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Husbandry Practices and Major Constraints of Sheep Production in East Gojjam Zone, North Western Ethiopia

Michael Abera[1] Kefelegn Kebede[2] Yoseph Mekasha[3]
1.Department of Animal Sciences, Debre Markos University, P.O. Box 269, Debre Markos, Ethiopia
2.School of Animal and Range Sciences, Haramaya University, P.O. Box 138, Dire Dawa, Ethiopia
3.International Livestock Research Institute, P.O. Box 5689, Addis Ababa, Ethiopia

Abstract
This study was aimed to generate basic information on sheep husbandry practices and major constraints in East Gojjam zone. Purposive sampling technique was employed to select the districts based on their potential of sheep production. Accordingly, three districts were selected. About 270 households (90 from each district) were selected through systematic random sampling. Statistical Analysis System (SAS 9.2., version, 2008) was used to analyze the data and Tukey cramer test was used for the comparison between the districts. The major feed resources both during dry and wet period was natural pasture across the districts followed by crop aftermath during dry period. All household heads of Gozamen, 75% of the household heads in Sinan and 76.92% household heads in Hulet eju district housed their sheep with goats in the same home. The overall lambing interval of ewe in east Gojam zone was reported to be 8-10 months (71.11%) and also about 26.29% of the sample population reported that the overall lambing interval was 11-13 months. The average marketing age was 4.9, 6.13 and 5.94 months for males in Gozamen, Sinan and Hulet eju districts, while the average market age for females were 5.36, 6.37 and 6.22 months respectively. This study revealed that rams and ewes in both Sinan and Hulet eju were late in marketing age ($p<0.05$) than Gozamen this might be due to the management condition of farmers and the Genetic difference of sheep. Comparatively disease was the most issue as production constraints in the sample population of East Gojjam zone (43.33%) than predators (2.59%) in lambs and other sheep production constraints such as feed shortage, drought, labor, and market accounting for about 54.07%.
Keywords: Husbandry practices, Constraints, East Gojjam Zone

Introduction
The livestock sector in Ethiopia play significant role in the national economy (Abera et al., 2016). At the national level, sheep and goat account for about 90% of the live animal/meat and 92% of skin and hide export trade value (Sisay, 2010). Despite low level of productivity, which accounted for several factors such as genotype, institutional, environmental and infrastructural constraints, indigenous sheep breeds have a great potential to contribute more to the livelihood of people in low input, smallholder, and pastoral production systems (Kosgey and Okeyo, 2007). Thus, it is urgent to improve the low productivity to satisfy the increasing demand for animal protein, improve the livelihood of livestock keepers and economic development of the country at large. Ethiopia's sheep population, estimated to be 28.89 million heads, is found widely distributed across the diverse agro-ecological zones of the country (CSA, 2016). In order to make best use from sheep keeping operation, it is important and a prerequisite to have a comprehensive understanding of the whole situation through assessing the production environment (climate, feed availability, and disease prevalence); the production system (production practice, preferences, socio-economic circumstances and level of input use); and productive and adaptive characteristics of the sheep breeds (Sisay, 2010). East Gojjam zone, where this study has been done, possess most diversified sheep populations. But further information is limited to show the sheep husbandry practices and major constraints, found in East Gojjam zone. Thus, the objective of this study was to assess husbandry practices and major constraints of sheep production in the studyarea.

Materials and Method
Description of the Study Area
The study was conducted in East Gojjam zone. It is 298 km from Addis Ababa and 265 km from the capital city Bahir Dar. The three districts (Gozamen, Hulet eju and Sinan) of East Gojjam zone were selected based on the potential of sheep distribution in their production environment. Gozamen is situated at an altitude of 2498 masl, longitude 37 o 43' 47.2'' E and latitude 10 o 20' 19.7'' N. Agro ecologically the district is traditionally divided into four climatic zones; 41.41% *Woinadega*, 35.55% *Dega*, 15.72% *Kolla* and 5.32% *Wurich* (RDOEGZ, 2016). The mean annual average temperature and rain ranges 7.5-25 oC and 900-1800 mm, respectively. Hulet eju is located at 196 km distance from Debre Markos, the capital of east Gojam Zone and 320 km from Addis Ababa. The altitude of the district ranges from below 2433 to 2468 masl and it is located between 11o 04' 48.4'' N and 37o 52' 45.8'' E. The district has annual temperature of 7.5 – 22.5 °C. The amount of rainfall generally varies with altitude but the average ranges between 900 to 1500 mm (RDOEGZ, 2016). Sinan district is found 27 km

from Debre Markos, the capital of East Gojjam Zone. The altitude of the district ranges from 2949 to 2975 masl and it is located between 10o 32' 28.2'' N and 37 o 46'14.7'' E. The mean annual rain fall distribution of the area is 1342 mm and the mean annual temperature of the district ranges from 7.2 °C -27.7 °C.

