Journal of Biology, Agriculture and Healthcare
ISSN 2224-3208 (Paper) ISSN 2225-093X (Online)
Vol.7, No.7, 2017

Productive Performance Evaluation of Dorper Sheep and Its F1 at Areka Agriculyural Research Centre Mente Dubo Breed Evaluation and Distribution Site Southern Ethiopia

Kebede H/Giorgis[1], Amelemal Alemyehu, Adissu Jimma, Derbi Gemeyu, Berket Zelke , Asrat Tera
Southern Agricultural Research Institute (SARI), Areka Agricultural Research Centre

Abstract
The objective of the present study was to evaluate the growth performance of purebred Dorper sheep and its F1 crossbred (50%, upgraded 75%), lamb following crossing pure imported Dorper with local ewe under BED site at the same rearing condition. For these study for crossing purpose Locally reared SNNPR regional native sheep, (Doygena n=74 ewe,Dawro,n=14 ewe, and and Bonga n=14 ewe were used. Local ewe was crossed with South African Dorper ram following station natural controlled breeding system. Data were collected during 2012-2015. For this study Productive data of four consecutive year data were analyzed. Blood level, lamb sex, birth season, birth year, birth type and ewes' parity were considered as fixed effects. Data analyses were performed using general linear model procedures of SPSS Version 20. Breed was a significant source of variation .This study confirms Dorper sheep can adapt and had performed better in the study BED site and Crossing with local and up grading could gain heaver birth weight than lower blood level. 75 percent F1 progeny was significantly better weight gain than 50 percent under station rearing condition. The birth weight of Dorper x doygena,Dorper X Bonga and Dorper X Dawro were 2.58±0.59,2.62±0.19,2.42±0.25k.gespectively . Birth weight for pure Dorper lambs born on BED site, for 50 percent, and 75% percent were3.6±0.158 kg, 2.58±0.59 kg respectively. Singles born lamb were significantly ($P<0.01$) heavier than twins and triplet with an average 3.036±0.680kg, 2.355±0.104 kg and 2.3±0.33kg respectively, but sex did not affect birth weight. The present results suggested that under better management and right breeding program Dorper sheep could improve the productivity of the local sheep.it can be conclude that Dorper and its F1 cross with Doygena,Bonga and Dawro sheep were adaptable and perform well at station rearing condition level.it is recommended that indigenous sheep genetic improvement via exotic Dorper sheep crossbreeding X local and production of F1 could be one option of breeding sheep source in side of community based sheep breed genetic improvement. It is also suggested that for better evaluation of the breed further study at farmer level in different agroecology is required.
Keywords: Dorper ; performance evaluation; crossing, southern native sheep.

1. Introduction

Small ruminants make a substantial contribution to the well-being of the people in Ethiopia and Sub-Saharan Africa (Seife Michael, 2014). In southern region, agriculture has been the back bone of the livelihood of the people. Particularly Sheep production is virtually the major source of income and food security in densely populated area of this region where crop production is hindered by land shrinkage. Sheep production was a great role in, domestic meat consumption as well as providing day to day service to the economic stability in general. Although the SNNPRs is endowed with the largest diversify sheep genetic resource in the country, so far very little has been done for genetic improvement.

Now a day's Genetic improvement of the indigenous animal resources become an integral component of most of the programs and projects. The genetic improvement strategy adopted mainly focuses on cross-breeding of the local breeds with exotic sire breeds. For this purpose, various sheep breeding and dissemination ranches have been established, a number of exotic sheep and goat genotypes have been imported, and research on cross-breeding have been going on for decades. One of most popular outstanding sheep is selected for genetic improvement was Dorper sheep breed.

Past importation of Dorper sheep and Boer goat breeds from Republic of South Africa to Ethiopia in suitable agro-ecological zones with the objectives of improving meat production potential of indigenous small ruminant genotypes through improved husbandry and crossbreeding and food and economic securities of smallholder farmers in Ethiopia (Getachew, 2016).

The program was designed to be implemented by prairie view A&M University as a main contractor and Langston University as a subcontractor, in close collaboration with the Ethiopian Government's Ministry of Agriculture. The ESGPIP Dorper/Boer program is collaboration between the ESGPIP, the Ethiopian Institute of Agricultural Research, six regional Agricultural Bureaus, six Regional Agricultural Research Institutes, Hawassa University, Haramaya University and Mekele University. The program operates in six regions including Afar, Amhara, Oromia, SNNPRS, Somali and Tigray.

