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Assessment of Livestock Feed Resource and Effect of Supplementing Sweet Potato Vine Hay on Growth Performance and Feed Intake of Grazing Local Goats in Aleta Chuko District, Sidama Zone SNNPRS, Ethiopia

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Abstract— *Through a diagnostic survey and feeding trials (Aleta Chuko Woreda, SNNPRS), availability of common feed resources and effect of sweet potato vine hay (SPVH) and concentrate (50%wheat bran +50% noug cake) supplementation to local bucks on growth performance were assessed at farmers' management levels. Out of 150 households (HHs) interviewed it was found that natural pasture, crop residues, fodder tree and industrial by products are main feed resources; livestock are mainly kept for milk production and income but small ruminants only for income and average livestock holding per HH was 6.69 TLU. Yearling bucks (16.9 ± 3.21 kg) were assigned into four treatment diets in a RCBD design. One animal from each of four treatment diets were given to each of four farmers selected. Bucks were grazing natural pasture from 8:00 to 17:00h and supplemented with 88g concentrate (T1), 88g concentrate + 171.2 g SPVH (T2), 88g concentrate +316.9 g SPVH (T3) and 88g concentrate + 461.3 g SPVH (T4) on DM basis. Goats under T2, T3 and T4 consumed higher ($p < 0.001$) total DM than those of T1. The DM (88, 259, 405 and 549), OM (75, 217, 335 and 455), CP (23, 49, 72 and 91), NDF (37, 97, 148 and 199) and ADF (20, 58, 90 and 122) intakes and daily weight gain (32, 48, 58 and 69g/head/d) increased ($P < 0.05$) with increasing level of supplementation of SPVH (T1, T2, T3 and T4, respectively). It can be concluded that supplementing bucks up to 461gDM/head/d SPVH gave highest growth rate.*

Keywords— Feed resource, Growth rate, Feed intake, Sweet Potato Vine Hay

I. INTRODUCTION

Ethiopia's livestock population is believed to be the largest in Africa. However, the contribution of the sector at either the macro or micro level is below its potential. The performance of animals is poor because of different factors of which feed shortage is a major one. Sweet potato is mostly cultivated in the south, southeast and east of Ethiopia (EARO, 2009). Sweet potato vines and damaged roots(unfit for human consumption) can serve as valuable feed of farm animals(Adugna,2008).However, the availability of the vines is for a very short period, usually concentrated during root harvesting times and the leaves can be shattered within few days. Valérie *et al*. 2011) also reported that sweet potato vines could perish within 2 or 3 days of harvest. Therefore, conservation of this biomass (vines) as hay and/ or silage could be the possible solution. Feed conservation could be one possible solution for copping feed shortage during dry season and hence, improving animal productivity. However, feed conservation is not common in most parts of Ethiopia (Adugna, 2008) and this aggravates feed shortage and thereby reduces animal productivity during the dry season. In the study area potential of feed resource availability are not studied and sweet potato are produced dominantly next to enset. However, the importance of this crop as animal feed and its preservation techniques are not well known.

This research was conducted with the objectives to assess availability and types of livestock feed resources and to evaluate the effect of supplementing sweet potato vine hay on *in vitro* digestibility, feed intake and weight of local grazing goats in Aleta Chuko district, Sidama Zone, South Ethiopia.

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II. MATERIALS AND METHODS

Description of the study area

The survey and the feeding trial were carried out at farm level in one of the kebeles near to Chuko town called Chuko lamala kebele. The district is located at distance of 330 km in the south from Addis Ababa. Total land area is about 32,328 hectares, at an altitude of 1000-2300 m. a. s. l. and it has 26 rural kebeles. Annual rain fall range between 1100mm-1400mm and it has two agro ecology kola and woinadega. Most of the kebele are found in the kola climatic zone and average temperature range between15-28^{0}C (Aleta Chuko Agricultural Office, 2011).

Diagnostic survey on feed resources availability

Sampling procedure for survey

Aleta chuko woreda Agricultural office crop production department classified 26 kebeles as practicing crop production. The classified groups were 4 kebeles under "coffee and enset producing area with no sweet potato plantation due to land limitation, 16 kebeles under "Maize, teff and khat producing area which also engaged in sweet potato plantation because of land availability", 6 kebele under "all crop production" but less sweet potato plantation due to land shortage". Accordingly, 1 kebele from coffee and enset producing area, 3 kebeles from maize, teff and khat producing area and 1 kebele from all crop production kebeles totally five kebeles were randomly selected. From each kebele, 30 (5*30=150) households were randomly selected for interview.