Methods of Data Collection

Sampling method

The sampling method employed for this study was purposive sampling technique, which was based on the potential of sheep production in the zone. East Gojjam Zone has 18 districts from which three districts (Gozamen, Hulet eju and Sinan) were selected purposively based on distribution of Sheep population. From each districts, three Peasant Associations (total of 9 Peasant Association) were selected based on the sheep population potential. 30 household per Peasant Association (total of 270 households) which own 3 and above sheep were selected through systematic random sampling for the interview.

Statistical Data Analysis

Statistical Analysis System (SAS 9.2., version, 2008) was used to analyze the data. Tukey cramer test was carried out as it is appropriate to assess the statistical significance among categorical variables. An index was calculated to provide overall ranking for qualitative data such as major feed resources, sheep production constraints and Common sheep diseases according to the following formula: Index = Σ of [3 for rank 1 + 2 for rank 2 + 1 for rank 3] given for particular qualitative variables divided by Σ of [3 for rank 1 + 2 for rank 2 + 1 for rank 3] for all qualitative variables considered.

Results and Discussions

Major Feed Resources

The quantity and quality of feed resources available for animals primarily depends upon the climatic and seasonal factors (Zewdu, 2008). The major feed resource in the current study area both during dry and wet period was natural pasture across the districts followed by crop aftermath in Gozamen and Sinan but hay production in Hulet eju during dry period (Table 1). This is result is in line with the results of other studies (Tesfaye, 2008; Shigdaf *et al.,* 2009; Mengistie *et al.,* 2010; Solomon *et al.,* 2011). During the wet period crop residues were important feed resource after natural pasture across the districts followed by improved forages in both Gozamen and Hulet eju but uncultivated land after natural pasture in Sinan district. Feed resource including hay and crop aftermath during wet period are less important but they are very important during dry period as shown in (Table 1) implying that the same feed resource used in different season have different importance. Similar result was reported by Bosenu (2012) natural pasture is the dominant feed resource during dry (76.67%) and wet season (90%) in Debrelibanous and (100%) during wet and (93.33%) during dry in Wuchale districts in Selale area. Natural pasture was the predominant source of feed for sheep during the main rainy season in Horro (93.0 %). Crop after math, fallow land, and crop residues serve as the main feed resources for dry season in Adiyo Kaka (Zewdu, 2008). According to Kedjela (2010) in Nedjo district farmers use about 0.54 natural pastures, 0.29 crop residues and 0.11 fallow lands for their sheep.

Table 1. Major feed resources

	District											
	Gozamen				Sinan				Hulet eju			
Dry season	Rank				Rank				Rank			
	1St	2nd	3rd	Index	1St	2nd	3rd	index	1St	2nd	3rd	index
Natural pasture	68	4	2	0.39	51	16	7	0.36	45	25	16	0.37
Hay	11	2	3	0.07	12	7	14	0.12	14	31	19	0.23
Uncultivated land	-	4	1	0.02	3	3	2	0.03	0	2	5	0.02
Crop residues	1	23	61	0.21	8	35	14	0.2	15	18	13	0.17
Crop aftermath	10	57	23	0.31	14	25	25	0.22	20	13	17	0.19
Improved forage	-	-	-	0.00	-	4	17	0.05	1	1	17	0.04
Concentrate feed	-	-	-	0.00	2	-	11	0.03	1	-	3	0.01
Wet season												
Natural pasture	80	4	40	0.53	64	19	9	0.44	54	30	16	0.44
Hay	-	-	-	0.00	2	12	13	0.08	7	6	4	0.07
Uncultivated land	-	13	2	0.06	8	15	11	0.12	9	10	10	0.11
Crop residues	10	57	34	0.33	11	29	15	0.20	8	20	35	0.18
Crop aftermath	-	-	-	0.00	1	1	6	0.02	2	8	3	0.05
Improved forage	-	14	12	0.07	1	11	17	0.08	6	14	18	0.12
Concentrate feed	-	2	2	0.01	3	3	19	0.06	4	2	4	0.03