Even if the productivity of indigenous sheep breed is clearly low due to a number of limitations like genotype, feed, disease, institutional, environmental and infrastructural constraints (Amelmal 2009, Niftalem,

1990; Abebe, 1999; Markos, 2006) the sheep types have the ability to add value in subsistence way of living of the low input smallholder and pastoral production systems (Kosgey and Okeyo, 2007). In one way or another boosting the productivity of indigenous sheep breed is vital to improve the livelihood of human population of the country, which grows at 2.5% per annum (CSA, 2007). sheep production is quit advantageous for our local small holder farmer as it is in the country wide due to sheep have special features, such as their being small in size, which implies low initial investment in starting and expanding sheep production as a business, efficient utilization of marginal and small plot of land. Because of the this the sector taken great emphasis from the regional government and the regional government invested huge amount of limited regular budget for genetic improvement of the local genotypes through cross breeding to attain high quality mutton. sheep breed to improve the daily earn of small holder farmers of the region. With ESGPIP re-initiation for Dorper sheep breed evaluation and distribution, adaptation with three Dorper rams from MelekaWarer Agricultural Research Center. The project activity comes to end with promising result since 2010. With this initiation and preliminary result from joint ESGPIP works the regional BoA allocated worth of 2million Birr and imported 44 Dorper sheep (6 rams and 38 ewes) pure breeder animals from Republic of South Africa in 2011. The region then allocated 4 million Birr for expansion of the barns and provision of pure water and electricity.
On the basis of this, genetic evaluation and adaptation of pure Dorpers and their crosses with local genotypes Doygena,Bonga and Dawro sheep have been undertaken in the Mente Dubo BED site. So far from Areka Agriculture Research Center distribution of F1 Dorper crossed breeding sheep were undertaken to central area of the region.

Objective
To evaluate productive performances of pure Dorper sheep and Dorper x indigenous sheep (Doygena sheep, Dawro sheep, and Bonga sheep) cross of (50%, 75% and 100%) at on-station rearing condition

2. Material and Methods

2.1. Study location/ experimental site

The study was conducted at Areka Agricultural research Centre, Areka BED site/Mante Dubo experimental site, located about 200 K.m.s from the regional city (Hawassa) and 303 K.m.s from capital city (Addis Ababa) on the way to Wolaita Soddo. The site is located at an altitude of 1711 masl and situated at N 07' 06.4312` and E037' 41.688`. The station is 38 hectare of total land and far 6.5km North -East of Areka Agricultural Research Center. The area has two rainy season with highest from July to September and the rest from March to May. Production of forage seeds and vegetative parts were established in 2008 during the introduction of Dorper sheep for establishment of breeding, evaluation and distribution to improve mutton yield of local sheep.

2.2, Health management

Daily clinical health follow up and monitoring activity was conducted in the period case for individual diseased animal was recorded in the daily follow up data sheet, the case animals were admitted date for pathognomonic sign (GPE), treatment response was recorded individually and to the prevention of the disease incidence though routine farm management practice was done. Vet supplies used Albedazol, oxy10% plus multi vitamin, oxy 10% plus Ivermectine, oxy20% plus Albendazol plus multi vitamin, oxy 10% plus Albnazol, Ivermectin, tricalbendazol (facenex), Pen-strip, mineral block, Deaznol and tetracycline eye ointment topical are list of drug stock used.

At AARC (Areka Agricultural Research Center) full quarantine period was maintained for one month the replacement Bach and are tested and certified as Negative for any fertility problems, serologically tested & certified for ovine Brucellosis, Vaccine and vaccination for most commune and endemic disease (like PPR, CCPP, Anthrax, Blackleg, ovine pasturelosis and sheep & goat pox), dewormed with 300mg Alb and dipping were conducted and case animal was treated and recovered before they pass to the station. During production time hearts water the most frequently occurred (headache) for the BED site. To overcome animal loss the pure Dorper sheep spent intensive feeding and monthly dipping. In addition to minimize Heart water diseases animals were treated with oxyttc 10 % IV.

