academicresearchJournals

Vol. 5(7), pp. 461-470, November 2017
DOI: 10.14662/ARJASR2017.074

ISSN: 2360-7874
http://www.academicresearchjournals.org/ARJASR/Index.htm

Academic Research Journal of Agricultural Science and Research

Full Length Research

Assessment of livestock feed availability, conservation mechanism and utilization practices in South Western Ethiopia

Kasa Biratu* and Saba Haile

Ethiopian Institute of Agricultural Research, Jimma Agricultural Research Center, P O Box 192, Jimma, Ethipia
* kasabiratu@gmail.com

Accepted 17 October 2017

The study was conducted in south-western Ethiopia aiming to understand the current status of feeds through collecting up to date information on feed availability, feeding strategies and conservation mechanisms and guide appropriate research interventions that can improve livestock productivity in the area. Using a stratified sampling technique, six districts (3 from each zone) were selected based on representativeness of agro-ecologies and a total of 342 respondents were interviewed to generate the data. Collected data were analyzed using descriptive statistics, GLM, ANOVA and LSD. The result showed as feed availability varies over different seasons. Crop residues (38.9%) were found the major feed source in dry season which is followed by natural pasture (30.4%), fodder trees (25.1%) and crop aftermath (5.6%). Whereas in wet season majority of the respondents (95.6%) use natural pasture as a major source of feed which is highly supported by tinned cereal crops like maize and weed materials. No chemical crop residue treatment practice was reported (100%) in the area but (40.1%) of the respondents use moistening and salting. Forage cultivation was not practiced by majority (68.4%) of the respondents. Almost all (99.1%) the respondents do not have access to industrial by-product feeds. Forage conservation practice was not in a place (100%). The major constraints reported includes shortage of grazing land (39.6), shortage of feed and feed related technologies (33.4%), animal health care problem (18.5%), lack of water (3.5%) and lack of improved breed of animals (3%). Development and demonstration of improved forages that can be integrated with the dominant farming system, efficient conservation and utilization of crop residue via different treatment options and maximizing the productivity of available individual and communal grazing pasture land using proven improved technologies needs attention.

Key words: Feed resources, feed utilization methods, feed conservation practice

Cite this article as: Biratu K, Haile S (2017). Assessment of livestock feed availability, conservation mechanism and utilization practices in South Western Ethiopia. Acad. Res. J. Agri. Sci. Res. Vol. 5(7), pp. 461-470

INTRODUCTION

Livestock contributes to the livelihoods of approximately 70% of Ethiopians and accounts for 15-17% of the total national GDP and 35-49% of the agricultural GDP (Gebremariam et al., 2010).

In the highlands of Ethiopia, with the rapid increase of human population and high demand for food, pastures

are steadily being converted to farmlands (Adugna, 2007). Land which is not used for cultivation is often waterlogged, flooded and steep and unsuitable for grazing. Environmental degradation due to deforestation and overgrazing have also substantially reduced soil fertility and further reduced arable and grazing land productivity (Tekalign, 2014).

Natural pasture is the main source of livestock feed in Ethiopia (Tolera et al., 2012). However, it cannot fulfill the nutritional requirements of the animals, particularly during the dry season, due to poor management and their inherent low productivity and quality. The annual DM production could satisfy only two-third of the total DM requirements of the livestock which results to body condition loss of animals in the dry season indicating feed shortage and suggests that livestock production and productivity are constrained by feed scarcity (Funte et al., 2010). The dry season is characterized by inadequacy of grazing resources as a result of which animals are not able to meet even their maintenance requirements and lose substantial amount of their weight (Legesse, 2008 & Zewdie, 2010).

Livestock production is the most important field of agriculture in Jimma and Ilu Aba Bora zones of south western Ethiopia which is characterized by mixed crop livestock farming system. The small holder livestock farmers in these zones rear animals for different purposes like providing draught power, milk, meat, manure and sources of cash. However, different study report indicates as there is a problem of feed and feeding management which resulted to low disease resistance ability, sterility problem and mortality of animals in Jimma and Ilu Aba Bora zones of south western Ethiopia. Therefore, in order to design an appropriate intervention options, it is important to generate more baseline information based on the following objectives:

- to understand the current status of feeds through collecting up to date information on feed resources, feeding strategies and conservation mechanisms
- to guide an appropriate research interventions that will improve livestock productivity in the area