Index = Σ of [3 for rank 1 + 2 for rank 2 + 1 for rank 3] given for particular qualitative variables divided by Σ of [3 for rank 1 + 2 for rank 2 + 1 for rank 3] for all qualitative variable considered

Water Source

As illustrated in Table 2 the maximum distance traveled to get water source in three districts were <1 km (54.81%) followed by 1-2 km (43.7%) while few number of the respondents reported that they travel 3-4km (1.11%) and >4 km (0.37%). According to Kedjela (2010), sheep in Nedjo area, 93.3% of smallholder farmers get water at a distance of less than 0.5 km. Majority (75%) of the farmers in Nedjo and Jarso area watered their sheep once in a day followed by two times per day (22.5%) and some sheep flocks (2.5%) had access to water freely per day.

Table 13. Distance traveled to get source of water in kilometers (Km)

District				
Distance (km)	Gozamen N (%)	Sinan N (%)	Hulet eju N (%)	overall N (%)
<1 km	13(14.44)	79 (87.78)	56(62.22)	148(54.81)
1-2 km	75(83.33)	10(11.11)	33(36.67)	118(43.7)
3-4 km	2(2.22)	1(1.11)	-	3(1.11)
>4 km	-	-	1(1.11)	1(0.37)

NB: km=kilometer

The overall dominant water source in the area were river which accounts for about 73.7% of the total water source for the livestock figure 1 followed by spring which contributes about 23.33% (Table 2). Similar to this study Workneh and Rownalds (2004) indicated that rivers are generally the most important sources of water during dry and wet seasons in crop livestock system households in Oromia region. About 73.33% of the sample population reported that they have access to water easily while 26.67% of the sample population did not get enough water. The majority of the respondent (49.63%) waters their lambs twice per day during the dry period. Similarly, about 44.81%, 45.93% and 54.07% water pregnant ewe, rams and young ewes, respectively, twice per day during dry period. During the wet season majority of the respondents water their animals only once per day. This might be due to the fact that sheep is able to get freely water from rivers during wet season since the dominant water source in the area is river (figure 1). Similar to this study, Solomon (2007) reported that about 40% of wet season and 60% of dry season source of water for livestock was river. Watering once in two to three days was common in some other area like lowland of Dire Dawa (Aden, 2003)

Table 14.Water sources in the study area

	Districts			
	Gozamen	Sinan	Hulet eju	Overall
Source of water	N (%)	N (%)	N (%)	N (%)
River	69(76.67)	57(63.33)	73(81.11)	199(73.7)
Dam	1(1.11)		-	1(0.37)
Pond	1(1.11)	1(1.11)	5(5.56)	7(2.59)
Spring	19(21.11)	32(35.56)	12(13.33)	63(23.33)
Availability of water				
Enough	44(48.89)	75(83.33)	79(87.78)	198(73.33)
not enough	46(51.11)	15(16.67)	11(12.22)	72(26.67)
Frequency of water				
Dry season				
Lamb				
Only once	69(76.67)	10(11.11)	4(4.44)	83(30.74)
Twice	21(23.33)	66(73.33)	47(52.22)	134(49.63)
Freely available	-	14(15.56)	39 (43.33)	53(19.63)
Pregnant				
Only once	70(77.78)	7(7.78)	1(1.11)	78(28.89)
Twice	20(22.22)	70(77.78)	31(34.44)	121(44.81)
Freely available	-	13(14.44)	58(64.44)	71(26.29)
Rams				
Only once	70(77.78)	7(7.78)	2(2.22)	79(29.26)
Twice	20(22.22)	61(67.78)	43(47.78)	124(45.93)
freely available		22(24.44)	45(50)	67(24.81)
young ewe				
Only once	70(77.78)	9(10.00)	4(4.44)	83(30.74)
Twice	20(22.22)	77(85.56)	49(54.44)	146(54.07)
Freely available	-	4(4.44)	37(41.11)	41(15.18)
Wet season				
lamb				
Only once	90(100)	87(96.67)	79(87.78)	256(94.81)
Twice	-	3(3.33)	7(7.78)	10(3.7)
Freely available	-	-	4(4.44)	4(1.48)
Pregnant				
Only once	90(100)	82(91.11)	57(63.33)	144(53.33)
Twice	-	8(8.89)	29(32.22)	37(13.7)
Freely available	-		4(4.44)	4(1.48)
Rams				
Only once	90(100)	80(88.89)	79(87.78)	249(92.22)
Twice	-	10(11.11)	11(12.22)	21(7.78)
Young ewe				
Only once	90(100)	88(97.78)	82(91.11)	260(96.29)
Twice	-	2(2.22)	8(8.89)	10(3.7)