2.3 Feeding management

Sheep flocks in the breeding site are feed on adlibitum roughage composed of grasses (major basal feed – like Napier grass, 'Desho', Rhodes and other local grasses) and legumes (Lablab, Stylo and Sesbania) at an average of 3:1 ratio (grass: legume). There are two feeding system (cut and carry and free grazing) in the farm. All pure breeds, pregnant ewes and lambs are kept on indoor feeding throughout the year. Whereas, dry ewes are allowed to stay grazing on pasture throughout the day. In addition to this, concentrate feeds composed of different ingredients (wheat bran=62.2%, Nuge cake=16.5%, cotton seed cake=16.5%, lime stone=3.5 % and salt=1.3%) and mineral blocks are offered as a supplement for different classes of sheep. Sheep kept in door are

supplemented with concentrate twice a day (half of daily recommended amount before noon and the other half in the afternoon). Whereas, for sheep graze on pasture, concentrate feeds are given in the morning. Amount of concentrate supplemented varies based on the type and stage of production as well as based on season. More concentrate is given during dry season as compared to wet season. For instance, pregnant ewes on average are supplemented with 300 gm and 500 gm in wet and dry season respectively.

2.4, crossbreeding exotic Dorper with local ewe

2.4.1 Genotype (breed) and flock size

In the beginning, with Ethiopia sheep and goat productivity improvement program (ESGPIP) adaptation with three Dorper rams from MelekaWarer Agricultural Research Center was presented for crossing with local Doygena ewe. After the completion of the project activity regional BoA imported 44 Dorper sheep (6 males and 38 females) pure breeder animals from Republic of South Africa in 2011 aim crossing with local sheep type (Doygea , Bonga and Dawruo local sheep breed/types.

Before Introduction of pure South African Dorper sheep the BED site, three locally available sheep type were identified for the crossing purpose. The locally available targeted to cross with Dorper were Doygena sheep breed from Doygena Districts Kembeta Tembaro Zone, Bonga Ewe from Kofa Zone,Dawro sheep breed from Dawuro Zone.Doygena sheep breed were known by their potentially productive sheep. The breed was short lambing interval, longevity, large litter size, annual reproductive rate, minimum pre weaning mortality, and large twining rate (66%)(Adissu,2016 unpublished).in addition average daily gain weight of Doygena sheep were encouraging Pre-weaning average daily gain were 103.6 ± 1.7 g/day and -weaning average daily gain were 67.3 ± 1.9g/day(Adisu, unpublished). The reason behind these remarkable results has been due to well-designed community based selective breeding program in their habitat so far. Local Doyena sheep characterized as long fat tail; Large size; short-haired; male and female were horned .predominantly sheep color were brown (943%), brown with white patches (32%), black (16%), black (19%) and black with brown patch (9%) Solomon etal, 2013)

According to Amelmal (2009),Dawro sheep population were brown, brown and creamy, and brown and white coat color were dominant. Female and male sheep had medium and smooth coat cover, and all of them had no horn. Sheep has characteristics as fat tailed type. Bonga sheep Long fat tail with straight tapering end (98.4%); hair sheep; large size; predominantly plain brown (57.9%) or with black (.9%) or white (5.3%) shade, plain white (10.5%) or with brown patches (10.5%), and black (2.6%); both sexes are polled. Reared by Keffa and Sheka and Bench Maji people (Solomon etal, 2013).

Crossbreeding (Dorper x local) multiplication were aiming to produce F1 crossbred breeding ram and breeding ewe. For the purpose of improving indigenous sheep productivity under farmer production systems 50% and 75% of Dorper sheep were distributed in different agro ecology of the region and interested organization. So far Areka Agriculture Research Center distributed f1 50% and 75% of Dorper sheep to Wolaita Zone,Silte Zone, Kembata Tembero Zone,Hydia Zone, Halaba special District and Gamogofa Zone. Promising F1 were distributed to farmers, investors and interested sheep raisers.

2.4.2 Mating scheme

In the BED site, breeding ewes were mated year round (non seasonal) so that lambing occur without pause. In these study all experimental breeding ewe were sired by exotic pure Dorper ram in a group of 15-20 ewe per ram. Before breeding ewe and breeding sire join pure Dorper breeding Sires prepared from rams kept for breeding purposes. The sires chosen were all above 25 kg and had at least two normal testicles, free from any reproductive abnormality. Ewes within breed were assigned to sire groups were parity into consideration.

