

# Comparative Growth and Production Performance Evaluation of Indigenous Begait and Abergelle Goat Breed under Farmer's Management Practice in Tigray, Northern Ethiopia

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## Abstract

The study was carried out in *Tanqua Abergelle* District to evaluate the growth and production performance of Begait and Abergelle goat breeds and their F1 kids managed under traditional management practice. Data on kids' growth performance and survival rate and milk production were collected from 48 Begait kids, 45 Abergelle kids, 40 Begait dams and 37 Abergelle dams respectively for one year. A total of 40 dams and 20 buck of Begait goat breeds were distributed for 20 beneficiaries for evaluation of the Begait goat breed in comparison of Abergelle goat breed. Housing, feeding and health care were thoroughly attended. Begait kids had highly significant heavier weight ( $p < 0.0001$ ) at birth ( $3.0\text{kg} \pm 0.07$ ), three months ( $9.75\text{kg} \pm 0.56$ ) six months ( $15.75\text{kg} \pm 0.58$ ) and nine months ( $21.12\text{kg} \pm 0.48$ ), than Abergelle kids body weight at birth ( $2.16\text{kg} \pm 0.04$ ), three months ( $8.22\text{kg} \pm 0.47$ ), six months ( $11.8\text{kg} \pm 0.49$ ) and nine months ( $13.98\text{kg} \pm 0.54$ ) respectively. Similarly Begait kids were highly significant ( $p < 0.001$ ) weight gained at six months ( $66.61\text{g} \pm 2.12$ ) and nine months ( $59.72\text{g} \pm 5.12$ ) than Abergelle kids weight gained at six months ( $39.72\text{g} \pm 4.47$ ) and nine months ( $24.17\text{g} \pm 3.10$ ) respectively. But not significance difference ( $p < 0.05$ ) on three months weight gain ( $75.06\text{g} \pm 6.08$ ,  $67.33\text{g} \pm 5.32$ ) respectively. The average milk yield per day of the Begait dam were 0.75 liter, whereas average milk production of Abergelle dams were 0.32 liter. Besides to this the average number of Begait kids born per breeding female was 1.2 of the total births, 90% were single births and 10% was twin births. Generally, Begait F1 kids had high growth rates (range 59.72 to 75.06g per day). As a result of this the community of Tanqua-Abergelle district had a positive attitude towards the Begait goat breed due to their good growth and reproductive performance. So that scaling up this technology has to be strengthened to enhance farmers benefit from Begait goat breed.

**Keywords:** body weight, reproductive performance, milk yield, management practices, survivability rate

## 1. Introduction

Small ruminant production is important due to the fact that it can easily be managed, requires small initial investments and its short generation interval (Otte, M.J. and P. Chilonda. 2002). Indigenous goat breeds constitute over 95% of the small ruminant population of Africa and that of Ethiopia is 99.77% that are indigenous breeds (CSA, 2012). In East Shoa administrative zone, there are over 488.5 thousand goats and in West Arsi administrative zone, there are over 370 thousand goats. The recent data from CSA (2012) indicated that country's goat population growth rate is 1.1% with off-take rate of 35%. In Ethiopia goat production accounts for 16.8% of total meat supply (Ameha, 2008) and 16.7% of milk consumed in the country (Tsedeke, 2007). In Ethiopia sheep and goats are raised by smallholder farmers as a major source of meat and immediate cash income. The recently released poverty map by ILRI, 2006 indicate that livestock types are key indicators where families sit on the poverty scale, sheep and goats being considered poor-man's species.

The majority of the farming communities of Ethiopian practices rearing of small ruminants. Small ruminants are kept for the purpose of meat, milk and wool production and income generation. Small ruminants are an important animal in subsistence agriculture because of unique ability to adapt and maintain themselves in harsh environments. Skin and manure are valuable by products of sheep and goat production. Owing to their ability to thrive and reproduce fast even in harsh environments they used as source of risk mitigation during crop failures, property security, monetary saving and investment in addition to many of other socio-economic and cultural function (Markos Tibbo, 2006). Ethiopia has great potentials to export large number of small ruminant and their byproducts especially to the Middle East and other African markets (Solomon *et al.*, 2002).

Our traditional way of -goat management is challenged by low survivability and high mortalities of kids. The outcome of the study will also be used to formulate sound disease prevention and control strategies. Examination of farmers' management practices that influence the survivability of kids in small-scale communal goat production systems will lead to an appropriate extension message to meet the needs of sheep and goat farmers. The main objectives were to demonstrate and evaluate growth and reproductive performance of Begait goat breed under farmer's management system.