Figure 1. Gozamen sheep population watering in the river

Housing System of Sheep

Good housing enhances production by reducing stress, disease hazards and making management easier (Dejen, 2010). The main housing system throughout the study districts was a house constructed adjacent to human shelter (43.3%) followed by separate housing (39.26%) (Table 4). The proportion of households living with sheep in the same house was 17.04%. Solomon (2007) reported that about 36.3% of the households constructed separate shelter for sheep, while 9.6% shelter sheep in the main house and 8.9% shelter in house adjacent to main house. All households of Gozamen, 75% of the households in Sinan and 76.92% households in Hulet eju district housed sheep with goats. Similarly about 25% of the households in Sinan and 23.07% in Hulet eju districts house sheep with cattle. According to Sissay (2010), most of the respondents 56 (87.5%) shelter or house fattening sheep in a separate barn while few 8(12.5%) households use common barn for the whole flock for night enclosure in Bahir Dar Zuria Woreda. Tesfaye (2008) reported that most of the Afar sheep owners (93.5%) sheltered sheep with other species mainly with goat (98.9%) while 6.5% reported that they sheltered sheep separately. This result is in agreement with the current result.

Table 15. Housing practices of the sample population

	District			
Housing practices	Gozamen N (%)	Sinan N (%)	Hulet eju N (%)	Overall N (%)
system of housing				
No housing	-	-	1(1.11)	1(0.37)
Separated housing	30(33.3)	15(16.)	61(67.)	106(39.2)
Adjacent to human house	31(34.4)	65(72.2)	21(23.3)	117(43.3)
In home with human	29(32.2)	10(11.1)	7(7.78)	46(17.04)
Does your sheep housed with other animals?				
Yes	1(1.11)	8(8.89)	13(14.44)	22(8.15)
No	89(98.9)	82(91.1)	77(85.6)	248(91.8)
IF yes with what?				
Goat	1(100)	6(75)	10(76.92)	17(77.27)
Cattle	-	2(25)	3(23.07)	5(22.73)

Herding of Sheep

The main objective of herding is to prevent sheep from damaging crops, theft and predators. A good understanding of the community's herding practices is crucial to bring sustainable improvement in the smallholders flock through community-based strategies (Solkner-Rollefson, 2003). Separate herding of sheep flock from other livestock was common practice (76.7%) and herding with other livestock ranks second to separate herding (23.33%). Even though separate herding is common means of herding in the study area sheep were kept mixed with cattle during the dry period (66.67%), wet (23.81%) and year round (9.52%) in some part of the districts. But also sheep were kept with goat (65.08%) during dry season (30.16%) followed by wet (4.76%) and year round. It is also sometimes common to find that sheep flock herded with equines. According to the respondents about 64.07% of the households herd their sheep flock alone while 35.93% keep with neighboring sheep flock (Table 5). Similar to this study, Wossenie (2012) reported that Hararghe highland sheep

were herded separately around their homesteads (68.9%).

Table 16. Herding of sheep flock

Descriptors	Districts			
Sheep herding practice	Gozamen N (%)	Sinan N (%)	Hulet eju N (%)	Overall N (%)
Is separate herding of sheep common?				
Yes	76(84.4)	73(81.1)	58(64.4)	207(76.7)
No	14(15.6)	17(18.9)	32(35.6)	63(23.33)
Season of herding sheep with cattle				
Dry period	10(71.4)	15(88.2)	17(53.1)	42(66.67)
Wet period	3(21.4)	2(11.8)	10(31.3)	15(23.81)
Year round	1(7.14)	-	5(15.63)	6(9.52)
Season of herding sheep with Goat				
Dry period	9(64.3)	10(58.8)	22(68.8)	41(65.08)
Wet period	5(35.7)	4(23.53)	10(31.3)	19(30.16)
Year round	-	3(17.65)	-	3(4.76)
Season of herding sheep with Equine				
Dry period	11(78.6)	15(88.2)	17(53.13)	43(68.25)
Wet period	3(21.43)	1(5.88)	12(37.5)	16(25.39)
Year round	-	1(5.88)	3(9.38)	4(6.35)
Is herding of sheep with neighboring flock common?				
Yes	8(8.89)	21(23.33)	68(75.56)	97(35.93)
No	82(91.11)	69(76.67)	22(24.44)	173(64.07)

