

Full Length Research Paper

Popularization of dorper sheep breed for enhancing production and productivity of local sheep: In the case Enda-Mekoni Woreda Southern Tigray, Ethiopia

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Ethiopia has endowed sheep breed with poor productivity in terms of meat yield. Therefore demonstration of Dorper breed sheep was conducted at Enda-Mekoni Woreda with the objective of improving production and productivity of local sheep. Two pure male Dorper sheep were introduced to Enda-Mehoni Woreda for community based breeding strategies. Data such as live Body weight and farmer perception were collected. Data was analyzed using descriptive statistics and Ranking methods. At the beginning, community had negative perception and not willing to cross their sheep with Dorper sheep. However, Farmers were given higher scored (49) to pure Dorper sheep on selection criteria for, male breeding stock. As a result, it's off spring (50% local and Dorper) was scored higher (97) on productivity and reproductive performance. In the present study, body weight of male crossed sheep was recorded 40 kg which is 18.7 kg higher body weight gaining as compared to local sheep with similar age. Moreover, crossed ewe had 8.5 kg superior on body weight gain compared to similar age of local sheep. Farmers notified that, pure Dorper and its crossed sheep had superior traits on loin, sternum, shoulder, body conformation, puberty age and marketable weight. The popularized Dorper sheep and its crossed had increased body weight growth as well as reproductive performance while crossed with local sheep. Therefore, it can be conclude that Droper sheep is adaptable to highland Tigray region as well as preferable to upgrade local sheep productivity.

Key Words: Breed, body weight, crossed, dorper, local, sheep.

INTRODUCTION

Ethiopia owns 55.0 million cattle, 27.3 million sheep, 28.2 million goats, 1.1 million camels, 51.3 million poultry and 5 million beehives (CSA, 2014). The livestock sub-sector is also already as a major contributor to the overall economy. The livestock sector contributes 19% of GDP, and 16 to 19 % of the foreign exchange earnings of the country (Ministry of Agriculture (MOA), 2012). Though,

Ethiopia has the largest livestock population, the contribution of these sector to livelihood improvement has remained very limited. The current production level of meat is low (4%) when compared to other regions of the world. Low growth rates of livestock result in relatively small carcasses (average carcass weights of cattle, sheep and goats estimated to be 129, 13.2 and 11.8 kg,

respectively (FAO, 2006). In Ethiopia, the per capita meat availability is estimated at 9.94 kg per person per annum which is much lower than that of the per capita consumption levels (32.3 kg per person/annum), in the developing countries (MoARD, 2007). The government's Growth and Transformation Program (GTP), launched in 2010 to 2011, has established annual export goals of 111,000 metric tons of meat and 2,000,000 live animals by 2015 which has led to an increment of, nearly four-fold from 2011 (MoARD, 2007). Moreover, sheep production in Ethiopia is based on indigenous breeds except Awassi-Menz cross breeds that contribute less than 1% of the population. Despite low level of productivity due to several technical (genotype, feeding and animal health), institutional, environmental and infrastructural constraints (Tibbo, 2006), indigenous sheep breeds have great potential in contributing more to the livelihoods of the people in low-input, small-holder crop livestock and pastoral production systems (Kosgey and Okeyo, 2007).

In Tigray 3.6 million cattle, 1.2 million sheep, 3.04 million goats, 4.3 million poultry and 213 thousand beehives population were found (CSA, 2011). Livestock use important economic functions as household savings, assets that provide interest-free credit, and as insurance to mitigate risk. According to Alemayehu and Tikabo (2010), findings showed that yearly age of sheep body weight was noted as 17.90 ± 2.59 and 19.66 ± 2.78 kg for female and male sheep, respectively. This breed was found to be relatively less as compared to other exotic sheep breeds like Dorper sheep that weigh around 40 kg (Snyman et al., 2010). The Dorper is a non-selective feeder, with both browsing and grazing behavior. The maternal influence is a desert sheep that has thrived and reproduced under harsh conditions for centuries. As a whole, this problem government has a strategy to improve the livelihood of rural society using livestock farming system. Therefore considering vital importance of sheep production under small holder farm system, operational research technology dissemination project was initiated to popularize Dorper sheep breed for enhancing livelihood of safety net households in south zone of Tigray region.

MATERIALS AND METHODS

Area description

The study was carried out in Enda-Mekoni Woreda and the Woreda lie from 1800 to 3925 m.a.s.l which was found in 662 Km from Addis Ababa and 120 km from the Regional capital, Mekelle. Topography of the area can be classified as very steep 65%, steep 12%, gentle 15% and valley 8%. The total land area of the Woreda is 62,184 ha. The study area has the altitude ranges from 2850 m.a.s.l (meter above sea level) and is predominantly classified as

high land 65%, Woina-Dega 30% and kola 5% agro ecology.