Data collection during survey

Primary data such as household characteristics, land holding, land use pattern, means of income, herd size, livestock species composition, purpose of livestock keeping, available feed resources and seasonal availability, concentrate availability, utilization of sweet potato vine as animal feed, preservation techniques and livestock production constraint were collected using pre-tested questionnaire. Secondary data, like distance, boundary, altitude, temperature, agro ecology and total area of the woreda were collected from the woreda Agricultural office.

Experimental feeds preparation

The source of grass was the rented private grazing land. The actual area of grazing land was 100m by 80m. This area was sub divided in to 4 horizontal equal parts and 4 threads were stretched horizontally. On the threads 4 point at equal distance were marked and sample were from each marked point by using quadrant (0.5m * 0.5m) and the samples were mixed properly from which sufficient amount sample was taken in to Hawassa University Animal Nutrition Laboratory. The first cut of the sample was conducted (03/01/2013) before grazing and the 2nd cut was conducted (19/04/2013) after grazing. Sweet potato vine was purchased from farmers after the tubers were collected for human consumption and sun dried for 2-3 days on the ground by using locally available materials (plastic). The sun dried vine was stored under shade. Wheat bran and nuge seed cake was purchased from market. The vine hay was chopped approximately in to 5 to 7 cm before offering to the animals.

Feeding trial

Experimental design and treatments

Twenty yearling Arsi Bale goats with average initial body weight of 16.9 kg±0.82 (mean ±SE) were purchased from local markets. Four households having goat keeping experience and utilization of sweet potato to their animals were selected purposely. The goats were adapted to the pen and area of selected farmers for two weeks before experiment was started. During adaptation period, they were treated against external and internal parasites with acaricide (stalidon) and anthelminthic (albendazole 300 mg), respectively. The experiment was conducted in a randomized complete block design with four treatments. The goats were blocked based on their initial body weight in to four blocks of five goats, and each animal within each block was randomly assigned to one of the four dietary treatments. A household received goats of one block so that a given household will have all treatments. The four dietary treatments were: T1 = Grazing + 100g concentrate, T2 = Grazing + 100g concentrate + 200g SPV hay, T3 = Grazing + 100g concentrate + 400g SPV hay, T4 = Grazing + 100g concentrate + 600g SPV hay. All supplements presented here were on as fed basis. Concentrates were made of 50% wheat bran and 50% noug seed cake.

Animal management

Goats were allowed 14 days of adaptation to experimental diet, and the actual data collection lasted for 84 days. Concentrate and SPV hay supplements were offered separately, twice a day in equal portion at 8:00 am before they were let for grazing and afternoon at 5:00 pm up on their return from grazing. Goats had free access to clean water and mineral salt. The amount of supplements offer and refusal was recorded daily to estimate intake. Representative sample of feed offered and refusal of each animal were collected daily over the experimental period and 10% of the feed offered and refusal was sub sampled after mixing for proximate analysis. Every two weeks in the morning (before feed was given to goats) during the feeding trial the animals were weighed individually and weight of each goat were recorded. The DM and nutrient intake of

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experimental animals were calculated as the difference between feed offered and refused.

***In vitro* digestibility trial**

Samples of the sweet potato vine hay, grass, wheat bran and noug seed cake were taken and allowed to oven dry at 60^{o}C for 48hrs and ground to pass through a 2mm sieve. The *in-vitro* true digestibility was determined using the ANKOM Technology.

Chemical analysis

Dry matter (DM) content of sweet potato vine hay, grass, wheat bran and noug seed cake were determined by oven drying the samples at 105^{o}C for overnight (12 hours). Sample of feed offered and refusal were ground to pass through a 1-mm sieve. The total Nitrogen (N) was determined by the Kjeldahl method and Crude protein (CP) was calculated as N x 6.25. The ash content of the samples was determined by complete burning of the samples in a muffle furnace at 500 ± 50 ^{o} C for 3 hours (AOAC, 1990). The neutral detergent fiber (NDF), acid detergent fiber (ADF) and acid detergent lignin (ADL) was determined using the detergent extraction method developed by using an ANKOM 2000 fiber analyzer.