Reproduction Performance and Breeding Management

Reproduction performance is the best mechanism in evaluation of live animal. The overall lambing interval of ewe in east Gojam zone was Reported to be 8-10 months (71.11%) and also about 26.29% of the sample population reported that the overall lambing interval was 11-13 months as shown in Table 6. Very few numbers of the respondents (2.22%) reported that the lambing interval of east Gojam sheep was 14-16 months. This result is slower than the result that Wossenie (2012) reported for Haraghe high land sheep (6.5±0.7) but comparable with the lambing interval for Bonga (8.9) and Horro sheep (7.8) months (Zewdu, 2008). Similar to this result, the lambing interval of sheep in Goncha Siso Enesie district was 9.64±0.105 and the average litter size was 1.12±0.0123 (Bamlaku, 2012).

The number of lambs per lambing in this study was only one lamb (87.03%) followed by twin lambing (12.96%) (Table 6). Triple lambing was not reported in this study area. The overall number of lambs in life time production of ewe was eight (66.67%) and some sample respondents replied five lambs (12.22%) and seven (9.62%). Lambing many number of lambs is common during September to November (53.33%) due to availability of feed (92.59%) during this period. Mengiste (2008) working on Washera sheep reported shorter lambing interval for ewes lambing in wet season than those delivering in dry season of the year. Through the provision of satisfactory nutrition and proper management in the tropics, it is practically possible to attain three lambing in two years (Agyemang *et al.,* 1985)**.**

Table 6. Reproductive performance of sheep in the study area

		Districts			
Reproduction performance		Gozamen N (%)	Sinan N (%)	Hulet eju N (%)	overall N (%)
Lambing interval of Ewe	8-10 m	55(61.11)	54(60.0)	83(92.22)	192(71.11)
	11-13 m	33(36.67)	31(34.4)	7(7.78)	71(26.29)
	14-16 m	2(2.22)	4(4.44)	-	6(2.22)
	17-20 m	-	1(1.11)	-	1(0.37)
Number of lambs per lambing	only one	87(96.67)	79(87.7)	69(76.67)	235(87.03)
	Twin	3(3.33)	11(12.2)	21(23.33)	35(12.96)
Number of lambs per production life time	Eight	77(85.56)	44(48.8)	59(65.56)	180(66.67)
	three(triple)	-		5(5.56)	5(1.85)
	Five		26(29.2)	7(7.78)	33(12.22)
	Six	5(6.49)	13(14.6)	8(8.89)	26(9.62)
	Seven	8(10.39)	7(7.87)	11(12.22)	26(9.62)

Seasonality of lambing

In small ruminants, overall performance production efficiency depends upon the reproductive performance. Higher meat production could be achieved by improving reproductive traits especially when meat production comes mainly from younger animals (Tasew, 2012). The overall season of lambing ranged from September to November as reported by the sample respondents (53.33%) followed by December to February (25.56%) as indicated in Table 19. The basic reason during this particular period was availability of feed resource (92.59%) followed by breeding management (7.4%). The main feed resources during this period were "***Sinar***" (Oat), crop aftermath and natural pasture as indicated by focus group discussion and development agents serving at rural development office. In contrast to this result Mengistie (2008) reported that Washera sheep are not seasonal breeders and there were considerable number of births every month (mean 44.5±8.7; range 32.3-59) with a peak occurring in August and February.

Table 7. Seasonality of lambing

		District			
Descriptor		Gozamen N (%)	Sinan N (%)	Huleteju N (%)	Overall N (%)
Season of of lambing	Sept-Nov	50(57.47)	43(47.7)	51(56.67)	44 (53.33)
	Dec- Feb	16(18.39)	29(32.2)	24(26.67)	69(25.56)
	Mar-May	19(21.84)	14(15.5)	13(14.44)	46(17.03)
	Ju-Aug	5(5.56)	4(4.44)	2(2.22)	11(4.07)
Reason of seasonality of lambing	mating mgt -		1(1.11)	19(21.11)	20(7.4)
	Availability of feed	90(100)	89(98.8)	71(78.89)	250(92.59)

MGT=Management

Castration Practices

Castration was primarily practiced for fattening (92.89%) across three districts. In the study area the aim of castration was to sell sheep at higher price and gaining much profit from fattened sheep. Table 8 shows that the basic reason of castration was to keep the animal for meat purpose and few numbers of respondents in Sinan replied that castration was under taken to control the behaviors of aggressive rams. The main castration season almost throughout three districts was November to February (63.91%) because during this season there is ample amount of feed resource which helps to cope up the castrated ram body building followed by June-October (31.36%). Traditional method of castration was common throughout the district as described in Table 23. Almost all the sheep owners in the three districts practiced traditional castration method (67.46%) by crashing the vas deference using local materials such as wood and hammer.