## 2. Materials and Methods

### 2.1 Study area

The study will be carried out in Tanqua Abergelle district which is located in central zone of Tigray region about 110km South East Mekelle (capital city of the region). Geographically the district is located between 10° 27' N latitude and 39° 01' E longitude with an altitude ranging from 1200 - 1500 a.s.l. Based on seven-year rainfall data the area has an average rainfall of 496.8mm. The major crop grown in the area are Sorghum, maize, and tef

### 2.2. Farmer selection

Twenty Farmers from the village of Sheka Tekli were selected purposively based on the farmer's willingness to transfer the technology to other farmers and Experience in small ruminant production. Female household head candidates were 80% and male head were 20%, based on the project setting criteria.

### 2.3. Training and visit

Training was given for the selected beneficiaries at their village. Field Visits was also arranged to expose the Begait goat breed to some successful achievements of small ruminant project activities. Monitoring and evaluation was strictly followed at everyone months interval after the farmers received the Begait goat breed

### 2.4. Measurements and observations

Birth weight of the newly born kids (BW), Weaning weight (WW), Six months weight (SMW), and Nine month weight (NMW), were recorded at empty gut before feeding and watering. All weight measurements except BW were taken at one month's interval using the Salter scale with capacity of 50kg and 200g precision, but birth weight was taken immediately after 24 hour birth. A total of 48 kids and 44 does with sex ratio 50:50 were used for analysis. Weaning weight gain(WWG), six month weight gain(SMWG), nine month weight gain(NMWG), Birth type (BT), Survive ability rate(SR), Milk yield, Health management, Subjective standard set for general management practices were also collected.

### 2.5. Begait goat production and management practices

Considering conception rate, calving rate, mortality rate, a total of 60 Begait goat breed (40 dams and 20 bucks) with the sex ratio 2:1 were introduced to the study area for twenty beneficiaries. The Begait goat breeds were reared under extensive management system. Feed and feeding system, health care were also assessed in the study area. And group discussion with the benefiteres were taken with the management of feeding, feed resource, health care and over all major problems of goat production and opportunities.

### 2.6. Statistical model and Data analysis

The BW, TMW, SMW, NMW, the weight gains of the kids at different ages were analyzed using (SAS, 2003) Software Means were compared using the Tukey test.

## 3. Result and discussion

### 3.1 Effect of breed on live weight change of goat kids

Birth weight is strongly influenced by breed, sex of kid, birth type, age of the dam, feeding conditions, season of birth and production system (Banerjee *et al.*, 2000; Tesfaye Tsegaye 2009). As indicated in (table1). Begait kids had highly significance heavier body weight ( $p < 0.001$ ) at birth ( $3.0 \pm 0.07$ ), six months ( $15.75 \pm 0.58$ ) and nine months ( $21.12 \pm 0.48$ ), than Abergelle kids at birth weight ( $2.16 \pm 0.04$ ), three months weight ( $8.22 \pm 0.47$ ), six months weight ( $11.8 \pm 0.49$ ) and also Begait kids had significance heavier ( $p < 0.05$ ) at three months ( $9.75 \pm 0.56$ ) than Abergelle kids ( $8.22 \pm 0.47$ ). This result is comparable with the report of (G. Berhane and L.O.Eik, 2006). Similarly, Begait kid had highly significance ( $p < 0.0001$ ) weight gain on six months ( $66.61 \text{g} \pm 2.12$ ) and nine months ( $59.72 \text{g} \pm 5.12$ ) than Abergelle kids with six months ( $39.72 \text{g} \pm 4.47$ ) and nine months ( $24.17 \text{g} \pm 3.10$ ), but had not significance difference ( $p < 0.05$ ) on three months weight gain ( $75.06 \text{g} \pm 6.08$ ,  $67.33 \text{g} \pm 5.32$ ) for Begait and Abergelle respectively.