MATERIALS AND METHODS

Description of the study area

Jimma and Ilu Aba Bora zones are found in the southwestern part of Ethiopia. The study districts (Gera, Seka-Chokersa, and Shebe-Senbo) are located within 100 kilo meter (Km) range from Jimma town which is 350 km away from the capital city, Addis Ababa. The zone have a bi-modal rainfall pattern with two distinct rainy and cropping seasons. The main rainy season (Gana) which is also main cropping season, extends from June to September. The short rainy season, known as “Harfaasa” covers the period from April to May. Jimma zone is one of the major coffee growing areas of southwest Ethiopia; cultivated and wild coffee is a main cash crop of the area. The zone is well endowed with natural resources contributing significantly to the national economy of the country. Major crops grown other than coffee are maize, teff (Eragrostis teff), sorghum, barley, pulses (beans and peas), root crops (Enset-false banana and potato), and fruits. Teff and honey production are another sources of cash after coffee. Enset (*Ensete ventricosum*) is a strategic crop substantially contributing to the food security of the zone (CSA, 2008). The mean annual minimum and maximum temperature of the area are 11.3^{O}C and 26.2^{O}C respectively.

Ilu Aba Bora zone is also found in Oromia Regional State, South Western Ethiopia. The study districts, Alle, Metu and Bure districts are located at a distance of 540, 562 and 580 km, respectively from Addis Ababa. The altitude of the zone ranges from 500-2575 meter above sea level. It is mostly known for its vegetation coverage, suitability for coffee, crop, livestock and bee production. The dominant crops being Maize, Teff, Coffee, Sorghum, Barley, Wheat, different pulse crops, finger millet, fruits, vegetables, and spices. Human population of the zone is 1,492,183 people. Out of the total population, 88% live in the rural areas where agriculture is the basic livelihood. Annual precipitation ranges from 1500-2200mm with 6 to 9 months of rain fall Alle, Metu and Bure districts represented high, medium and low land, respectively.

Sampling procedure

A total of six districts each three from Jimma and Ilu Aba Bora zones were selected purposively based on accessibility and representativeness of the three agro-ecological conditions (high, mid and lowland). Peasant associations (PAs) and farmers in the PAs were selected using systematic random sampling technique. Households (HHs), those having at least one of the livestock species at the time of interview were included in this study. Accordingly, 57 HHs from each district and a total of 342 HHs were participated. A pre-tested questionnaire were used in collecting the data by applying personal interview.

Statistical analysis

Descriptive statistics, GLM, ANOVA and LSD procedures were applied to compare means using Statistical Package for Social Sciences (SPSS) version 20 (SPSS Inc., Chicago, Illinois, USA, 2010) .

RESULT AND DISCUSSION

Household characteristics

Majority (83.3%) of households interviewed in the study area were male headed. This is in line with the report of Workneh and Rowlan (2004) in which they indicated as majority of (96%) Oromia Regional State households were male headed. The overall average age of respondents ranges from 20-82 and the mean (SE) age category in midland (45.99±14.23) were found significantly higher (P< 0.05) than the highland (41.32±12.03) and lowland (41.94±12.13) which do not differ significantly (Table 1). Mohammed et al. (2016) also reported as an overall mean (SE) age of Seka, Omonada and Tiro Afata districts of Jimma zone were 45.32±0.88 which is higher than the overall mean age result of this study findings. Similarly Yisehak et al. (2013) reported mean age of 43.6, 41.0 and 45.9 at Seka, Dedo and Mana districts of Jimma zone respectively.

No significant difference (P>0.05) was observed in family size and male female family members across the three agro-ecologies. The overall mean(SE) family size was counted 6.12±2.14 members/ household. Yisehak et al. (2013) also stated as the average household size in Seka, Mana and Dedo districts were 8.80, 9.50 6 and 9.63 respectively which is slightly higher than the current findings and even the Ethiopian national average household size (7.4) (USAID, 2009). Out of the total family size, 22.4% were under the age category of less than 15 years of age and 1% belongs to the age group greater than 65 indicating that majority 76.6% of the family member fail under the more active working force of age.

Majority (34.2%) of the educational status of the respondent farmers were found illiterate followed by grade 4-6 (26.3%). Dawit, et al. (2013) similarly reported as large number (21.7%) of the respondents were illiterate, while the rest (23.3%, 46.7, 5% and 3.3%) had educational background for basic education, primary education, junior secondary education and high school level respectively at Adami Tulu Jiddo Kombolcha district of Oromiya.