Data management and statistical analysis

For the survey data, descriptive statistics was employed to describe the various variables in the livestock production system. The data was analyzed statistically using SPSS soft ware, version 16. Experimental data on feed intake and weight gain were subjected to analysis of variance (ANOVA) using the General Linear Model (GLM) procedure in SPSS version 16 and SAS. Duncan pair-wise comparisons were used to determine the differences (statistical significance) between treatments means at 5% level of significance. The model used for data analysis was: $Y_{ij} = u + T_i + B_i + e_{ij}$, where: Y_{ij} is the response variable, u is the overall mean, Ti is the treatment effect, Bi is the block effect and eij is the random error.

III. RESULTS

Household characteristics in the study area

Out of the total respondents, the majority was male and the overall mean age of respondents was 44.9±0.94 (mean ±SE) years. The family size of respondents above fifteen years was 3.69±0.12 years and respondents below fifteen years were about 2.94±0.15 years.

Land holding and land use pattern

The majority of the land owned was allocated for crop production followed by fallow land and grazing/pasture. The average, land holding in the area was 0.83 ha (Table 1).

Table 1. Mean value of total land holding (hectare) and purpose of land use in Aleta Chuko Wored

Land holding and land use	N	Mean	SE	Minimum	Maximum
Total land holding	150	0.83	0.04	0.00	2.30
Crop production	150	0.75	0.35	0.10	2.00
Fallow lad	150	0.01	0.00	0.00	0.20
Private grazing land	150	0.07	0.01	0.00	0.90

N=number of respondents and SE=standard error

Livestock production and reasons for keeping livestock

The livestock holding per household is given in Tables 2. Cattle, sheep, goat, horse, donkey and chicken rearing are common in the area. The total livestock population accounts 4.88 TLU.

Table 2. mean value of livestock population in Aleta Chuko Woreda

variables(N=150)	Mean(SE)	Mean (TLU)
Cow	1.71 (0.13)	1.37
Oxen	0.31 (0.07)	0.25
Heifers	1.24 (0.06)	0.99
Calves	1.49 (0.05)	1.19
Sheep	2.52 (0.23)	0.25
Goat	2.28 (0.12)	0.23
Chicken	5.29 (0.2)	0.11
Donkey	0.56 (0.07	0.28
Horse	0.03 (0.06)	0.21
Total Livestock	15.4	4.88

TLU=Tropical livestock unit, N = number of respondent, SE = standard error

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Farmers keep livestock for many reasons; the major reasons are the source of milk, meat, manure, cash and a form of savings. In the study area, cattle are kept mainly for milk and meat; goat and sheep are mainly kept as a means of meat and savings; chicken are kept mainly for cash, egg production and same times for meat. Besides these major reasons, some respondents used livestock as a source of manure for fertilizer.

Constraint of livestock production

There are several constraints of livestock production in the area. Feed shortage, livestock diseases, low productivities, water scarcity, lack of modern technology and predators in descending order were the main constraints.

Chemical composition and *in vitro* dry matter digestibility of feeds

The chemical composition and *in vitro* dry matter digestibility (IVDMD) of the experimental feeds used are indicated in Table 4. The CP content of noug seed cake (NSC) was higher compared with other feeds. Wheat bran used in this experiment had similar CP content with SPV hay. The NDF content of wheat bran was higher than both NSC and SPV hay but NC had lower NDF than SPV hay. Similarly, ADF content of SPV hay was higher than wheat bran but lower than that of NSC. In vitro dry matter digestibility of SPV hay was higher than wheat bran but noug seed cake was the least.

Major livestock feed resource and feeding system

The availability of feed resources in the study area is shown in Tables 3. The least in the order of importance as feed resources in the area was hay because in the area there is no experience of hay making. The respondents reported that there were agro-industrial by-products are available on local market.

Table 3. Feed resources calculated from ranking results of respondents of Aleta Chuko Woreda.