Generally the breeding is based on the crossing of indigenous dam line (Doygena sheep,) with exotic ram or Doper to produce improved F1 and recently crossing is continued with Bonga and Dawro local sheep breed/type. On the other hand producing pure Dorper progeny is the aim to replace the remaining breeding stock.

2.5. Data Collection Procedure

Reproductive and productive data(types of birth, birth weight and weaning weight) where collected per each birth and twining rate (lambing rate), fertility, birth weight and weaning weight(weaning rate) where analysis for every blood level(100% Dorper,75% and 50%) independently in each birth year. Reproductive and productive data were entered into Microsoft EXCEL, 2007 software for data management. Prior to data analysis, preliminary testes such as homogeneity test, normality test and screening of outliers were employed. Means and their standard error and frequency were analyzed using descriptive statistics of SPSS.

Model

$y_{ijklm} = \mu + Bi + Gj + Pk + Sl + Tm + e_{ijklm}$

where: Y_{ijklm}== the body weight and Average daily weight gain n^{th} lamb

μ = Overall mean

Bi = Fixed effect of breed (i = 50%,(Dorper x Doygena, Dorperx Bonga and Dorper x dawro)Dorper X Doygena

75% upgraded and 100%)
Gj) = Fixed effect of lamb sex (j = male, female)
Pk = Fixed effect of ewes parity (*k* = 1, 2, 3)
Sl) = Fixed effect of lambing season (*l* =main rain, short rain and dry)
Tm) = Fixed effect of birth type (*m* = single, twin, triple)
eijklm = Effect of random error.

$$\text{Post weaning ADG} = \frac{\text{At180dayWt} - \text{A90 dayWt}}{\text{90 day}}$$

$$lambing\ rate\ == \frac{\text{Number of lambs born}}{\text{number of females available for mating}}$$

$$\text{Weaning rate} = \frac{\text{Number of lambs}}{\text{lamb weaned/females available for mating,}} \text{ often expressed as a percentage}$$

2.6 Data Management and Analysis
Data were analyzed using the General Linear Models procedure of SPSS. Least squares analyses of variance were used to evaluate the effect of breed, parity, and year, Birth type. breed were levels in to: -pure Dorper,Dorper × Local Doygena(50%), Dorper × Local Bonga 50%, Dorper × Local Dawro (50%), Dorper X local Doygena upgraded (75%) lamb were used .sex (two levels: male and Female , ewes' parity (four levels: 1, 2 ,3and 4,first parity, second parity, third parity and fourth parity respectively. birth type (three levels, single, twin and triple) and birth year (four levels:1,2,3,4, 2012, 2013,2014 and 2015 respectively).The effect of season of lambing was defined as main rainy , small rainy season and dry season. Means of significant main factor were compared using SNK test.

3. RESULTS AND DISCUSSION

3.1 Lamb growth performance from birth to weaning (90 days)
In the BED site all required data were recorded in the record book. Lamb birth weight, were recorded within 24 hours after birth. Lambs were weaned at about 90 days of age. Lambing was in all year round .Due to lack of records, ewe post-partum body weight was excluded from the analysis of birth weight.

Table 12 shows the Least Squares means of birth and weight until weaning (90 days). Pure Dorper lambs had significantly heavier ($p<0.001$) birth weight than 75% crossbred lamb and 50% crossbred lambs (3.51±0.14k.g, 3.14±0.19k.g, 2.52±0.07k.g respectively. Birth type has also influenced birth weight significantly ($p<0.001$) Single born lambs were heavier ($p<0.001$) at birth (3.12±0.0 8 k. g) compared to twins (2.42±0.11k.g) and triplet (2.23±0.36k.g. In all growth parameters, single birth lamb performed significantly higher than twins which were in agreement with the finding of Ayele *et al.,* (2014). on the other hand the result reveled that lamb parity have influence on birth weight of Lambs born from fourth parity ewes were heavier ($p<0.05$) at birth than those born from ewes of first, second third parity weighing 2.95±62, 2.78±08, 2.93±10, 2.87±23 kg respectively.

