Characterization of Gumuz sheep under traditional farmer practice in Metema woreda of Amhara Regional State

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Abstract

The objective of this study was to describe the physical, reproductive and growth characteristics of Gumuz sheep breed. The study was conducted at Metema Woreda of the Amhara National Regional State in Ethiopia. The coat color patterns of Gumuz sheep are plain (50.5%) including white, reddish brown, black, brown or grey, patchy (29.5%) and spotted (20%) with above color combinations. The tail is thin, having convex head profile and wattle is absent in both sexes. In 86% of males the horn is rudimentary or absent and females are polled. In mature females and males, the average body length was 66.95 cm and 68.31cm, height at wither was 63.59 cm and 67.31 cm and chest girth was 76.07 cm and 77.94 cm, respectively. In the 27 monitored flocks, breeding male to female ratio was 1:6.7 and females of breedable age formed 47.8% of the flock with average litter size of 1.17. The average birth weight was 2.79 ± 0.028 kg and males, single born lambs and lambs born to later parity ewes were significantly heavier than females, twin born lambs and lambs born in first or second parity. The average weight of lambs at one, two and three months, one and one and a half years were 6. $61\pm .15$ kg, $7.74\pm .22$ kg, $12.64\pm .24.05\pm 6.53$, and 29.5 kg, respectively. The average weight at one and half years was statistically similar to weights at the later age groups. The average marketing age was less than one year. Comparing to other breeds, the Gumuz ewe produce large number of progeny in her lifetime and males grow fast, which indicated that the breed has good potential for meat production.

Key words: Birth weight, body measurement, coat color, Gumuz sheep, lamb, twin.

Introduction

Ethiopia is known for its large population of livestock and diverse agro-ecology. The population of livestock is estimated as 41,527,142 cattle, 14,655,565 sheep, 13,661,562 goats, 1,504,208 horse and 3,962,969 asses (CSA, 2003). Sheep in particular have a great role in the economy of the farming population of Ethiopia. Sheep and sheep products are the major source of cash income for the farming community. In addition, sheep are raised

mostly to safeguard against crop failure and unfavorable crop prices in intensive cropping areas.

Despite the large size of the country's sheep population, the productivity per unit of animal and the contribution of this sector to the national economy is relatively low. This may be due to different factors such as poor nutrition, prevalence of diseases, lack of appropriate breed and breeding strategies. However, the indigenous sheep breeds of Ethiopia have relative advantage in their natural habitat to which they are well adapted. Sheep types in Ethiopia have been identified (Sisay, 2002; Solomon and Gemeda, 2004; Workneh *et al.*, 2004; Solomon, 2008). However, many of the recognized breed types including Gumuz breed have no population estimates and description of physical, physiological and functional characters and their status as a breed is not known. On-farm and on-station characterization of the merits and demerits of the identified breed types is indispensable to design sustainable genetic improvement, conservation and management strategies. The objectives of this study were, therefore, to characterize the physical feature and to evaluate some of the reproductive and production performance of Gumuz sheep under on-farm condition.

Materials and methods

The study area

The study was conducted in Metema woreda of the Amhara National Regional State. It is located about 900 km Northwest of Addis Ababa and about 180 km West of Gondar town. The altitude of Metema ranges between 550 and 1608 meters above sea level, while the minimum annual temperature ranges between 22 ^oC and 28 ^oC. Daily temperature is very high during the months of March to May, where it might reach as high as 43 ^oC. The mean annual rainfall of the area ranges between 850 to around 1100 mm.

Physical features

Based on the typical breed character as recognized by farmers, 114 female and 58 male Gumuz sheep were selected to characterize the physical features of the breed. Based on FAO (1986) physical descriptors list; color, head profile, ears, wattle, horns, beard, tail and ruff were observed. Linear body measurements including chest girth (CG), body length (BL), height at wither (HW), ear length (EL), tail length (TL) and horn length (HL) were measured.

Growth and reproductive characters

Twenty-seven Gumuz sheep flocks with a total of 249 animals were selected, ear tagged and monitored for a detailed characterization of growth and reproductive performances. Birth weight and fortnightly weight of lambs were measured during a four month study period (end of September to end of January).

Statistical analysis

Physical features were analyzed using descriptive statistics. The General Linear Model (GLM) procedure of SAS (1999) was used to analyze the growth traits where sex, parity and type of birth were taken as fixed effects. Duncan's multiple range tests was used to establish the statistical significance of differences between means following Gomez and Gomez (1984).

Results and discussion

Qualitative characters of Gumuz ewes and rams

Gumuz breed is a thin tailed breed with varying coat color (Figure 1). The coat patterns of female sheep were 41.2% plain, 32.5% spotted and 26.3% patchy. Reddish brown and white (30.7%), black and white (20.2%) and reddish brown (16.6%) were the most frequent colors among the female sample population. All females were without horn and ruff. Head profile was mostly convex (93%). They have long and semi pendulous ears and wattles are generally absent.