Landholding and land use pattern

The average land holding per household in Jimma zone was 2.12 hectare (ha) whereas 1.97 ha in Ilu Aba Bora zone. No significant difference (P>0.05) were observed between the two zones both in average landholding, land allocated for crop production and land left for grazing purpose (Table 1). The landholding in this study is higher than the national average reported as 1.14ha per households (CSA, 2015). Slightly higher average total land holding was also reported (2.28±0.15) in the case of Seka, Mana and Dedo districts of Jimma zone (Yesihak et al., 2013). The overall mean land holding in this study (2.05±0.09) were found slightly higher (1.93 ha) than Gomma district as reported by Belete (2009). Mohmmed et al. (2016) also reported similar landholding pattern (2.14 ha) in the study made at Kersa, Tiro Afeta and Omo-Nada districts of Jimma zone.

Crop cultivation covers about 62.9% of the total land owned by the respondents in the study area while (10.7%) land is allocated for livestock grazing, (9.8%) agro-forestry and the rest were left as fallow and swampy land (Table 1). Slightly similar results were reported in Adami Tulu district that (69%) of the land was allocated for crop cultivation while the rest was allocated for private grazing land, homestead land and enclosed plantation/wood land, respectively (Dawit et al., 2013). Higher grazing land share is reported in this study compared to the national percentage share of land areas for temporary crops which was reported (73.4%) while share of land area for permanent crops and grazing land were reported (7.4%) & (9.9%) respectively (CSA, 2015). Yesihak et al. (2013) also reported as the grazing land share was significantly different across the considered districts of Jimma zone such as Seka (0.28±0.06), Mana (0.46±0.08) and Dedo (0.21±0.03) respectively which is a better share than the findings of this study.

Livestock holding and utilization

Livestock holding in the selected districts of both zones were indicated in table 2. The livestock production system commonly found in the area is an extensive system where free grazing is more common in the dry season. The overall average(SE) size of livestock holdings per household/TLU in the study area were found 5.65± 0.19, 0.11± 0.01, 0.06 ± 0.01, 0.20 ± 0.03, 0.08 ± 0.01 and 0.03 ± 0.01 for cattle, sheep, goats, horse, donkeys, and mule respectively. This is in agreement with the findings of Mohammed et al. (2016) that the average number of livestock in terms of tropical livestock units (TLU) in the three districts; Kersa, Omo Nada and Tiro Afeta of Jimma zone were cattle (4.74±0.24) (P<0.05), sheep (0.10±0.01), goats (0.06±0.01), donkey (0.07±0.02) (P<0.05), horses (0.05±0.02) and mule (0.06±0.03). Similarly Teshager et al. (2013) indicated as the distribution of average livestock species in Bacho, Algie-Sachi and Chewaka districts of Ilu Aba Bora zone were (48.6%) for cattle, (4.6%) for goat, (9.8%) for sheep, donkey (0.4%), horse (3.8%), mule (0.6%) and chicken (32.2%).

Cattle production in the study area was found dominant relative to the other species of animals implying their importance in the existing farming system (Table 2). Even though the population of other species of animals found in Jimma and Ilu Aba Bora zones except cattle are not sound when compared to the other areas of our country, most of the farmers in the study area have a

Table 1. Mean (±SE) landholding and land share for different purposes

Agro-ecology	Total land (Mean ± SE)	Crop land (Mean ± SE)	Grazing land (Mean ± SE)	Agro-forestry (Mean ± SE)
Highland	2.10±0.17	1.23±0.12	0.24±0.05	0.27±0.08
Midland	2.14±0.18	1.35±0.16	0.22±0.05	0.16±0.05
Lowland	1.90±0.16	1.30±0.13	0.18±0.04	0.12±0.06
Overall	2.05±0.09	1.29±0.08	0.22±0.03	0.20±0.05
Sig.	**ns**	**ns**	**ns**	**ns**

Means in the same column sharing different letters of superscripts are significantly different (P<0.05), ns= non significant

Table 2. Mean (± SE) livestock species holding per household/TLU in the study areas

Zones	Districts	Cattle	Sheep	Goat	Horse	Donkey	Mule
Jimma	Gera	6.34±0.44^{a}	0.08±0.02^{b}	0.05±0.02^{b}	0.00±0.00^{c}	0.05±0.05	0.00±0.00
	Seka Chekorsa	5.06±0.37^{bc}	0.06±.015^{b}	0.03±0.01^{b}	0.04±0.02^{c}	0.14±0.03	0.05±0.02
	Shebe Senbo	4.02±0.27^{c}	0.06±0.02^{b}	0.05±0.02^{b}	0.01±0.01^{c}	0.04±0.02	0.02±0.01
Ilu Aba Alle		6.37±0.59^{a}	0.14±0.03^{a}	0.06±0.02^{ab}	0.74±0.11^{a}	0.09±0.04	0.05±0.02
Bora	Metu	6.16±0.57^{ab}	0.15±0.03^{a}	0.03±0.01^{b}	0.35±0.09^{b}	0.06±0.03	0.03±0.02
	Bure	5.96±0.54^{bc}	0.16±0.03^{a}	0.11±0.03^{a}	0.06±0.04^{c}	0.11±0.04	0.01±0.01
	Overall	5.65±0.19	0.11±0.01	0.06±0.01	0.20±0.03	0.08±0.01	0.03±0.01
Sig.		**	*	*	**	ns	ns