Table 8 Castration practices according to respondent's response

	Districts			
Castration practices	Gozamen N (%)	Sinan N (%)	Hulet eju N (%)	Overall N (%)
Do you have Experience in castration				
Yes	34(37.78)	68(75.56)	67(74.44)	169(62.6)
No	56(62.22)	22(24.44)	23(25.56)	101(37.4)
Reason of castration				
To control breeding	2(5.41)	2(2.94)	2(2.98)	6(3.55)
For fatting	32(94.12)	60(88.24)	65(97)	157(92.89)
To control behavior of ram		6(8.82)	-	6(3.55)
Season of castration				
June-October	3(8.11)	25(36.76)	25(37.31)	53(31.36)
Nov –February	27(79.41)	40(58.82)	41(61.20)	108(63.91)
Janu- Mar			1(1.49)	1(0.59)
Apr- May	4(10.81)	3(4.41)	-	7(4.14)
Method of castration				
Traditional method	29(85.29)	38(55.88)	47(70.15)	114(67.46)
Modern method	5(13.52)	22(32.35)	20(29.85)	47(27.81)
Both method		8(11.76)		8(4.73)

Culling of ewes

Culling is a common practice in livestock production and management program. In the study area most of the respondents (95.19%) practice culling of ewes. The major reasons for culling ewes were due to age (61.4%) and sterility (23.3%) (Table 9). According to respondents, culling due to disease problem was rare (7.78%), although it was one of the serious production constraints in the area. The dominant ways of culling ewes in the study area was selling live sheep (80.54%), and this is followed by slaughtering for home consumption (19.46%).

Table 9. Culling practice of ewes in the study area

Descriptor	Districts			
	Gozamen N (%)	Sinan N (%)	Hulet eju N (%)	Overall N (%)
Do you have experience in culling ewes				
Yes	89(98.89)	82(91.11)	86(95.56)	257(95.19)
No	1(1.11)	8(8.89)	4(4.44)	13(4.81)
Reason of culling				
Disease	10(11.24)	6(7.32)	4(4.65)	20(7.78)
Age	68(76.4)	40(48.78)	50(58.14)	158(61.48)
Sterility	9(10.12)	34(41.46)	17(19.77)	60(23.35)
Body condition	2(2.25)	2(2.44)	15(17.44)	19(7.39)
Ways of culling ewe				
Selling live sheep	76(85.4)	71(86.56)	60(69.77)	207(80.54)
Slaughtering for consumption	13(14.6)	11(13.42)	26(30.23)	50(19.46)

Culling of rams

Culling of rams was practiced by most of the farmers (85.5%) in the study area (Table 10). Color is the common criteria to cull their breeding ram in east Gojam Zone (60.17%). The most preferred color were plain white, red and brown while plain black color was totally discouraged because they link this color with religious views (from group discussion with elders and model farmers). Next to this point farmers focus on the low mating ability of their rams (25.54%) to cull their breeding rams followed by age (9.09%).

Table 10. Culling rams across the districts

	districts			
Parameters	Gozamen N (%)	Sinan N (%)	Hulet eju N (%)	Overall N (%)
Do you practice culling of rams				
Yes	71(78.89)	83(92.22)	77(85.56)	231(85.56)
No	19(21.11)	7(7.78)	13(14.44)	39(14.44)
Reason of culling rams				
Disease	-	1(1.2)	6(7.79)	7(3.03)
Age	5(7.04)	16 (19.28)	-	21(9.09)
Body condition	2(2.82)	2(2.4)	1(1.3)	5(2.16)
Color	61(85.92)	38(45.78)	40(51.95)	139(60.17)
Mating ability	3(4.23)	26(31.33)	30(38.96)	59(25.54)

Marketing age of Ewes and Rams

The average marketing age was 4.9, 6.13 and 5.94 months for males in Gozamen, Sinan and Hulet eju districts, while the average market age for females were 5.36, 6.37 and 6.22 months respectively. This study revealed that rams and ewes in both Sinan and Hulet eju were late in marketing age ($p<0.05$) than Gozamen this might be due to the management condition of farmers and the Genetic difference of sheep.