**Table1. Comparison of live weight change of Begait and Abergelle kids**

Parameters	Begait kids		Abergelle kids		P
	N	Mean +SE	N	Mean +SE	
BW(kg)	24	3.0±0.07	24	2.16±0.04	< 0.0001
TMW(kg)	24	9.75±0.56	24	8.22±0.47	0.0234
SMW(kg)	23	15.75±0.58	24	11.8±0.49	< 0.0001
NMW(kg)	23	21.12±0.48	23	13.98±0.54	< 0.0001
TMWG(g)	24	75.06±6.08	24	67.33±5.32	0.346
SMWG(g)	23	66.61±2.12	24	39.72±4.47	< 0.0001
NMWG(g)	23	59.72±5.12	23	24.17±3.10	< 0.0001

BW- Birth weight, TMW- three months weight, SMW- six month weight , NMW- nine month weight, TMWG - three months weight gain, SMWG - six months weight gain, NMWG - nine months weight gain

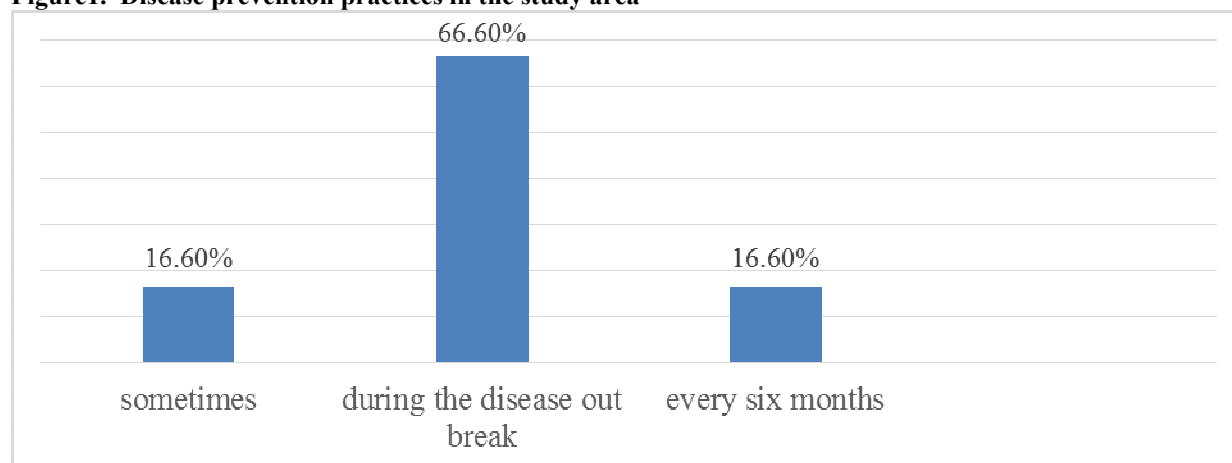


Picture.1: Abergelle kids one years old (left) and Begait kids three months old (right) in the field

### 3.2. Vaccination of goats

Small ruminant diseases are the main problems of smallholder farmers' in the study areas. The most economic important of small ruminant diseases frequently observed in the study areas were identified as PPR, pasturolosis and parasite. Similar to this finding (Solomon *et al.*, 1995; Yohannes *et al.*, 1995; Solomon and Gemeda, 2000; Markos, 2006) has reported that high prevalence of diseases and parasites are another serious constraint for small ruminant production in Ethiopia. This causes high mortality amongst kids and lambs, diminishing the benefits of their high reproductive. To control the spread of these diseases in the study areas about 66.6% of the beneficiaries of the study areas were practiced vaccinating of their goats against the most common small ruminant diseases whenever an outbreak diseases is occurred, 16.6% of the beneficiaries were practiced vaccination their goat every six months. However, 16.6% of the beneficiaries did not vaccinate their goats. In the study areas most of (100%) animal health service was delivered by governmental animal heath personnel. The frequency farmers in the study areas vaccinate their goats is showed in figure1.

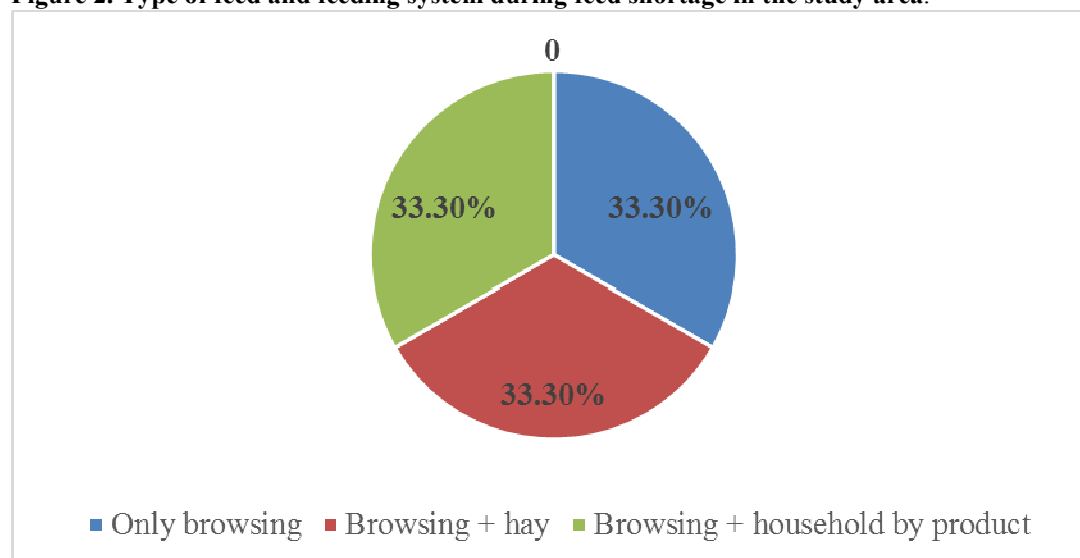
**Figure1. Disease prevention practices in the study area**