SE=standard error; * (p<0.05) **(p<0.001) shows significant difference b/n means across the column and ns= none significant difference. Different letters across columns shows significant difference among the means

Table 3. Purpose of rearing animals in the study area (n=342)

Purpose of rearing	Cattle			Sheep & Goats			Equine		
	1st	2nd	3rd	1st	2nd	3rd	1st	2nd	3rd
Meat production	-	-	-	-	79.5		-	-	-
Milk production	30.7	43.6	21.1	-	-	-	-	-	-
Work (drought)	49.4	33		-	-	-	-	-	-
Social Security			46.8	85.3	-	-	-	-	-
Hide and skin production	-	-	-	-	-	43.6	-	-	-
Transport	-	-	-	-	-	-	100	-	-

n= overall number of respondents

Feed Resources and Feeding System:

tradition of keeping more than one species of domestic animals. Similarly Yisehak et al. (2013) reported as keeping of more than one species of livestock per household is a common practice in the case of Seka, Mana and Dedo districts of Jimma zone.

Most of the respondents indicated that the primary purpose of keeping cattle is to get male calf that grows up for traction purpose, but the rearing of sheep and goat were mainly for social security (Table 3). This finding is in agreement with the report of Dhaba et al. (2012) in which (93%) of the respondents in Ilu Abba Bora zone were keep small ruminant animals for income generation. Dereje and Tesfaye (2008) differently reported as western Harerghe farmers rear goats for milk purpose in addition to immediate income source and meat. Equine were dominantly kept for transport purpose (Table 3). Almost all (98.2%) of the cattle, sheep, goat and equine reared in the study area were local breeds. Yisehak et al. (2013) reported similarly as (98.8%) cattle, (100%) of small ruminants and equines were local breeds in his study at Jimma zone. Teshager et al. (2013) also reported as all the species of animals kept in Bacho, Algie-Sachi and Chewaka districts of Ilu Aba Bora zone were indigenous animals.

According to the respondents, irrespective of the agro-ecologies, the livestock production system in Jimma and Ilu Aba Bora zones are dependent on grazing from the natural pasture and crop stubbles. In wet season,

Table 4. Livestock feed sources in dry and wet seasons in the study area

Feed source N=342	Dry Season			Wet Season		
	Highland %	Midland %	Lowland %	Highland %	Midland %	Lowland %
Natural pasture	36.8	14	40.4	97.4	94.7	95.6
Crop residues	21.9	51.8	43.0	0	0	0
Fodder trees	39.5	21.1	14.9	0	0	0
Crop after math	1.8	13.2	1.8	0	0	0
Tinned maize	0	0	0	2.6	5. 3	4.4

N= total number of respondents

Table 5. Factors affecting the productivity of the available grazing land in the study area

Variables $n_{= 342}$	Highland %	Midland %	Lowland %
Overstocking	24.6	26.3	28.1
Weeds dominated	20.2	0.9	3.5
Drought problem	3.5	7.9	6.1
Decrease in the size of land	33.3	29.8	27.2
Overstocking and drought	8.8	7	3.5
Overstocking and decrease in the size of land	9.6	28.1	24.6

n= number of respondents

majority of the respondents (95.6%) reported as natural pasture is the major source of feed which is supported by tinned cereal crops like maize and some other weedy materials. This is in agreement with different scholars study results on a mixed crop livestock farming system of Ethiopia in which they indicated the high contribution of natural pasture in supporting the life of ruminant livestock being as the major source of feed both in dry and wet seasons followed by crop residues, crop aftermath, indigenous fodder trees and shrubs respectively (Teshager et al., 2013; Belay et al., 2011, Asaminew and Eyassu, 2009). Similarly Tekalign (2014) stated that 87.1% of the Ethiopian livestock feed is based on green fodder and crop residue. Also farmers in Baresa watershed, Meskan Woreda of Gurage Zone, Southern Nations, Nationalities and Peoples Regional State (SNNPRs) use high seeding rate of maize at planting so that maize population is high enough for thinning to be used as a feed source during the rainy season (Mergia et al., 2014). In this study it is found out that the free movement of animals were restricted in crop growing season and the occurrence of water logging in the grazing fields cause mud which makes inconvenience of grazing. Adugna (2007) similarly stated that in some highland areas, there are seasonally water logged extensive grassland plateaus that restrict pasture use (Table 4).