The coat color patterns in males include 60.3% plain, 25.9% patchy and 13.8% spotted coat pattern (Figure 1). Plain white (27.6%), reddish brown and white (19%) and black and white (17%) coat color patterns were dominant. Reddish brown, black, brown and grey coat

were also observed in plain pattern and mixed in patchy or spotted patterns. In males, 13.8% and 20.7% of the sample population have horn and rudimentary horn, respectively and the rest (65.5%) had no horns. Ruff was present in 63.8% of male population. Wattle was rarely observed and head profile was mostly convex.



Figure 1. Gumuz ewe (left) and ram (right).

Body measurement and weight of Gumuz ewes

The results of the linear body measurements and body weights of Gumz ewes indicated that the average body weight, body length, height at wither and chest girth were 31.41 kg, 65.95 cm, 63.59 cm and 76.07 cm, respectively (Table 1). Tail length and ear length were 34.46 cm and 11.59 cm, respectively (Table 1).

Traits	Ν	Minimum	Maximum	Mean	SD.
Body weight (kg)	114	22	42	31.4	3.935
Body length (cm)	114	61	72	65.95	2.456
Height at wither (cm)	114	55	70	63.59	2.831
Chest girth (cm)	114	67	84	76.07	4.004
Tail length (cm)	114	25	44	34.66	3.165
Ear length (cm)	114	7	14	11.59	1.055

Table 1. Average body measurements and weight of Gumuz ewes.

The average body weight, body length, height at withers and chest girth of this sheep breed are higher than the values obtained for other breeds of central highland and Rift Valley of the Amhara Region by Sisay (2002) and Menz sheep by Markos *et al.* (2004). But, they are

almost equal to the measurement obtained for Washera sheep of Northwestern highlands by Sisay (2002) and comparable to the measurement obtained for Horro sheep by Markos *et al.* (2004).

Body measurement and weight of Gumuz rams

The results of the linear body measurements and body weights of Gumz rams are presented in Table 2. The average body weight of Gumuz ram (34.63 kg) is heavier than the average body weight of central highland sheep breeds (29.43 kg), Rift valley sheep (27.46 kg), Northwestern highland sheep (31.4 kg) and Menz sheep (25.3 kg) (Sisay, 2002; Markos *et al.*, 2004). The average chest girth height at withers of Gumuz rams are also higher compared to the central highland and Rift Valley sheep. The central highland and Rift valley sheep are 64.72 cm and 60.4 cm heigh at wither where as the Gumuz had 67.31 cm height. The Gumuz breed was also longer (68.31cm) in body length compared to the central highland (61.3 cm), Rift valley (55.78 cm) and northwestern highland sheep (65.16)(Sisay, 2002).

Traits	Ν	Minimum	Maximum	Mean	SD
Body weight(kg)	35	26	50	34.63	6.765
Body Length (cm)	35	60	77	68.31	3.771
Chest Girth (cm)	35	66	87	77.94	4.911
Height at Wither (cm)	35	59	77	67.31	4.143
Tail length (cm)	35	23	48	35.23	5.253
Ear length (cm)	35	9	16	11.93	1.441
Horn length (cm)	5	12	16	14.40	1.817

Table 2. Average body weight and body measurement of Gumuz rams.

Litter size

Forty-one male and 45 female lambs were born during the four month monitoring of the sample Gumuz sheep population. Twenty-six lambs were born as twins, which is equivalent to a litter size of 1.17 per ewe. The observed litter size in Gumz sheep is higher than the litter sizes of 1.02 (Niftalem, 1990) and 1.03 (Abebe, 1999) reported for Menz sheep.

Birth weight

The observed average birth weight for Gumuz breed (Table 3) is higher than the reported values of 2.5 kg for Horro (Rege *et al.*, 1996), 1.76 kg for Menz (Abebe, 1999) and 2.33 kg for another local breed (Aden, 2003). However, average birth weight of Adal and Black Head Somali lambs (Beniam, 1992) were slightly heavier than the average obtained for Gumz sheep in the present study.

Variable	Ν	Birth weight (kg) Mean±SE
Overall	86	2.79 ± 0.028
Parity		***
1	19	$2.49 \pm .043$ at
2	18	2.66 ± 0.039^{a}
3	28	2.87 ± 0.031^{b}
4	14	2.94 ± 0.045^{b}
5	7	$2.8 \ 0\pm 0.073^{b}$
Sex		***
Male	41	$2.86{\pm}\ 0.036^a$
Female	45	2.67 ± 0.031^b
Type of birth		***
Single	60	2.88 ± 0.028^{a}
Twin	26	2. 64 ± 0.041^{b}

Table 3. Least square means (\pm SE) for birth weight of Gumuz lambs.