Based on the existing digital data, mean annual rainfall is 650 to 950 mm. *Belg* (small rains) and *Keremti* (long rainy season) are the two cropping seasons. Farmers depend on *Keremti* season for crop production. The dominant soil type in the Woreda plains is clay soil, loam and sandy soil in the medium and high altitude areas. The mean annual temperature of the woreda is between 12°C and 18°C.

Beneficiary selection and selection procedure

Two pure Dorper breed sheep were brought with financial support of operational research project, distributed to farmers on the objective of community based breeding strategies. Two farmers research group each contained 15 members which were established at Enda-Mekoni Woreda and the group take responsibility for the sheep as breeding service for the community. In line with this, the economic status and experience of the households on their previous practices to adopt technologies, availability of enough feed and space, living standard and initiations were included as selection criteria.

Data collection and analysis

Linear body measurements such as heart girth (HG), body length (BL) and height at wither (HAW) were collected. The animals were measured in their standing position under field conditions using plastic measuring tape and measuring stick and at the same time, the body weight was taken using a 50 kg size spring balance early in the morning before allowing the animals for grazing. Male and female animals were measured separately. Body weight measurements were taken at 12 months age of local and crossed Dorper sheep. 30 (16 male, 14 female) experienced farmers were collected at a perception data using group discussion. Perception data were collected through participatory rural appraisal (PRA) tools. The data were analyzed through mean body weight and descriptive statistics.

The following linear body measurements were taken as per the procedures of ESGPIP (2009).

- Body length: the distance from the base of the tails to the base of neck (first thoracic vertebrae).
- Heart girth: the circumferential measure taken around the chest just behind the front legs and withers.
- Wither height: the distance from the surface of a platform on which the animal stands the wither.

RESULTS AND DISCUSSION

Phenotypic characterization of crossed sheep (50% local highland X Dorper sheep)

The crossed sheep (50% local highland and Dorper) has both sex pattern coat description with black head, course fiber type, course wool hair type, long and straight hair type. In line with this, both sexes has short and

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Table 1. Mean comparison of body measurements of the different sheep breeds of Tigray.

Breed	Mean body measurements					
	Height at Withers		Girth Circumference		Body length	
	Male	Female	Male	Female	Male	Female
Crossed(50% local X Dorper sheep)	63	55.5	81	72	50	47.5
Begait	65.26 ^a	65.7 ^a	72.34 ^a	75.1 ^a	53.95 ^a	54.87 ^a
Abergelle	58.8 ^b	60.56 ^b	69.1 ^b	74.8 ^a	49.7 ^b	52.17 ^b
Ille	53.81 ^c	55.9 ^c	66.9 ^{ab}	73.0 ^a	48.63 ^b	52.06 ^{ab}
Common highland sheep	56.67 ^{bc}	58.88 ^b	69.62 ^b	74.57 ^a	46.88 ^b	48.58 ^c

Table 2. Body weight gain of crossed sheep.

Age	Sex	Body Weight (kg)		Difference in body weight (kg)
		Crossed (50% Local and Dorper)	Local	
1 year	M	40	21.3	18.7
1year	F	29	20.5	8.5

compacted body shape, straight profile face and lateral ears orientation with 5 and 10.5 cm ear length in male and female, respectively. In addition to this, male crossed sheep has short length horn but in female crossed sheep does not exist. Moreover, both sexes have long thin tailed and early puberty age at six month. The first lambing and mating age at female and male were 9 and 7 month age, respectively. Both sexes crossed sheep has medium udder and testicle size.

In the absence of weighing scale, a number of body linear measurements such as heart girth values can be used to estimate the weight of an animal (Nsoson et al, 2003; Vargas et al., 2007; Elizabeth et al., 1997). For example, studies have shown that heart girth can explain 86 to 91% of the body weight in sheep (Thys and Harouin, 1991). Mean body measurements of different sheep breeds are given in Table 1. Crossed sheep in male and female sex had comparable height at withers of 63 and 55.5 cm with begait sheep which is the biggest sheep in Tigray. Moreover, girth circumference of crossed sheep was higher than other Tigray sheep breeds especially male crossed sheep which had 81 cm girth circumference but female crossed breed had comparable girth circumference. Male crossed sheep had comparable body length with male begait breed but higher than other breed. However, female crossed sheep has lower body length (47.5 cm) than other female sheep breed in Tigray. Similarly, according to Alemayehu and Tikabo (2010) reported the height at withers, Girth circumference and body length of highland sheep of Tigray for male 58.10 ± 3.20 , 62.20 ± 3.52 and 47.94 ± 3.12 cm, respectively. However, according to the authors report, the height at withers (58.18 ± 3.21 cm), Girth circumference(65.03 ± 4.43 cm) and body length ($49.59 \pm$

3.11 cm) of highland sheep of Tigray was comparable with Dorper crossed sheep.

