Sheep and goats are important components of the livestock subsector and are sources of cash income and play a vital role as sources of meat, milk and wool for smallholder keepers in different farming systems and agro-ecological zones of the country, they are also sources of foreign currency (Tibbo, 2006). Moreover, due to their high fertility, short generation interval, adaptation in harsh environment and their ability to produce in limited feed resource they are considered as investment and insurance (Tsedeke, 2007).

Sekota sheep is one of the identified indigenous sheep breeds of Ethiopia (Gizaw et al., 2008). Like other breeds of the country, Sekota sheep can be characterized by low productivity in terms of growth rate, meat production, and reproductive performance, which can be attributed to overcrowding, poor nutrition, and the resultant stress that provides a rich atmosphere for disease and serious production losses (Sisay, 2002). However, Sekota sheep is well adapted to drought-prone environment, and are believed to have better tolerance to drought conditions than other sheep breed.

The growth performance of sheep is an important character which determines the overall productivity of the flock and the economic return from sheep production enterprises with the objective of meat production. Increased economic returns from sheep production require improvements in the market weight of lambs to market age (Mengistie et al., 2010). Pre-weaning growth performance traits such as birth weight and growth rate have important implications on flock productivity, management systems and breeding policies to be followed. The objective of this study was to analyze birth weight and pre-weaning growth performance of Sekota sheep under traditional farmers' management system.

MATERIALS AND METHODS

Description of the Study Area

The study area, Sekota district, is found in Waghimra zone of the Amhara Regional state which is located between 12° 23' and 13° 16' north longitudes and 38° 44' and 39° 21' east latitudes. Sekota district is located in the eastern part of Waghimra zone, 435 km north east of Bahir Dar (capital of the region) and 720 km north of Addis Ababa. Sekota district represents from hot to warm sub-moist agro ecology having an altitude of <1500m ("Kola") to cold sub-moist agro ecology of 1800 -2200 m "Dega" agro ecology. (MoA, 1998). The annual rainfall,



which is erratic in distribution, varies between 350 and 650 mm. Generally, the topography of the district is rugged and chain of mountain terrains which limits seriously access to the various parts of the district. The agricultural production system of Sekota district is mixed livestock crop production system dominated by livestock production. The productivity of the land is low emanating from very low rainfall. The main agricultural crops are sorghum, barley, wheat, teff and leant.

Data collection

Data on growth performances of Sekota sheep was collected from a total of 231 lambs from September 2010 to January 2011. For this purpose, a total of 230 Sekota ewes of almost 5 months of pregnancy (based on owners' information) were selected and ear tagged. Reproduction records like birth date, parity, birth type and birth weight were recorded immediately after lambing. Weights of lambs were taken fortnightly using Salter balance. Average daily gain was calculated as $ADG_{t_2-t_1} = (W_{t_2} - W_{t_1})/t_2-t_1$; where $ADG_{t_2-t_1}$ is the weight gain between periods birth and three months age, W_{t_2} is the weight at three months age, W_{t_1} is the birth weight of sheep and t_2-t_1 is the number of days between ages t_1 and t_2 .

Statistical analysis

The General Linear Model (GLM) procedure of Statistical Analysis System (SAS version, 2003) was used to analyze the data. The fixed effects considered in the model were: location (Hamusit, Abia); sex (male, female); parity (1, 2, ..., ≥5) and birth type (single, multiple).

The statistical model was:

$$Y_{ijkl} = \mu + L_i + S_j + P_k + B_l + e_{ijkl}$$

Where;

Y_{ijkl} = the observation on body weight and weight gain (pre-weaning) of the n^{th} lamb

μ = the overall mean

L_i = the fixed effect of the i^{th} location

S_j = the fixed effect of j^{th} sex

P_k = the fixed effect of k^{th} parity

B_l = the fixed effect of l^{th} type of birth

e_{ijkl} = the random effect

RESULTS AND DISCUSSIONS

Birth weight

Factors affecting birth weight and pre-weaning growth performance of Sekota sheep is presented in Table 1.

The overall least squares mean birth weight of Sekota lambs obtained in the current study (2.73 ± 0.06 kg) was similar with the birth weight of Washera sheep (Mengistie et al., 2010), Gumuz sheep (Abegaz et al., 2011), Afar sheep (Yakob, 2008) and Horro sheep (Abegaz et al., 2002). The birth weight of Sekota sheep, however, was heavier than the weight reported for Menz sheep (Tibbo, 2006; Gizaw, 2002; Kassahun, 2000), local sheep around Dire Dawa (Aden, 2003).

Among the fixed effects considered, parity and type of birth significantly affected birth weight of Sekota sheep. Lambs born from fifth and above parity dams were heavier ($p < 0.001$) in weight than their lower parity dam born lambs. This finding is in line with other findings (Mengistie et al., 2010; Gardner et al., 2007) who reported sustained increase in lamb birth weight with dam age up to 6 years. The scientific explanation forwarded for the increased trend of lambs weight at birth with increase in dams parity or age at lambing are competition for nutrients for growth of young ewes and growth of fetus, and the favorable uterine environment provided by the older ewes.

The single born lambs were significantly ($p \leq 0.001$) heavier than their multiple born contemporaries (2.93 ± 0.06 vs. 2.53 ± 0.06). This is in agreement with literature (Mengistie et al., 2010; Duguma et al., 2002; Benyi et al., 2006; Tibbo, 2006; Gardner et al., 2007; Yilmaz et al., 2007). This could be because of the finite capacity of the maternal uterine space to gestate offspring (Gardner et al., 2007). In addition, the diminished nutrition supply via blood vessels during prenatal life and the relative decrease of carnuncles attached to each fetus could affect birth weight of multiple born lambs.