Solomon (2007) reported that the average age of 9.69±2.01 and 11.31±1.92 months at marketing for male and female sheep, respectively. Apparently, male sheep were sold on priority and females were retained for breeding in western low land sheep at Mettema districts but the current study indicated that sheep in east Gojam zone (Table 11) were marketed with earlier age than Solomon's report (2007) but it is in agreement with Bosenu's (2012) report where the average market age of male sheep in Debre Libanos and Wuchale was 5.18±0.97 and 5.31±0.97 months, respectively. Similarly, females are sold at an age of 5.91 ±1.04 and 6.17±1.62 months in Debre Libanos and Wuchale, respectively.

Table 11. Marketing age of both females and male sheep (in month)

Districts by their respective (Mean± SE)of marketing age

Variables	Gozamen	Sinan	Hulet eju	Over all for both sex
Marketing age of ram	4.9 ± 0.12^{b}	6.13 ± 0.13^{a}	5.94 ± 0.13^{a}	5.66± 0.13
Marketing age of ewe	5.36 ± 0.13^{b}	6.37 ± 0.29^{a}	6.22 ± 0.22^{a}	6.06± 0.21

NB: Means with different superscripts within same row are statistically different (significant at 0.05)

Sheep Production Constraints

The major production constraints in the study area were disease, feed shortage, water problems, input, extension service, genotype (breed), predators and drought (Table 12). However, severity of the problem was observed in case of disease with index value of 0.35 and 0.29 for Gozamen and Sinan districts, respectively. Shortage of feed was major constraint in Hulet eju district (index=0.41) followed by droughts in both Gozamen (index=0.20) and Sinan (index=0.20) but Disease (index=0.31) was treated secondary to feed shortage in Hulet eju. Feed shortage problem ranked first to be the bottleneck problem in the study area where as disease and parasites are the leading for Alaba district of SNNPRS according to the report of Tsedeke (2007).

Feed shortage was treated as third important issue in Gozamen (index=0.14) and Sinan (index=0.15) whereas predator was indicated as third in Hulet eju districts (index=0.13). Other production constraints like water, labor, and market and extension service were not reported as severe as disease, feed shortage and drought in all three districts as indicated in Table 12. According to Bamlaku (2012) the major sheep production constraints in Goncha Siso Enesie district was disease followed by shortage of grazing land, breed performance and feed during dry season.

Table 12. Sheep production constraints

Sheep production constraints	District											
	Gozamen				Sinan				Hulet eju			
	R1	R2	R3	Index	R1	R2	R3	I	R1	R2	R3	Index
Disease problems	56	8	6	0.35	46	8	3	0.29	42	16	11	0.31
Feed shortage	5	26	9	0.14	6	23	24	0.15	45	43	0	0.41
Water problem	1	3	7	0.03	4	7	11	0.07	1	1	30	0.07
Lobar problem	3	2	5	0.03	0	5	5	0.03	0	0	1	0.00
Market problem	0	0	0	0	0	8	18	0.06	1	10	17	0.07
Predator	0	1	3	0.01	8	7	5	0.08	0	2	3	0.13
Breed(genotype)	2	19	15	0.11	0	3	1	0.01	0	3	7	0.02
Input	4	17	16	0.11	6	2	8	0.06	1	13	15	0.08
Extension service	0	0	3	0.01	2	0	4	0.02	0	2	6	0.02
Drought	19	13	24	0.20	16	25	10	0.20	0	0	0	0
Theft	0	1	2	0.01	3	2	1	0.03	0	0	0	0

Index = Σ of [3 for rank 1 + 2 for rank 2 + 1 for rank 3] given for particular constraint variable divided by Σ of [3 for rank 1 + 2 for rank 2 + 1 for rank 3] for all constraints variable considered

Disease Prevalence and Health Management

Some of the disease reported by the respondents is coenuruses, anthrax, diarrhea, lungworm, brucellosis, sheep pox, and blackleg and lung disease. According to respondents the common disease in the study area were coenuruses in Gozamen (index=0.21) and in Sinan (index=0.37) but in Hulet eju the most important disease is lungworm (index=0.27). Some farmers in Menz area reported that they sometimes use traditional treatments (just dipping them in a river) for sheep affected by coenuruses. This practice is not supported by literature rather breaking the life cycle of the tape worm (cause of coenuruses) should be considered. This could easily be achieved by burning the head of slaughtered sheep to prevent its utilization by domestic dog as dog is the intermediate host for the continuity of its life cycle. Strengthening health service in both Menz and Afar area is mandatory (Tesfaye, 2008).

