Original Research Article

Assessment of Major Sheep Feed Types, Feeding System and its Nutritional Quality Evaluation, Arsi Zone, Oromia Region, Ethiopia

ABSTRACT

The aim of this study was to assess the major sheep feed types, feeding system and its nutritional quality evaluation in Arsi Zone, Oromia Region, Ethiopia. A total of 100 households (hh) were taken from each district. For laboratory work, feed sample were collected from ten randomly selected farmers from each peasant association and nutrition composition like Dry matte, crude protein, Ash, Neutral detergent fiber, Acid detergent fiber, Acid detergent lignin, Invitro dry matter digestibility, Digestibility of organic dry materwere tested and Metabolizable Energy was calculated. The field survey data were analyzed using SPSS and SAS software used for nutritional composition test. The Pearson Chi-Square and Tukey HSD test was used to determine mean differences at ($p < .05$). The results of the field survey revealed that, the major feed resources available in both districts comprised of natural pasture (82%) followed by crop residue (25%) and Free grazing is the common feeding system in both districts. The overall mean of, Dry matter, Ash, crude protein, Neutral detergent fiber, Acid detergent fiber, Acid detergent lignin, Invitro dry matter digestibility, Digestibility of organic dry mater and Metabolizable Energy content of natural grasses were 89.5%, 5.9%, 68.5%, 68.5%, 37.1%, 4.9%, 55.5%, 43.8% and 7.4 KJ/kgDM, respectively. The corresponding values for barley straw were also 90.9%, 5.4%, 5.4%, 70.7%, 54.8%, 9.6% and 8.2 KJ/kgDM for Dry matter, Ash, Crude protein, Neutral detergent fiber, Acid detergent fiber, Acid detergent lignin and Metabolizable energy respectively. Significant ($p < .05$).) difference was seen on Ash and Digestibility of organic dry mater content in natural pasture between two districts and there was no significant difference on other composition It was concluded that, natural pasture and barley straw are the main sheep feed in area. Further studies are needed to see other feed resource and test nutritional composition.

***Keywords**: Barley straw, Feeding system, Natural grass, Nutritional quality, Sheep*

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1. INTRODUCTION

Ethiopia has the largest livestock population in Africa with estimated number of 64 million cattle, 40 million sheep, 51 million goats, 8 million camels and 49 million chickens (CSA, 2020). A study of Kadi, (2022)

indicated that the livestock sector in Ethiopia contributes about 47% to the Agricultural Gross Domestic Product (AGDP), including monetary values and the non-marketed services (traction and manure).At the household (hh) level, livestock plays a significant role as sources of food and family income for smallholder farmers and pastoralists. Small ruminants are among the major economically important livestock species in Ethiopia playing an important role in the livelihood of resource-poor farmers. They are the integral part of livestock keeping in Sub-Saharan Africa (SSA) that are mainly kept for immediate cash sources, milk, meat, wool, manure and saving or risk distribution. Among the small ruminant, sheep are the second most important species of livestock in Ethiopia that are dominantly found in the crop-livestock production system and contribute up to 63% of the net cash income derived from the livestock production(Admasu *et al*., 2017, Bimrew *et al*., 2010, *Ayalew et al.,* 2013, Bayissa *et al*., 2022, Bediyeand feyisa, 2006 and Belay *et al*., 2013).

Mixed crop livestock production practice is a common production system of Ethiopia in different agro ecological conditions which depends on indigenous breeds of small ruminants with low level of production and productivity. Feed is among the major factor that determines the production potential of animals. In mixed farming system, use of crop residues is mainly important for livestock feeding and soil mulching. In the Ethiopian highlands where crop-livestock systems are prevalent, the contribution of straw to the total dry matter (DM) fed to livestock ranges from 10% to70% (Admasu *et al*., 2017).

Small ruminant feed resources in Ethiopia are mainly grazing on communal natural pasture, crop stubble, fallow grazing, road side grazing, crop residues, browses, and non-conventional feeds (hh food leftovers, weeds, crop tillers and fillers), improved forages and crop residues. The contribution and quality of these feed resources is however, depends up on agro-ecology, types of crop produced, accessibility and production system. Crop residue supply roughly 50-80% of the total resources of ruminant livestock feed in the mixed cereal-dominated crop and livestock production system that varies with agro ecology, crop variety and production potential. Barley is a major food crop in the highland areas of Ethiopia with associated production of 1 metric ton of the grain is accompanied by 1.2 metric tons of straw. Ruminant animals have the ability to utilize barley straw since the ruminal microbes have the ability to ferment the cell walls (Amare, 2006).

Arsi zone is known by having a huge sheep population of 1.66 million heads Asmare *et al.,* (2010), and main feed source of the natural pasture and crop residue of barley straw. However, the nutritional composition of available feeds in the study district has not yet been investigated. Therefore, the aim of this study was to assess the major sheep feed types, feeding system and evaluation of nutritional quality of the common feed assessed.