Majority (49%) of the respondents use their own grazing land and some (28%) use the communal grazing land but (23%) had an access to both individual and communal grazing lands. The productivity of both individual and communal grazing lands were evaluated as poor by majority of the respondents (61.4%), good (38.3%) but getting worth by (0.3%). The reasons frequently suggested for less productivity of the available grazing lands were, decrease in the size of grazing land followed by overstocking and expanding of weeds over the grazing lands (Table 5). Also drought, overgrazing and drought as well as muddiness of the grazing land in the rainy season were also reported as the causes for its low productivity across the study area (Table 5). This is in line with constraints listed by respondents of Bacho, Algie and Chewaka of Ilu Aba Bora zone in which they reported as expansion of crop land, increased human population, overgrazing and lack of knowledge on improved forage production by integrating with food crops were listed (Teshager et al., 2013). Similarly shortage of land, low technical know-how on improved forage production and high cost of feeds and poor access to markets were indicated as livestock productivity problem in Diga district, Ethiopia (Adugna et al., 2014).

Crop residue management and utilization

Although crop residue is one of the available feed resource commonly used in the study area, majority of the respondents do not practice appropriate handling of it (Table 6). Both crop residue and crop after math were utilized untreated by majority of the respondents begging from the time of harvest. Similarly Mohammed et al.

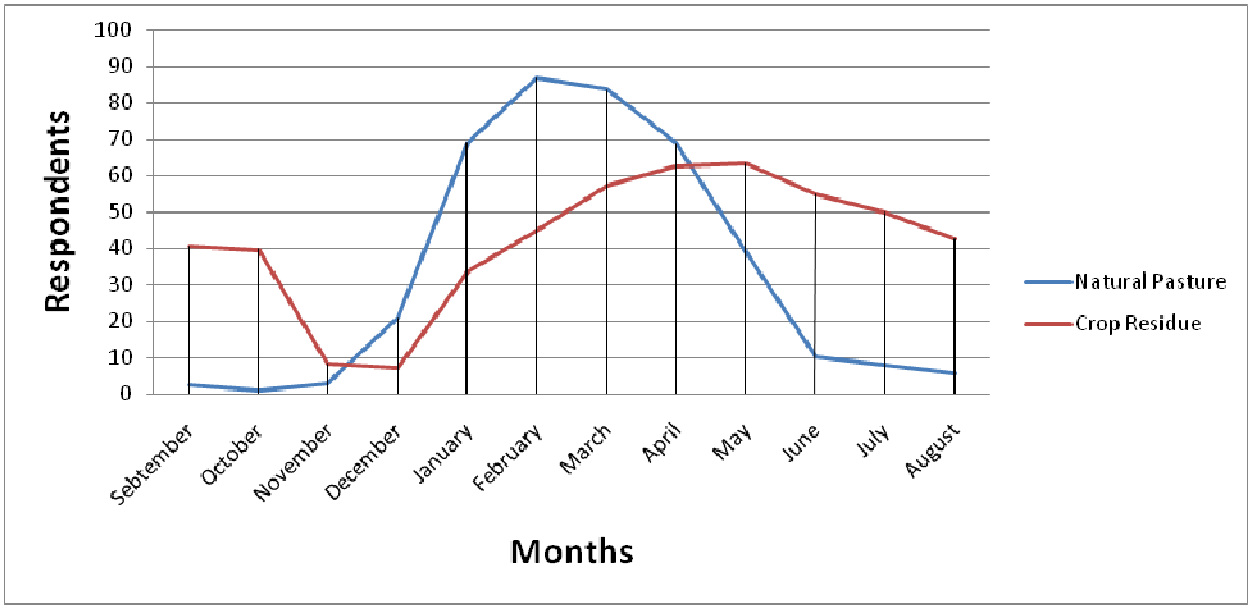

Figure 1. Natural pasture and crop residue scarcity in the study districts

Table 6. Crop residue storage, feeding time and priority animals in feeding

Parameters	Highland		Midland		Lowland	
		(%)		(%)		(%)
Storage practice	n=114		n=114		n=114	
Stalked in the open air		54.4		46.5		41.2
Stalked under shed		4.4		27.2		10.6
Baled		0		0		0
No storage		41.2		26.4		48.2
Start of feeding						
Soon after collection		47.4		32.5		59.6
During wet season		0.9		0		0
During feed shortage		14.9		19.3		3.5
During dry season		5.3		10.5		25.4
Both at feed shortage and dry season		31.5		37.7		11.4