	Ranks					
Variable (N=150)	1st	2nd	3rd	4th	5th	Index
Natural pasture	90	40	10	10	0	0.293
Crop residue	60	80	10	0	0	0.289
Hay	0	30	70	30	20	0.182
Fodder tree	0	0	30	60	60	0.120
AIBP	0	0	30	50	70	0.116

*N= number of respondents; AIBP= Agro-industrial by-product; Index: sum of single feed resource ranked (5*first ranked feed resource) + (4* second ranked feed resource) + (3* third ranked feed resource) + (2* fourth ranked feed resource) + (1* fifth ranked feed resource)/Sum of all weighted feed resource mentioned by the respondents*

Table 4. Chemical composition (%DM, unless specified) and in vitro dry matter digestibility of experimental feed

	Experimental feed				
	SPV hay				
Variables	Offer	Refusal	WB	NSC	WB+NSC
DM (%)	93.10	94.20	92.46	94.30	93.50
OM	82.50	84.12	84.82	86.71	85.32
CP	15.20	13.20	17.01	33.5	26.31
NDF	35.30	37.50	52.17	32.01	41.65
ADF	22.12	23.20	17.25	28.16	23.21
ADL	8.89	9.50	---	----	------
IVDMD	83.06	82.70	81.03	78.06	79.60

SPV= sweet potato vine, WB= wheat bran, NC= noug seed cake, IVDMD = in vitro dry matter digestibility, DM=dry matter, OM=organic matter, CP=crude protein, NDF=neutral detergent fiber, ADF=acid detergent fiber and ADL=acid detergent lignin.

Utilization of sweet potato as livestock feed

Most of the respondents use sweet potato vine as livestock feed. 74.7% of the respondents use sweet potato vine as animal feed as fresh, 25.3% offer as wilted and none of the respondents gave as dried. According to the respondents, there was no conservation practice this is because of lack of knowledge regarding method of conservation practices and its importance. Farmers cultivate sweet potato in back yard

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system mainly for human consumption on small plots of land mostly planted in June, July and September and harvested in October and November.

Feed intake and body weight change

Feed intake of grazing goats fed different levels of sweet potato vine hay is presented in Table 5. The SPV hay DM, OM, CP, NDF and ADL intake increased (P<0.05) with increasing level of SPV hay.

Table.5: Intake of supplements (concentrate + SPVH) to grazing goats (g/day)

	Treatment				
Total intake	T1	T2	T3	T4	SE
DM	88	259^{a}	405^{b}	549^{c}	1.50
OM	75	217^{a}	337^{b}	455^{c}	1.26
CP	23	49^{a}	72^{b}	91^{c}	0.19
NDF	37	97^{a}	148^{b}	199^{c}	0.56
ADF	20	58^{a}	90^{b}	122^{c}	0.35

SPV=sweet potato vine, T2=88 g concentrate +171.2 g SPV hay, T3= 88 g concentrate + 342.4 g SPV hay, T4= 88 g concentrate + 513.6 g, DM=dry matter, OM=organic matter, CP=crude protein, NDF=neutral detergent fiber and ADF=acid detergent fiber. Mean with different superscript letters are significantly different (p<0.05)

Weight gain of goats fed different level of sweet potato vine hay is presented in Table6. The average daily gain for T4 was higher (P<0.05) than goats in T1 and T2. The weight gain for T3 and T4 were similar (P>0.05).

Throughout the experimental period performance of the control group was significantly (P<0.05) lower than that of the other groups (Fig. 1) which indicates that increasing the level of sweet potato vine hay in the diet positively affected the total weight gain.

Table.6: Weight gain and blood chemistry of grazing goats fed different levels of sweet potato vine hay

	Treatment					
Parameter	T1	T2	T3	T4	SE	P
Initial weight (kg)	16.9	16.9	16.9	16.8	0.80	NS
Final weight (kg)	19.6^{b}	20.9^{ab}	21.8^{ab}	22.6^{a}	0.78	***
Weight gain (kg)	27^{c}	4.0^{b}	4.9^{ab}	5.8^{a}	0.38	***
Weight gain (g/d)	32^{c}	48^{b}	58^{ab}	69^{a}	4.37	***
Urea (mg/dl)	-33.5	26.9	29.5	34.7	28.0	
Creatinine (mg/dl)	1.6	1.1	1.1	1.6	0.4	
Alkaline phosphatase (u/l)	318	210	397	332	3.7	
Serum glutamine pyruvate transaminae (u/l)	36.4	37.8	34.4	29.9	3.4	
Serum glutamine oxaloacetate transaminae (u/l)	125	114	109	101	20	