Body weight gain

Body weight of male crossed sheep (50% local and Dorper) at yearling age was 40 kg in the study area but similar age of local sheep had 21.3 kg live body weight (Table 2). This implies that crossed breed sheep had superiority of 18.7 kg higher live body weight gaining compared to local breed at similar age. Moreover, the weight of female crossed sheep at yearling age was 29 kg while similar age of local sheep is 20.5 which is 8.5 kg live body lower than crossed sheep. According to Alemayehu and Tikabo (2010), findings showed that yearly age of sheep body weight was noted as 17.90 ± 2.59 and 19.66 ± 2.78 kg for female and male sheep, respectively. Similarly Berhe (2010) reported that, yearling weight of Ethiopian shoat was 22 kg and to compare with the current study, the minimum and maximum average matured weights of sheep were also reported as 21.6 ± 9.3 and 41.5 ± 2.0 kg, respectively (according to Abebe, 2010) in Ethiopia.

Perception of the community on Dorper sheep

During group discussion farmers explained that at the beginning, the community was not interested to breed their sheep with Dorper sheep. This was due to Dorper sheep has short tail, short leg, black color and huge body conformation. The community thought that Dorper sheep as donkey, dog and pig and they also decided not to slaughter and eat. Selling their attitude was link with other

Table 3. Farmer selection criteria on male breeding stock.

Traits	Farmer score on male breeding stock	
	Local	Dorper
Loin	-	10
Sternum	-	10
Shoulder	-	10
Body conformation	-	10
Tail length and width	10	-
Ear length	5	5
Body color	8	2
Height	8	2
Total score	31	49
Percentage (%)	38.7	61.3

Table 4. Farmer's perception crossed sheep performance.

Traits	Farmer scored	
	Crossed (50% Local and Dorper)	Local
Birth weight	10	-
Weaning weight	10	-
Feed efficiency	10	-
Body conformation	10	-
Loin area	10	-
Shoulder area	10	-
Sternum area	10	-
Height	-	10
Ear length	5	5
Body color	2	8
Tail length	1	9
Puberty age	10	-
Tolerant for feed and water shortage	-	10
Resistance to external parasites and diseases	-	10
Marketable weight	10	-
Total Scored	97	52
Percentage (%)	65	35

cultural norms and religion. Later on, the community was interested to breed their sheep with Dorper sheep and later saw the off-spring of Dorper sheep.

Farmers reported that traits to be consider when selecting breeding stock is given in Table 3. They were given higher scored (49) to pure Dorper sheep on a criteria use, in the selection for male breeding stock. Farmers also notified that, pure Dorper sheep had superior traits on loin, sternum, shoulder and body conformation when compared. However, farmers observed that local sheep had superior traits on body color, height, tail length and width. In line with this local sheep has as superior as Dorper sheep on ear length. All the respondents agreed that Dorper sheep was preferable to

have male breeding stock as compared to local sheep.

Farmer's perception on crossed sheep traits

Farmers were given higher scored (65%) for crossed sheep (50% local and Dorper), on the productivity and reproductive performance when compared to pure local sheep (Table 4). The respondents reported that, crossed sheep had superior traits on birth weight, weaning weight, feed efficiency, body conformation (a wide, straight back, smooth shoulder, fullness through the heart area, a good spring of ribs and a long, well balanced, with adequate skeletal size), loin area, shoulder area, sternum area,

puberty age and marketable weight but the breed is a heavy eater and non-selective. Hence the sheep require more supplementation feeding during feed shortage and cannot be maintained at a high stocking rate on limited grazing area.

Farmers in study area preferred red or white body color with fat tailed sheep for holiday scarification, than short and less fat tailed sheep. Moreover, crossed sheep had early marketable age (6 month) with high body weight and conformation than local sheep. However, local highland sheep has superior traits on tolerance of feed, water, parasite and disease than crossed sheep. In line with this, farmers reported that crossed female sheep had early first age at puberty (9 month age) which is 4 month early than local female similar age. Generally, the community had interest to breed their sheep with Dorper sheep after they seen the off-spring of Dorper sheep.

Conclusion

Popularization of Dorper breed has improved productivity of local breed by 50% in yearling weight. Beside this, farmers were perceived positively on Dorper crossed breed in terms of body weight gain, early puberty age and marketable weight. Therefore, popularization of pure Dorper sheep breed in large scale is very crucial for enhancing income of small scale farmers.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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