n= number of respondents

(2016) reported as stubbles of crops like maize, sorghum and teff were allowed to be grazed by livestock from October to December in Kersa, Omo Nada and TirAfeta; Jimma zone of administration. No chemical crop residue treatment was reported (100%) but (40.1%) of the respondents stated as they practice moistening and salting during feeding for collected and managed crop residues. The scarcity of crop residue and natural pasture varies over months as indicated in figure 1. Crop residue is available plenty for few months (October - January) following the harvest of grain in the area and the shortage aggravates in the months between February to May under natural condition. In wet season most of the available grazing land became water logged and the animals were fed from tinned maize crops and removed weed materials. In contrast, Zewdie (2015) reported as natural pasture availability varies over months based on rainfall and crop residue serves as the only livestock available feed from January to May at Melka Watershed of Nile Basin, Jeldu District, Western Ethiopia.

Irrespective of the agro-ecologies, majority of the respondents stalk crop residues on farm in the open air followed by no storage at all and the animals are allowed to graze freely begging from the early time of harvest (Table 6). Even though, Jimma and Ilu Aba Bora zones were known for coffee crop production, maize, sorghum, teff and other crops like horticultural crops, pulse and oil crops were common and used as a feed for animals (Table 7).

Table 7. Major crop residue utilization in the study area

Crops (%)	Highland n=114	Midland n=114	Lowland n=114
Teff	69.4	90.4	18.6
Maize	83.3	97.4	95.6
Sorghum	31.6	53.3	87.7
Wheat	4.4	7.9	1.8
Barely	7	1.8	1.8
Oil crop residue	0	0.9	3.6
Pulse crops	6.1	2.7	7.9
Banana and Enset	0	0.9	1.8
Rice bran	0	0	18.4

n= number of respondents

Table 8. Available improved forages and production constraints in the study area

Parameters n=342	Highland %	Midland %	Lowland %
Available improved forage			
Sesbania	40.7	40	41.7
Elephant grass	23.0	30	27.8
Vetiver grass	31.3	30	30.6
Reason for no improved forage cultivation			
Lack of knowledge	89.7	77.8	89.4
Shortage of land	7.2	16.6	5.9
Not important	3.1	2.2	2.4
Reduced yield of main crops	0	3.3	2.4

n= overall number of respondents
Concentrate and feed supplement

Fodder crop production and conservation

Forage cultivation was not practiced by majority (68.4%) of the respondents and *Sesbania sesban* is reported dominant (50.3%) improved fodder introduced as coffee shade in the area followed by Elephant grass (34.4%) (table 8). Even though it is not preferred by animals under normal condition, Vetiver grass (15.3%) which is introduced for soil conservation purpose is also used as a source of feed in the critical time of the dry season when the animals are forced to graze on any green fodder materials available.

Even though, the availability of natural pasture is good at rainy season of the year in the area, there is no (100%) tradition of conservation practices (hay and silage making). Similarly Zewudie (2015) reported as the production of improved and cultivated forage crops is not a common practice in the Nile Basin. The same is true in the case of proper management of crop residue which is not under practice for its abundant availability during the crop harvesting season. This is in agreement with Yisehak et al. (2013) in which he indicated as there is no conservation practice in Jimma zone of his target study districts. Different reasons were suggested by the respondents for not practicing forge crop cultivation and conservation among which lack of knowledge or information on the use of improved forage, land shortage and its less importance were reported respectively (Table 8).

As it is indicated in table 9, majority of the respondents do not have a tradition of supplementing their animals. However, supplementary feeding were in practice by some of the respondents by using cereal miller residue (Bulullee) followed by Atella (local alcohol beverage residue) and rejected maize grain (Tortoraa) and their combinations. No (100%) agro-industrial byproducts feeding was reported in the study area. Similarly Yisehak et al. (2013) reported the use of Attela, cereal miller by products, maize grains and salt as sources of supplements in Seka, Dedo and Omo Nada districts of Jimma zone. In contrast to this study, the utilization of commercially available feeds like noug cake, sunflower cake, wheat bran, maize and soybean and grain by-products like pulse hulls were used in Diga district of East Wollega zone (Adugna et al., 2014). Stable salt is the only mineral supplement known in this study areas (Table 9). Yisehak et al. (2013) differently reported as farmers in Seka, Mana and Dedo of Jimma zone supplement lactating cows by stable salt but drought oxen by cereal grain.