Wt = weight, T1=grazing + 88 g concentrate, T2=88 g concentrate +171.2 g SPV hay, T3= 88g concentrate + 342.4 g SPV hay, T4= 88 g concentrate + 513.6 g on DM basis, SE= Standard Error and NS= non significant. Means with different superscript letters are significantly different (p<0.05)

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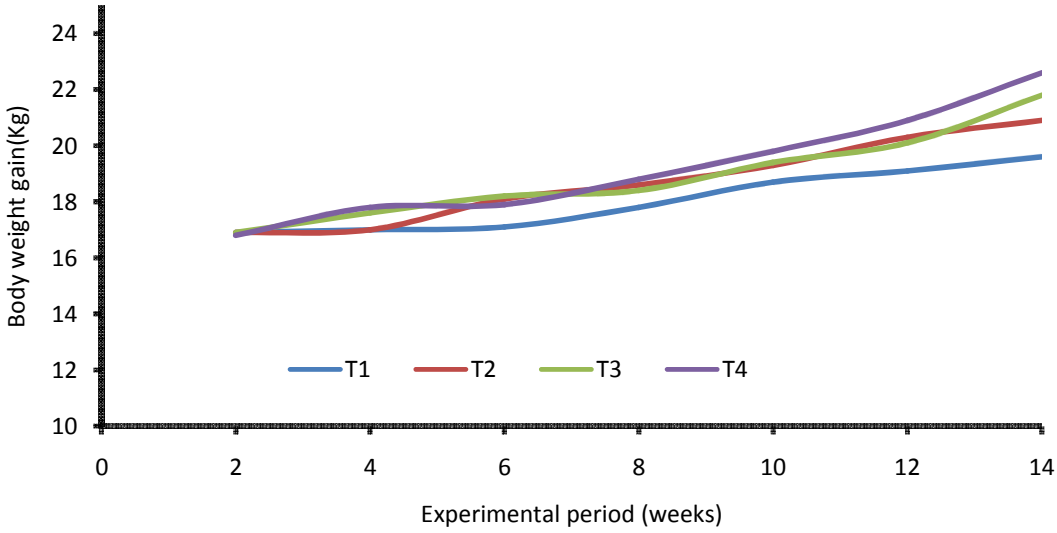

Fig.1: Trend of weekly weight gain of grazing goats fed different levels of SPV hay

IV. DISCUSSION

Household characteristics in the study area

The mean age of respondents in the study area were higher than that reported (39.31) by Endeshaw (2007) in Dale Woreda, Sidama Zone, but it was similar (43.03) with Belete (2009) in Goma District of Jimma Zone, Western Ethiopia. The average family size of the households of the current study was higher than average values at the national (5.2) and SNNPR (5.1) levels (CACC, 2003). The possible reason might be due to its accessibility to international road, cash crop area, and shortage of land availability. However, it is lower than 7.5 persons per household which was reported by Endeshaw (2007). The family size of respondents above fifteen years was less than the value (2.63) reported by Belete (2009).

Land holding and land use pattern

The average land holding of the study area is within the range of 1.01 to 2.00 ha for about 30.8% of farmers in the SNNPR and for 33.3% of farmers at the national level (CACC, 2003).Moreover, average land holding per household was similar (0.74 hectare) with Abera (2012) in Shebedino Woreda, Sidama Zone, but lower than (1.27 hectare) that reported by Endeshaw (2007) and (1.9 hectare) Belete (2009). This may be related to population increase and area of cash crop. It is evident that land holding per household is declining as human population in the area is increasing. Land use for crop production was lower than the values (0.8, 1.11 ha) reported by Belete (2009) and Endeshaw (2007), respectively but similar (0.68 hectare) with that reported by Abera (2012). Farmers allocate most of their land to crop production. Land for grazing is given less emphasis in the areas mentioned by the above authors which is also the same in the present.

Livestock production and reasons for keeping livestock

All the categories of livestock species shown in this study were similar with Abera (2012) and Endeshaw (2007) but species composition varies depending up on the type of area of the study. The total livestock population in the area was less comparable with the result (4.44 TLU) reported by Endeshaw (2007) in moist woyina dega, but lower than moist kola. Abera (2012) reported total livestock population of 3.4 TLU which was lower than in this study.