^{*t*}Means within each sub-class with different superscripts differ significantly. *** denotes significant difference at $P \leq 0.001$.

The results of the analysis of variance revealed that male lambs were heavier than females at birth (P \leq 0.001) and this is consistent with numerous earlier reports (Niftalem 1990; Kassahun, 2000; Gemeda *et al.*, 2003). Lambs born of young ewes in their first and second parity were significantly (P \leq 0.001) lighter than lambs born of older ewes. This result is in agreement with earlier findings for other breeds (Gemeda *et al.*, 2003; Kassahun, 2000; Aden, 2003). Single born lambs were significantly (P \leq 0.001) heavier than twin born lambs.

Pre-weaning growth

Body weights at one, two and three months (weaning) of age are given in Table 4. During the first 30 days lambs gained around 4 kg and during the second and the third 30 days the gain was about 3 kg each. Analysis of variance showed that the effect of parity on lamb weights after birth is insignificant. Similarly, the effect of type of birth remained only up to one month of age.

	Age (month)						
Variable One mont		h Two		months	Three	Three months	
	N	Mean \pm S.E	N	Mean \pm S.E	N	Mean \pm S.E	
Overall	70	6.61±.154	63	9.74±.22	44	$12.64 \pm .24$	
Parity		NS		NS		NS	
1	15	6.18±0.29	13	9.16±.44	7	12.54±.54	
2	14	6.04±0.34	14	$9.48 \pm .41$	10	12.41±41	
3	23	6.75 ± 0.22	19	$10.02 \pm .35$	17	12.67±.32	
4	10	6.72 ± 0.33	9	$9.95 \pm .51$	5	13.44±.61	
5	8	6.7±0.36	5	$9.58 \pm .53$	5	$11.84 \pm .58$	
Sex		**		*		*	
Male	32	$6.86 \pm .21^{a^*}$	28	$10.19\pm.32^{a}$	22	$13.23 \pm .31^{a}$	
Female	38	$6.10\pm.19^{b}$	35	$9.08\pm.27^{b}$	22	$12.04 \pm .32^{b}$	
Type of birth		*		NS		NS	
Single	52	6.82±0.15 ^a	47	9.93 ± .22	32	12.81±.24	
Twin	18	$6.13\pm.26^{b}$	16	9.34±.38	12	12.18±.41	

Table 4. Least squares means $(\pm SE)$ of pre-weaning lamb weight (kg) at specified age.

*Means Within each sub-class with different superscript letter differ significantly. NS, * and ** denot non significant difference and significant difference at $P \le 0.05$ and $P \le 0.01$, respectively.

Post weaning growth

Based on ages estimated from dentition classes, weights of different age classes beyond three months of age are given in Table 5. The mean weight for lambs <6 months is roughly equal to the adjusted three month weight (Table 5). Lambs <6 months and 6-12 months old were significantly lighter than older animals (P \leq 0.001). However, there were no significant differences among the older age groups. Thus, it can be estimated that Gumuz sheep attain

their mature weight around 13-18 months of age. This finding draws support from a report that the thin tailed sheep attain mature weight starting from two permanent teeth (Sisay, 2002).

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Variable	Ν	Mean \pm SE
Category		
<6 month	67	$12.3 \pm .798^{a^*}$
6-12 month	40	$23.05\pm\!.645^b$
13-18 month	36	$29.5 \pm .923^{\circ}$
19-24 months	41	$32.39 \pm .571^{\circ}$
25-48 months	35	$34.14 \pm .776^{\circ}$
>48 months	28	$33.96 \pm .603^{\circ}$

Table 5. Least square means (± SE) weight (kg) of Gumuz sheep at different age category.

*Means with different superscript letters differ significantly at P<0.001.

Conclusion and Recommendations

Gumuz sheep breed is one of the thin tailed sheep breeds of Ethiopia. The coat color pattern of the breed varies and includes plain, patchy or spotted patterns with white, reddish brown, black, brown or grey hair. The head profile is convex, without wattles. The males have rudimentary horns or polled while the females are polled. The ewes have better mothering ability in terms of birth weight, rate of gain up to weaning and the animals attain high market weight at an early age. All these evidences demonstrate that Gumuz sheep breed has good potential for meat production under the prevailing harsh environmental condition of Metema.

It is recommended that to validate the conclusions drawn from the current preliminary onfarm study, it is important to undertake a well planned and controlled on-station study to evaluate the genetic potential of Gumuz breed for meat production. Secondly, in order to improve Gumz sheep farmers' income and to conserve the breed, it is important to design and implement appropriate community-based genetic improvement program for Gumuz sheep breed.

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