Lamb sex did not affect lamb birth weight. Birth weights of lambs born in the two seasons (Dry season, Wet season) were 3.03±0.022, and 2.72±0.08 k.g respectively, which significantly different ($p <0.05$). The result indicate that When parity ewes increase lamb birth weight had also significantly heavier lambs at birth time compared to those born to first time lamb indicating the influence of relatively heavier and older ewes reflected probably through higher milk yield ,good mothering ability on nourishing .The result is agreed with Horo and Menz (Awgichew,2000).As shown in Table 2 blood level has influence on lamb weaning weight significantly ($p<0.001$) Where pure Dorper born lambs have maintained their weight superiority on weaning weight and beyond. Lambs were weaned at near to 90 days of age. Pure Dorper lamb and 75 percent lambs did not differ significantly ($p>0.05$) in weaning weight at 90 days of age (16.99±1.08k.g vs 16.82±1.41k.g respectively.

3.2 Lamb growth performance from weaning to six month (90 days of age)
pure Dorper lamb were significantly heaver six month weight than Dorpe X Doygena50% ,DorperX Bonga 50% and Dorper X Dawro 50% lamb,25.66±1.72k.gvs21.23±0.912k.g,20.97±2.6,20.44±3.5k.g respectively(table 1). The result is comparable with the report of Ayele (2014) Dorper and crossing with Menze and Afar at Debreberhan agricultural research Centre.

Table1 Over all Least square mean and standard error (LSm±SE)for the effect of breed, birth season, parity ,lamb sex ,and birth type on birth weight, weaning weight, and 6month weight

Effect	N	Birth weight (±SE)	N	Weaning weight (±SE)	N	Sex month weight(±SE)
overall	213	2.81±0.06	113	14.58±0.398	85	20.47±0.749
Blood level		***		*		*
Pure Dorper	42	3.6±0.158^{a}	25	16.99±1.21^{a}	23	25.66±1.72^{a}
Cross breed						
50%(Dorper X Doygena	125	2.58±0.59^{b}	103	14.61±1.2.99^{b}	75	21.23±0.912^{b}
50%(Dorper X Bonga)	18	2.62±0.19^{b}	14	13.9±.85^{b}	9	20.97±2.6^{b}
50%(Dorper X Dawro)	13	2.42±0.23^{b}	13	14.8±1^{b}	5	20.44±3.5^{b}
75%Dorper	15	3.17±0.69^{a}	8	16.81±1.67^{a}	6	24.0917±2.93^{a}
Birth season		**		**		NS
Dry	76	2.973±0.022^{a}	42	13.72±0.696^{a}	33	19.436±0.923^{a}
Short rain	132	2.626±0.73^{c}	68	14±0.592^{a}	50	18.72±0.826^{a}
Main rain	8	2.867±0.27^{b}	3	24.33±2.24^{b}	2	26.5±3.24^{b}
Parity		*		*		NS
1	139	2.721±0.72^{a}	74	14.62±0.570^{a}	53	21.9±0.824
2	61	2.84±0.102^{a}	33	14.59±0.780^{a}	28	18.321±0.693
3	10	2.869±0.219^{a}	6	11.687±1.9^{a}		NA
4	9	2.95±0.348^{b}	6	19±2.744^{b}		NA
Lamb sex		Ns		NS		*
Male	117	2.82±0.78	54	14.27±0.659	39	20.077±0.895^{a}
Female	97	2.73±0.82	59	14.68±0.69	46	18.85±0.29^{b}
Birth type		***		**		*
Single	160	3.03±0.68^{a}	82	15.64±0.5^{a}	70	20.84±0.679
Twin	50	2.355±0.104^{b}	30	12.67±0.8^{b}	15	16.669±1.22
Triple	9	2±0.33^{b}	4	13±3.8		NA

values within each sub-class with different superscript letters are significantly different at *=P<0.05, **P<0.01, ***=P<0001, NA= Data not Available.