Farmers keep livestock for many reasons in the area. The major reasons were source of milk, meat, manure, cash and a form of savings similar with the report of Belete (2009) and Endeshaw (2007). According to Abera (2012) the majority of the respondent keeps cattle mainly for milk, meat and saving which is comparable with current the study and farmers also use cattle manure as source of fertilizer. Farmers with no cattle reared goats and sheep for the purpose of using their manure for fertilizer because enset particularly at its early stage require high amount of manure (Endeshaw, 2007). In the coffee and enset growing area, traditionally farmers decompose manure and kitchen wastes by depositing on the back yards. After a long period of decomposition they used the compost for back yard vegetables, enset and coffee as organic source of fertilizer. According to Endeshaw (2007) the community members strongly stressed that goats, sheep and chicken can be easily sold in the nearby markets whenever there is an urgent need

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for cash. Hence they protect cattle from being sold for minor problems which agree with finding of the present.

Major livestock feed resource and feeding system

Natural pasture was primary source of feed to animals in the area which agrees with reports of Ayantunde et al. (2005). According to Alemayehu (2005), livestock are fed entirely on natural pasture and crop residues at present in the country. Moreover, crop residue was the most commonly utilized feed resource in district next to natural pasture. The result of present study is almost similar with that reported by the above authors. Grazing was the predominant form of ruminant feeding which was in agreement with reports of Solomon (2000). However, the least in the order of importance as feed resources in the area were hay which is similar with Abera (2012) and Alemayehu (2005) because in the area there is no experience of hay making. In support of this study, Sisay (2006) reported that feeding of agro-industrial by-products is prioritized based on the productive potential of animals. The respondents reported that there were agro-industrial by-products like, noug cake and wheat bran which is available on local market. Even though there was limited accessibility of agro industrial by-products in the area, respondents supply agro-industrial by-products to their animals.

Utilization of sweet potato as livestock feed

Most of the farmer in the study area used SPV as livestock feed. Similarly Adugna and said (1992) reported that in wolaita, most of the farmers utilize sweet potato vine, enset and cassava during the dry season. Moreover, Dinku (2012) and Abera (2012) also reported that farmers utilized SPV as animal feed. Cows are most favored to feed with sweet potato vine which may relate with the great demand for milk. Generally, the harvesting time of sweet potato overlap with the time of feed shortage. This also helps to overcome the major livestock constraint of feed shortage by providing the vine while human being uses the tuber.

Constraint of livestock production

Feed shortage, livestock diseases, low productivities, water scarcity and predators in descending order were the main constraints. Similarly, Abera (2012) reported that the main constraints were feed shortage, livestock diseases, low productivities, water scarcity and predators. Moreover, feed shortage, diseases and parasites, animal management, genotype and genetics and socio-economic and institutional constraints are the main problems in sheep and goat production in the country (EARO, 2003). In support of this study, constraints of feed shortage in both seasons (dry and wet) limits productivity of small ruminants for Goma district of Jima zone, Western Ethiopia (Belete, 2009). Also Duressa (2007) reported that feed shortage is the most determining factors of livestock production in Adame Tullu Jiddo Kombolcha district of Oromia National Regional state. In addition, Asrat (2009) reported that animal diseases, shortage of grazing land, shortage of feed resources as well as inadequate veterinary services are the major constraints of livestock production in Dawuro zone Mareka woreda of SNNPRS.

Chemical composition and *in vitro* dry matter digestibility of feeds

The crude protein (CP) content of sweet potato vine hay in this study was higher than the range (6.8-13.1%) reported by Larbi et al. (2007) for plant harvested after 20 weeks of planting. In addition, the CP content of SPV hay in this study was higher than the values (13.9%, 6.53%) reported by Gebreegziabher (2013) and Tadesse et al. (2013), respectively. However, the CP content in the current study is lower than the values (19.44%, 16%) reported by Nambi et al. (2001) and Netsanet (2006), respectively. This may be due to differences in variety and management practices as well as soil fertility of the areas.