Pre-weaning growth

Pre-weaning growth performance of lambs depends up on the inherent genetic potentiality and the mothering ability of ewes. The overall least squares mean one, two and three months weight of sekota sheep is presented in Table 1.

The overall least squares mean three months weight of Sekota sheep obtained in the current study (11.9 ± 0.21 kg) was heavier than weaning weights of Horro sheep and Menz sheep (Kassahun, 2000; Tibbo, 2006) while it was similar with the weaning weights of Washera sheep (Mengistie et al., 2010) Gumuz sheep (Abegaz et al., 2011) and Horro sheep (Abegaz et al., 2002).



Location was an important source of variation affecting the three months weight of Sekota sheep that lambs from Hamusit area had heavier weights than lambs from Abia (12.9 ± 0.24 vs. 10.9 ± 0.23 ; $p < 0.001$). This might be because of the differences in the nutritional condition and management of sheep of the different areas.

Single born lambs were significantly ($p < 0.05$) heavier than those born twins at one months of age. Better pre-weaning growth of single born lambs is a common trend in many other breeds (Abegaz et al., 2011; Mengistie et al., 2010). However, the birth type effect diminished at two and three months age. This might be because, after some days multiple born lambs may be able to get enough milk from their dams because of increased intensity of suckling. If all the twins equally survive, their total rate of weight gain is greater than that of singles and will be an added attribute of the breed.

Table 1 - Least square means of birth weight, three months weight and growth rate of Sekota sheep

Variable	N	Birth weight (kg)		Three months weight (kg)		ADG (gm)
		Mean±SE	N	Mean±SE	N	Mean±SE
Overall	231	2.73±0.06	226	11.9±0.21	226	102±2.66
Parity		***		NS		NS
1	48	2.47±0.06 ^c	48	11.3±0.21	48	97.1±2.53
2	72	2.77±0.06 ^{abc}	71	11.7±0.20	71	99.1±2.42
3	75	2.88±0.06 ^{ab}	69	11.6±0.20	69	97.8±2.45
4	30	2.63±0.08 ^{abc}	30	11.4±0.28	30	95.0±3.39
≥5	5	2.99±0.18 ^a	5	12.2±0.59	5	117±7.19
Sex		NS		NS		NS
Male	124	2.70±0.07	121	11.9±0.23	121	101±2.93
Female	107	2.76±0.06	105	11.9±0.24	105	102±2.79
Type of birth		***		NS		NS
Single	209	2.93±0.06 ^a	205	12.9±0.19	205	101±2.39
Twin	22	2.53±0.06 ^b	21	11.8±0.32	21	102±2.92
Location		NS		***		NS
Hamusit	100	2.69±0.07	99	12.9±0.24 ^a	99	113±2.95
Abia	131	2.77±0.06	127	10.9±0.23 ^b	127	102±2.77

ADG: Average daily gain in grams; Means within each sub-class with different superscripts differ significantly *** = $P \leq 0.001$ and NS = not significant

At two and three months age lambs from second, third and fifth parity dams had significantly better ($p < 0.01$) growth than lambs from first and fourth parity dams. This is consistent with literature (Kassahun, 2000; Tibbo, 2006), that lambs born from the second and third parity ewes had a significantly higher growth rate than those from maiden ewes. This could be due to the difference in milk supply and maternal care, since maiden ewes produce less milk than average and lack experience to take care of their lamb. Influence of superior maternal environment of older ewes (to some age actually) is expected to be translated into better lamb performance up to weaning (Inyangala et al., 1996).

The effect of *kebeles* was significant ($p < 0.05$) for weights at birth, 2 month and 3 months age. It was consistently observed that, the lambs born in Hamusit *kebeles* were heavier than lambs born in Abia *kebeles*. In the present study in Hamusit *kebele* may be more sheep feed type found than Abia that available for lambs and lactating ewes.

Pre-weaning growth rate

The growth rate of young lambs depends almost entirely on the quality and quantity of feed, the ewes milk yield, lambs milk intake. Furthermore, the milk yield of the dam in turn depends up on the nutrition and mature size of the ewes (Ibrahim, 1998).

The overall mean average daily weight gain calculated from birth to weaning was 101 ± 2.66 gm. This result is comparable to the reports of Kassahun (2000) for Menz breed at on station condition, Mengistie et al. (2010) for Washera breed at on farm condition and was higher than the result obtained from local sheep around Dire Dawa (Aden, 2003). However, it is lower than the growth rate of Horro sheep (Kassahun, 2000), Gumuz sheep (Abegaz et al., 2010).

All the fixed effects considered were not significant which is inconsistent with the reports of other scholars (Mengistie et al., 2010; Abegaz et al., 2011; Kassahun 2000; Aden 2003).

CONCLUSION AND RECOMMENDATION

Sekota sheep breed is one of the short fat tailed sheep breeds of Ethiopia being reared in the degraded areas of Sekota. The results obtained revealed the potential of the breed for meat production in the prevailing environment. The effect of parity on birth weight indicates special care for lambs from maiden ewes. Management options like integrated health care and supplementation of feed for sheep during the dry season help farmers to benefit from their sheep.



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