Table 2 Least square means and standard error of weight gain at , 90 and 180 day of Dorper and its cross with local/g/day

	Gain to 90 day		Gain to 180 day	
Source of variation	N	LSM±SE±	N	LSM±SE±
		***		**
Over all mean	213	114.48±4.37	153	99.3±6.43
Lamb breed		***		*
Dorper X Doygena	103	127 ±4^{c}	82	86±12^{b}
Dorper x Bonga	16	125±9^{c}	9	89±28^{b}
Dorper X Dawro	11	134±11^{c}	8	92±42^{b}
Pure	41	163±7.6^{a}	33	181.5±19^{b}
Upgraded 75%	15	161±1^{b}	15	175±28^{a}
Lamb sex		NS		NS
male	92	136±4.2^{a}	81	93±13^{a}
female	84	140±4.1^{a}	71	102±13^{a}
litter size		**		**
single	134	143±3.5^{a}	116	108±11^{a}
Twin	40	129±6.8^{b}	36	103±17^{a}
triple	3	100±2.3^{c}	2	57±55^{b}
parity		NS		NS
Parity one	111	136±4.3^{a}	105	105±11^{a}
Parity two	52	141±5^{a}	41	90±16^{a}
Parity three	10	130±11^{a}	5	93±45^{a}
Lambing season				
Main rain	28	156±7^{a}	29	107±19^{a}
Short rain	79	130±5.2^{b}	87	98±13^{b}
Dry season	69	124±5^{b}	36	90±16^{c}
Lambing year		*		*
2012	20	148±8.7^{a}	24	126±24^{a}
2013	42	145±7^{a}	54	112±17^{a}
2014	38	140±6^{a}	39	65±17^{b}
2015	76	133±4^{b}	35	110±16^{a}

values within each sub-class with different superscript letters are significantly different at *=P<0.05, **P<0.01, ***=P<0001, NA= Data not Available.

Preweaning lamb growth

The univariate analyses indicate that overall pre-weaning weight gain of lambs was 114.48±4.37g/h/d. blood level significant source of variation (P<0.0001).Pure Dorper sheep had significantly better growth performance compared to Dorper X Doygena 50% ,Dorper X Bonga 50% and Dorper X Dawro 50% lambs(173±7.6 vaVS.127±4,125±9,134±11 g/h/d respectively. At the same time birth type, season of lamb birth and year of lambing had significant effect (P<0.05) on weight gain to 90 days. Report by Mesfin ,(2014) revealed that higher estimate of overall weight gain for Dorper x local Tumelie sheep under station rearing condition. The present result are higher than the estimate Ayele,2014 at Debreberhan agricultural research Centre (Dorper x Menze, Dorper X Afar,pure Dorper under station rearing condition).

Post-weaning growth of lambs

The overall average daily weight gain from weaning to six month was 99.3±6.43 g/day. Post weaning average daily weight gain was affected by lamb genotype, lamb litter size and lamb birth year. Pure Dorper lamb can gain better(P<0.0001) than Dorper x Doygena 50%,Dorper X Bonga 50% and Dorper X Dawro 50% up to 6 month of age respectively. However there is no significant difference in weight gain up to 6 month by sex and by parity. The weight gain of single and twin born lamb have significantly heaver (P<0.01) than triple born lamb 98±11,103±18vs57±55g/day. Compared to birth to weaning gain weaning up to sex month gain is lower, these probably happen because of lamb shock due result lamb suddenly changed only on grazing which agree with the report of Mesfin,2014 from Sirnka Agricultural research Centre. The difference of lamb weight gain from weaning up to six month between lamb genotype were significant which match a number of study in crossing Dorper x different breed in different management system(etal Ayele,2014,etal Mesfin,2014).

Conclusion and recommendations

It can be concluded that at Aeka Agricultural research Centre under station rearing condition, Crossing of Dorper sheep breed x selected indigenous sheep results better adaptable F1 progeny. Indigenous available ewe(Doygena, Bonga, and Dawro) crossed by Exotic Dorper ram produced lambs that could attain more than 20 K.g within six month that ram can be desirable to distribute for breeding purpose. Blood level had significant effect on the birth weight, weaning weight and six month weight of lambs. Pure Dorper gained better than F1 (Pure Dorper x local crossbred lamb under station rearing condition with minimum concentrate supplementation. Compared to crossbred F1 lamb Pure Dorper lamb need better management system. It is suggested that sheep producer, investors, small holder farmer could be possible to increase their productivity by crossbreeding pure dorper with local sheep.

Although these result provide basic information for things considered during local and exotic sheep crossbreeding under station rearing condition, for a better evaluation of the breed, it is recommended further study on the breed performance under farmer condition at dissemination area in different agroecology

Reference

Abebe Mekoya, 1999. Husbandry practice and productivity of sheep in Lalo-mama Midirworeda of central Ethiopia. An MSc Thesis submitted to the School of Graduate Studies of Alemaya University of Agriculture, Dire Dawa, and Ethiopia.