The CP content of the wheat bran that used in this trial was similar with the value (17.2%) reported by Getnet *et al.* (2000), but lower than that reported by Asnakew (2005) and Simret (2005), (19.6%, 20.1%) respectively. This may be due to various factors like soil type, variety and other environmental factors which affect the chemical composition of feeds. The CP content of noug seed cake is also lower than the result (35.5%) reported by Kebede et al (2008). The current study of neutral detergent fiber (NDF) content of SPV hay was lower than the values (40.5%, 39%) reported by Gebreegziabher (2013) and Aregheore (2003) but similar to the value (35.04%) reported by Netsanet (2006). Acid detergent fiber (ADF) and acid detergent lignin (ADL) contents of sweet potato vine hay in the current report is higher compared to the values (20.3% ADF and 6.8% ADL, respectively) reported by Aregheore (2003),but lower than that reported (30.5 and 10.2%) by Gebreegziabher (2013).The *in vitro* dry matter digestibility of sweet potato vine hay was higher than the results (79.3% and 80.9%) reported by Abera (2012) and Dinku (2012), but comparable with the result (82.2%) reported by Gebreegziabher (2013).

Feed intake and body weight change

Animals in all the treatment groups consumed almost all concentrate feed supplement that was offered to them. Intake of the DM and OM of sweet potato vine hay in this study increased with increasing level of supplementation

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which was similar to the report by Abera (2012) and Dinku (2012).

Tadesse et al. (2013) reported that decreased CP intake with increasing proportion of sweet potato vine supplementation is not consistent with this study. This may be due to the higher CP content of SPV in this study than the above authors which may increase intake or the amount of concentrate used. As Dinku (2012) and Abera (2012) reported CP, NDF, ADF and ADL intake increased with increasing level of supplementation of SPV which is comparable with this study.

The goats supplemented with SPV hay had better average daily weight gain than the non-supplemented ones. The better daily weight gain in the supplemented goats could be due to the higher intake of DM and CP (Table 6) when compared with the non supplemented goats. The result is consistent with the result reported by Aregheore (2003) in goats fed batiki grass and SPV in different proportion. Even if the weight gain of the non supplemented goats is low, there was body weight gain. This may be due to the equal amount of concentrate supplementation to treatments. The average daily weight gain of bucks fed supplemented diets were comparable to the results (60.9, 59.52 g/day) obtained by Kebede et al. (2008) in feeding different proportion of Sweet Potato Vine and Sesbania Gradflora foliage in the diet of browsing Arsi-Bale goats supplemented with fresh SPV as a substitute for concentrate mix. Likewise, the average daily weight gain of T4 is consistent with the value reported by Dai (2008) in sheep supplemented with vine to root ratio of 25:75% and the average daily weight gain of T2 was comparable with the result reported by Netsanet (2006) for goats fed 25% sweet potato with concentrate. However, average daily weight gain of this study was lower than the gain (72.38, 86.19 g/day) reported by Dinku (2012) and Abera (2012) for sheep supplemented with 102.36 g DM and 400 g fresh SPV, respectively. The low daily gain in the current experiment may be due to low CP and high NDF and ADF content of the sweet potato vine hay offered to the experimental animals. Moreover, the quality of grass might be low compared with that of Dinku (2012) and Abera (2012) which could have contributed to gain lower weight. In addition, supplementing Borana weaned calves with 500 g/head/day of sweet potato vines improved growth equivalent to that of calves fed 200 g cotton seed cake/head/day (Karachi, 1988). In general, the supplemented goats had better live weight gain, which could be attributed to the high intakes. This is in line with the fact that supplements result in improved animal performance in several ways, such as by providing essential nutrient for rumen microorganism, enhancing the microbial activities in the rumen and providing nutrients (Tolera and Sundstøl, 2000).

V. CONCLUSION

According to the survey the main feed resources for livestock in the area were natural pasture, crop residue; fodder tree and industrial by product such as wheat bran and noug seed cake and feed shortage was the main problem for livestock production, especially during the dry season. There is a culture of feeding sweet potato vine (SPV) in the area, but not widely adapted and there was no practice of making hay and other conservation technique. When given sweet potato vine hay as a supplemental feed to growing goats best performance was observed from the non supplemented group. Thus proper supplementation with feeds that can be grown on the farm such as SPV would be one way of enhancing the productivity and economic contribution of animals fed poor quality roughage on small holder mixed farms. The harvesting time of sweet potato overlap with the time of feed shortage. The vine was available only during a short period, so farmers need to conserve the vines as silage and hay as a solution to provide sweet potato vine as forage to livestock all year round.

It can thus be concluded that up to 549g DM SPV hay supplementation improves intake, growth rate and income and can be recommended for buck feeding.

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