### 3.4. Small ruminant feeds and feeding practices

Feed shortage is a major problem of small production system in the study areas. Similar report were reported by many authors in different parts of the country (Abule, 2003; Kedija, 2006; Teshome, 2006; Endeshaw, 2007; Getahun, 2008; Tesfaye, 2008). Indigenous browses are the major sources of feeds in the study area especially for goats while concentrates were not common. Goats of the study areas are total dependent on natural pasture and tree species for browsing during the days' time. Almost about 66.6% of the beneficiaries were used additional feeding practice during the dry and wet season of the years. Only 33.3% of the Begait goat beneficiaries' were not supplemented to their goats.

**Figure 2. Type of feed and feeding system during feed shortage in the study area.**



### 3.4. Average daily milk yield and fertility rate of Begait dams

In Ethiopia productivity of local goats is very low. The reason behind it could be due to genetic effects or major environmental factors. Why because these factors influence daily milk yield of dams. The average daily milk yield of Begait goat dams under farmer's management system were 0.75 liter per day. This is similar to (Neugebauer *et al.*, 1991) and (Farm Africa, 1996). report As shown in ( table 2.), but the average milk yield of the Begait goat breed were vary across the lactation stages 0.68 liter per day in early lactation , 0.84 liter per day in medium and 0.73liter per day in late lactation respectively. Whereas milk yield of the Abergelle dams were 0.35 in early lactation stage, 0.47 in mid lactation and 0.15 in late lactation respectively. From these 40 Begait dams 36(90%) were gave single birth and 4(10%) were gave twin birth and average number of kids born per breeding female was 1.2 of the total births. .Whereas 100% the Abergelle dams were gave single birth.

**Table 2: Average daily milk yield**

Milking stages (in litter)	Begait Dams	Abergelle Dams
Early stage	0.68	0.35
Medium stage	0.84	0.47
Late stage	0.73	0.15
<b>Average</b>	<b>0.75</b>	<b>0.32</b>

### 3.5. Survival rate of Begait and Abergelle kids (F1) in the study area

Birth type, sex of the kids affected survival of kids (Table 4). Kids born twin had the lowest survival rate than their single born counterparts which might be due to their low birth weight and insufficient milk. The result is in line with the report of Zeleke (2007) for Somali goats

**Table4. Survival of the newly born Begait and Abergelle goat kids before and after weaning weight in Tanqua-Abergelle district**

Breed	Birth type	N	Survival rate			
			At pre weaning		At post weaning	
			N	%	N	%
Begait	Single	36	34	94%	30	83.3%
	Twin	8	6	75%	4	50%
Abergelle	Single	37	36	97.3%	34	91.9%
	Twin	-	-	-	-	-

N = number of observation, % percent

### 3.6. Farmer's perception

The beneficiary of Sheka Tekli in collaboration Abergelle agricultural research center Begait goat kids were evaluated as compare to their own local Abergelle goat kids in overall performance and the farmers were perceived the Begait goat breed as non-feed selective browser, easily adaptable to the environment, milk yielder and also they are fast grower. That's why the community of the study area have great interest to breed their local

Abergelle goat breed with the Begait goat breed in order to improve the growth and survivability their flock.

#### 4. Conclusion and recommendation

Begait goat breeds are adaptable and best perform in low land of central zone of Tigray, Tanqua Abergelle Wereda. And the community of kebele Sheka Tekli kebele had a positive attitude towards the Begait goat breeds. The demand for Begait goat breed is still increasing throughout the region in general and the study area in particular. In addition to this the result of this study indicated that in all growth parameters and reproductive performance of the Begait goat breed increased through effective management practices. Therefore well managing of Begait goat breed for increment overall growth and reproductive parameters are a mandatory animal husbandry practices.

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