Table 13. Common sheep diseases in the study area

Disease prevalence		Districts											
		Gozamen				Sinan				Hulet eju			
Local name	Scientific name	R1	R2	R3	I	R1	R2	R3	I	R1	R2	R3	I
Azurit	Coenuruses	13	22	29	0.21	49	23	9	0.37	12	15	10	0.18
Abasenga	Anthrax	3	10	7	0.07	10	5	11	0.09	9	11	8	0.01
Kezen	Diarrhea	12	5	7	0.10	5	16	14	0.11	11	10	13	0.12
Sal	Lungworm	8	20	14	0.14	7	8	13	0.09	15	13	21	0.27
Wurja	Brucellosis	13	7	6	0.11	6	18	14	0.13	7	9	9	0.02
Fentata	Sheep pox	23	13	14	0.20	4	9	20	0.09	13	10	8	0.12
Abagurba	Blackleg	12	5	6	0.09	6	6	7	0.07	9	10	10	0.06
Yesanbamich	Lung disease	6	8	7	0.08	3	5	2	0.05	14	12	11	0.22

R1, R2, R3 and I=are ranks and index

Mortality

The reported mortality during one year previous to survey date was assessed and the result is given in Table 14. Higher number of lamb mortality was observed in Gozamen (81.43%) than Sinan (56.06%) and Hulet eju (60.78%). The reported number of ram and young ewe mortality were almost similar while castrated rams were rarely died. The most important thing in causing death in lambs was disease accounting about 43.33% while predators (2.59%) in lambs and other production constraints (feed shortage, drought and labor all were together contribute about 54.07%) and this result is in agreement with reported values of earlier reports on pre-weaning lamb mortality by Gatenby (1986); Njau *et al*. (1988). High mortality of 10 to 50 percent was recorded to be common in young lambs up to weaning (Gatenby and Humbert, 1991; Ibrahim, 1998) in all type of traditional management system. Aden (2003) reported that in the Dire Dawa area of Ethiopia, the greatest cause of death to sheep was apparently disease (57.32%), which was responsible for more than half of the mortality rate. This was followed by predators (14.63%), miss-mothering (12.2%) and accident (8.54%) in that order.

Table 14. Mortality of sheep in the study area

	District			
Mortality	Gozamen N (% of total death)	Sinan N (% of total death)	Hulet eju N (% of total death)	Overall N (% of total death)
Ewes	13(18.57)	18(27.27)	9(17.65)	40(21.39)
Ram	-	5(7.58)	7(13.72)	12(6.42)
Young ewe	-	4(6.06)	4(7.84)	8(4.28)
Castrated	-	2(3.03)	-	2(1.07)
Lamb	57(81.43)	37(56.06)	31(60.78)	125(66.84)

Conclusion

The major feed resource in the current study area both during dry and wet period was natural pasture across the districts compared. In East Gojjam Zone about 73.33% of the sample population reported that they have access to water easily while 26.67% of the sample population did not get enough water.

The majority of the respondent (49.63%) waters their lambs twice per day during the dry period. All households of Gozamen, 75% of the households in Sinan and 76.92% households in Hulet eju district housed sheep with goats.

Even though separate herding is common means of herding in the study area sheep were kept mixed with cattle during the dry period (66.67%), wet (23.81%) and year round (9.52%) in some part of the districts. But also sheep were kept with goat (65.08%) during dry season (30.16%) followed by wet (4.76%) and year round.

The average marketing age was 4.9, 6.13 and 5.94 months for males in Gozamen, Sinan and Hulet eju districts, while the average market age for females were 5.36, 6.37 and 6.22 months respectively. This study revealed that rams and ewes in both Sinan and Hulet eju were late in marketing age ($p<0.05$) than Gozamen this might be due to the management condition of farmers and the Genetic difference of sheep.

Recommendation

The major feed resource available in East Gojjam zone is natural resource. Therefore, it should be conserved for future livestock production.

Almost all farmers in East Gojjam Zone housed their sheep with other livestock. Therefore, emphasis has to be given to house sheep in their separate home.

The major sheep production constraint in the study was disease. Therefore, attention should be given to this problem.

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