Adissu Jimma un published .on farm performance evaluation of Doygena sheep In kembata Tembaro Zone Doyogena Districts An M.Sc Thesis submitted to the School of Graduate Studies of Hawasa University of Agriculture, Hawasa Ethiopia ..

Amelmal A. (2011). Phenotypic characterization of indigenous sheep types of Dawuro zone and Konta special woreda of SNNPR, Ethiopia. An MSc Thesis Haramaya University., Ethiopia

Ayele Abebe, , Solomon , Asfaw , Shenkute , Shambel , Tefera , Tesfaye , Yeshimebet ,2015 Growth Performance of Dorper and its F1 Crossbreds at DebreBirhan Agricultural Research Centre Debre-Birhan Agricultural Research Center, P.O.Box112, Debre-Birhan, Vol.5, No.13, 2015 Ethiopia.

CSA (Central Statistical Agency of the federal Democratic Republic of Ethiopia), 2007. Agricultural Sample Survey, 2007/08). Report on Livestock and Livestock Characteristics. Addis Ababa, Ethiopia.

Ermias Belete, Gebeyehu Goshu and Berhan Tamir,2015 Productive performance evaluation of Dorper sheep crosses (50% Dorper × pure Adilo indigenous sheep breed) under farmer conditions in different agro ecological zones. 1Wolaita Sodo University, Ethiopia.

Gavojdian, D.; Cziszter, L. T.; Pacala, N. 2013 ,Sauer, M. Productive and reproductive performance of Dorper and its crossbreds under a Romanian semi-intensive management system south African Journal of Animal Science . 2013.

Jesus Mellado, Víctor Marín, José L. Reyes-Carrillo, Miguel Mellado, Leticia Gaytán,2016 .Effects of non-genetic factors on pre-weaning growth traits in dorper sheep managed intensively in central mexico.

Kassahun Awgichew, 2000, Comparative performance evaluation of Horro and Menz sheep of Ethiopia. Under

grazing and intensive feeding conditions M.Sc., Animal Science, University of Wales, UK)

Kosgey, I.S., and A.M. Okeyo, 2007. Genetic improvement of small ruminants in low-input, smallholder production systems: Technical and infrastructural issues. Small Ruminate. Res.70:76–88 SPSS, (Statistical Package for Social Sciences). Version 20. SPSS Inc., USA. Version 20.0, SPSS Inc., USA.

Markos Tibbo, 2006. Productivity and health of indigenous sheep breeds and crossbreds in the central Ethiopian highlands. Doctoral Thesis, Swedish University of Agricultural Sciences Uppsala, Sweden.

Mesfin Lakew, Haile-Melekot, Getinet Mekuriaw, Solomon Abreha, Haimanot Setotaw,2014 Reproductive Performance and Mortality Rate in Local and Dorper × Local Crossbred Sheep Following Controlled Breeding in Ethiopia. Sirinka Agricultural Research Center, Woldia, Ethiopia. By Islamic Azad University, Rasht Branch, available on: www.ijas.ir

Niftalem Dibessa, 1990. On farm study of the reproduction and growth performance of Menz Sheep presented to the School of Graduate Studies of around Debre Brihan area. An M.Sc Thesis Alemaya University of Agriculture, Dire Dawa Ethiopia.

Richard K. (2010). Dorper Sheep and the Production of Lean Lamb in Arid Australia. International Specialized Skills Institute. Melbourne, Australia.

Seifemichael M., Kefelegn K., Negassi A. and Banerjee A. K,2014. Variability in Linear Body Measurements and their Application in Predicting Body Weight of Afar Goats in Ethiopia. Haramaya University, School of Animal and Range Sciences, Dire Dawa, Ethiopia.

Solomon Gizaw, Solomon Abegaz, Barbara Rischkowsky, Aynalem Haile, Ally Okeyo Mwai1, and Tadelle Dessie ,2013.Review of sheep research and development projects in Ethiopia.

Taddle Getachew, A. Haile , Wurzinger , Rischkowsky, 2016 Review of sheep crossbreeding based on exotic sires and among indigenous breeds in the tropics: An Ethiopian perspective.