Table 9. Supplementary feeding and types of supplement in the study area

Parameters n=114 each	Highland %	Midland %	Lowland %
Supplement	35.1	49.1	24.6
No supplement	64.9	50.9	75.4
Types of supplement			
Bululee (cereal miller residue)	44.7	52.4	20.9
Atella (local alcohol beverage residue)	14.9	17.5	25.6
Bululee & Atella	6.4	3.2	14
Maize grain and bululee	4.3	4.8	0
Maize grain	29.8	22.2	32.6
Rice bran	0	0	7
Mineral supplement			
Salt	53.5	53.5	38.6

n= number of respondents

Table 10. Water source and watering frequency in the study area over seasons

Parameters n= 342	Highland Dry (%)	Highland Wet (%)	Midland Dry (%)	Midland Wet (%)	Lowland Dry (%)	Lowland Wet (%)
water source						
River	89.5	84.2	76.3	75.4	96.5	94.7
Pond	1.8	0	6.1	5.3	1.8	0.9
Spring water	3.5	14.9	13.2	16.7	1.8	3.5
Pipe water	5.3	0.9	4.4	2.6	0	0.9
Distance traveled						
watered at home	3.5	0	2.6	0	4.4	0
< 1 km	83.3	89.5	71.9	75.4	65.8	74.6
1-5 km	13.2	10.5	25.4	24.6	29.8	25.4
6-10 km	0	0	0	0	0	0
Watering frequency						
Adlibtum	9.6	0	18.4	0	11.4	0
Once a day	42.1	94.7	64	85.1	72.8	83.3
Twice a day	40.4	5.3	12.3	14	10.5	15.8
Three times	7.9	0	5.3	0.9	5.3	0.9

n = overall number of respondents

Water source and its utilization

The water source, its distance from farmers residence and watering frequency per day is indicated in table 10. The main source of water both in dry and wet season were found from river followed by spring water across the three agro-ecologies. Majority of the respondents reported as the distance traveled to access water by livestock was less than one kilometer. Irrespective of agro-ecologies, watering once a day was reported as the major frequency both in dry and wet seasons. The respondents reported as lack of purity of the water is a challenge and in some cases leech parasite is causing severe health problem to the animals drinking directly from the river. Teshager et al. (213) similarly reported as river is the main source of water used but watering twice a day is the common practice. The same author reported as the major water related problems were scarcity, access to water sources and hygiene problems.

CONCLUSION AND RECOMMENDATION

Natural pasture grazing constitutes the main source of animal feed throughout the year with maximum availability during crop growing season (June to December) in the considered districts. In the case of dry season, where the natural pasture potential critically decreases, the crop residue overcomes and remains the main feed option with the naturally occurring shrubs and

tree fodders at the time of critical scarcity period between February to April.

Crop residues are abundantly available at the beginning of the dry season following the harvest of cereal and pulse crops. However, the abundant crop residues right after harvest is used immediately on the farm due to lack of knowledge on proper conservation, storage and feeding systems.

Forage cultivation is rarely practiced which dominantly sourced from integrated crops like coffee and soil conservation activities. Even though, the tradition of supplementing animals is rarely practiced among the livestock owners in the study area, there is no access for different supplementary feed options such as industrial by products and mineral blocks. Therefore:

- Forage materials that can adopt to the existing farming system of the area especially those materials tolerate coffee shad effect and be productive under intercropping condition with cereal crops should need to be identified, evaluated and demonstrated.
- Proven improved forage feed materials found productive in swampy areas should be introduced for efficient utilization of land resource and maximization of feed availability.
- Training and demonstration of the feeds and feeding technologies; feed conservation strategies, crop residue management and utilization options, improved forage cultivation strategies needs a special focus.

ACKNOWLEDGEMENT

The authors are highly acknowledged respondent farmers, livestock expertise and development agents of the study areas for their cooperation in generating this information. Ethiopian Institute Agricultural Research is also acknowledged for funding this study.

REFERENCES

Adugna T (2007). Feed resource for processing export quality meat and livestock in Ethiopia. Ethiopian sanitary and phytosanitary standards and livestock and meat marketing program (SPS-LMM). Texas Agricultural experiment station (TAES/Texas A & M university system). Addis Ababa, Ethiopia.

Adugna T, Fekede F, Diriba G, Dereje D, Dereje K, Shibru G, Wakgari K and Alan D (2014). Assessment of livestock feed production and utilization systems and analysis of feed value chain in Diga district, Ethiopia. ILRI.

Asaminew T and Eyassu S (2009). Smallholder dairy production system and emergence of dairy cooperatives in Bahir Dar Zuria and MechaWoredas, North western Ethiopia

Belay D, Yisehak K and Janssens GPJ (2011). Analysis of constraints facing urban dairy farmers and gender for Jimma town. Afr. J. of Basic and Applied Sciences. (3): 313-318.

Belete S (2009). Production and marketing systems of small ruminants in Goma district of Jimma Zone, Western Ethiopia: M.Sc. Thesis(Animal Production), Hawassa University College of Agriculture, Department of Animal and Range Sciences, Awassa, Ethiopia.

CSA (Agricultural Sample Surveys) (2015). Crop yield for major grain crops, private small holder farms, main season. Addis Ababa, Ethiopia.

CSA (Central Statistical Agency) (2008). Livestock and livestock characteristics, agricultural sample survey. Volume II, Statistical Bulletin. 446, 188p.

CSA (Central Statistical Agency) (2014). Agricultural sample survey Vol. II. Statistical Bulletin No. 505. CSA, Addis Ababa, Ethiopia.

Dawit A, Ajebu N and Sandip B (2013). Assessment of feed resource availability and livestock production constraints in selected Kebeles of Adami Tullu Jiddo Kombolcha District, Ethiopia. Afri. J. of Agricultural Research. 8(29): 4067-4073.

Dereje T and Tesfaye L (2008). Livestock production systems in Darolabu, Habro and Boke districts of Western Harerghe: Proceedings of the 16th annual conference of the Ethiopian Society of Animal Production (ESAP) held in Addis Ababa, Ethiopia.

Dhaba U, Belay D, Solomon D and Taye T (2012). Sheep and Goat production systems in Ilu Abba Bora Zone of Oromia Regional State, Ethiopia: Feeding and Management Strategies. Global Veterinarian. 9 (4): 421-429.

Funte S, Negesse T, Legesse G, (2010). Feed resources and their management systems in Ethiopian highlands: the case of Umbulo Wacho Watershed In Southern Ethiopia. Tropical And Subtropical Agro-ecosystems. 12(1): 47-56.

Gebremariam S, Amare S, Baker D, and Solomon A (2010). Diagnostic study of live cattle and beef production and marketing: Constraints and opportunities for enhancing the system. July 2010. 10-13 pp. http://www.ata.gov.et/wpcontent/uploads/Ethiopia-livestock-Value-Chain-Diagnostic-July-2010.pdf. Accessed on 18 February 2014.

Legesse G (2008). Productive and economic performance of small ruminants in two production systems of the highlands of Ethiopia. PhD Dissertation, University of Hohenheim, Stuttgart, Germany.

Mergia A, Adugna T, Getnet A (2014). Feed resource assessment and utilization in Baresa Watershed, Ethiopia. International Journal of Science and

Research (IJSR) ISSN (Online): 2319-7064.
Mohammed H, Yisehak K and Meseret M (2016). Characterization of livestock production system in three selected districts of Jimma Zone, Southwest Ethiopia. Journal of Reproduction and Infertility. 7(2): 47-62.
Tekalign E (2014). Forage seed systems in Ethiopia: A scoping study. ILRI Project Report. Nairobi, Kenya: International Livestock Research Institute (ILRI).
Teshager A, Belay D and Taye T (2013). Socio-economic and farm characteristics of smallholder cattle producers in Ilu Aba Bora Zone of Oromia Regional State, South Western Ethiopia, Global Veterinarian. 10 (5): 607-613.
Tolera A, Yami A and Alemu D (2012). Livestock feed resources in Ethiopia: Challenges, Opportunities and the need for transformation. Ethiopia Animal Feed Industry Association, Addis Ababa, Ethiopia.
USAID (United States Agency for International Development) (2009). USAID country health statistical report. USAID, Addis Ababa, Ethiopia.
Workneh A and JR (2004). Design and execution and analysis of livestock breed survey in Oromiya regional state, Ethiopia. OADIS (Oromia Agricultural Bureau), Addis Ababa, Ethiopia and ILRI (International Livestock Research Institute), Nairobi, Kenya. pp: 260.
Yisehak K, Taye T and Aynalem H (2013). Characteristics and determinants of livestock production in Jimma Zone/Southwestern Ethiopia, Afr. J. of Basic & Applied Sciences. 5 (2): 69-81.
Zewdie W (2015). Assessment of livestock production system and feed resources availability at Melka Watershed of Nile Basin, Jeldu district, Western Ethiopia. Global Journals Inc. (USA) Online ISSN: 2249-4626.