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2. MATERIALS AND METHODS

2.1. Description of the study area

The study was conducted in Tiyo and Digelunatijo districts Fig.1. Tiyo is a district in central Ethiopia, located in Arsi Zone of Oromia Region at about 175 kilometers south east of Addis Ababa. Asella is the town found at 6°59' to 8°49' N latitude and 38°41' to 40°44' E longitude at altitude ranges of 2500 to 3000 meters above sea level (m.a.s.l). It has a subtropical highland climate of the warmest month of the year in April with an average temperature of 16.6°C and the coldest in December (13.5°C). The average temperature of Digelunatijo is 15.1°C and is a district in Sagure town of Arsi Zone.

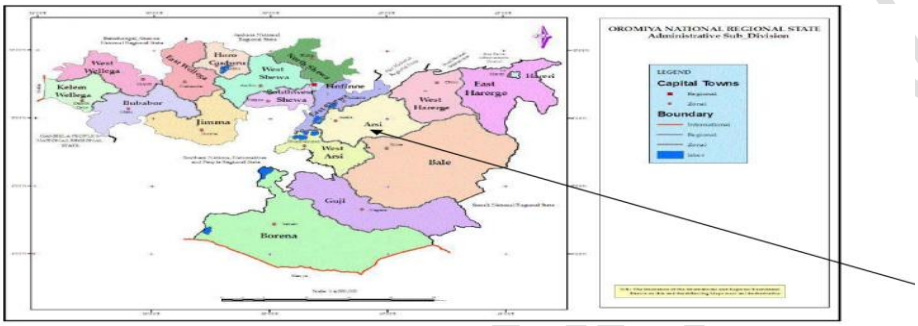

Fig. 1: Map of the study area (Source: BFED, 2008)

2.2. Survey on Sheep Feed and Feeding System in the Study Area

The two districts, Tiyo and Digelunatijo, were purposively selected from Arsi Zone based on sheep population potential. Three Peasant Associations (PAs) (Dosha, Burka Chilalo and Bilalo) from Tiyo; and Saguremole, Sagure 01 and AshebekaWalkite from Digelunatijo districts were randomly selected. A total of 100 hhs respondents were selected from each district. The sample sizes were determined by using the formula recommended by Ashra (2007) for formal survey studies as follows: $N = 0.25/SE^2 = 100$

Where, N=sample size; SE= standard error, assuming the standard error of 5% at a precision level of 0.05 and the confidence interval of 95%.

The assessments were conducted using structured questionnaire. The questionnaires were pretested before the actual data collection started. The data collected were includes the socio-economic characters of the hh, the common sheep feed types and the feeding system were assessed.

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2.3. Laboratory Analysis of Sampled Feed

The major feed resources of farmers' high priority regarding their relative abundance and importance as sheep feed based on information obtained during the interview were sampled for quality test. Representative samples of natural pasture and barley straw were collected in October 2022 from both districts. To determine the nutritional quality (chemical composition) of common feeds in the study areas, samples of natural pasture and barley straw were collected from 60 randomly selected farmers (10 from each PA), combined, dried properly under shade, packed individually and sent to Holeta Agricultural Research Center's laboratory to test dry mater (DM), crude protein (CP), total ash, neutral detergent fibers (NDF), acid detergent fiber (ADF), acid detergent lignin (ADL), *in vitro* DM digestibility (IVDMD), Digestible Organic Matter in Dry Matter (DOMDM) and metabolizable energy (ME) of natural pasture and barley straw were tested.

2.4. Statistical Analysis

Data analyses were carried out using SPSS software for the survey work. Descriptive statistics of mean and percentage were used to present the results. Chemical compositions data for both feed types were subjected to analysis of variance using a General Linear Model procedure of statistical analysis system (SAS) version 9.1 (SAS, 2002). The Pearson's chi squire and Tukey was used to determine mean differences at $P<0.05$. Agro ecology was considered as predictor variables and natural pasture and barley straw nutritive values and DM yield were considered as response variables.

The statistical model used in the survey part can be expressed as:

$Y_i = X_i\beta + \varepsilon_i$

Where, Y_i is the decision vector, X_i is a vector of explanatory variables derived from hh surveys at β of corresponding regression coefficient and ε_i is the error term.

The statistical model used for nutritional quality was:

$Y_{ij}k = \mu + e_{ij}k,$

Where Y is the response variable, μ is the overall mean, $e_{ij}k$ is the random residual error assumed to be normally and independently distributed.

3. RESULTS AND DISCUSSION

3.1. Common sheep breed, Purpose of Keeping Sheep and sheep holding characteristic in Sampled Households in the Study Districts

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According to the respondents, sheep were kept for different purpose Table 1. All the respondents 100% in Digelunatijo and majority 67% in Tiyo used sheep as source of cash income, while the remaining 33% in Tiyo rear to slaughter during different festival and holydays. There is a significance (*P*< .05), difference between the study districts on purpose of sheep keeping. On the other hand, large number 61% in Tiyo and 64% in Digelunatijo of the hh interviewed have 11-12 sheep in number and 20% in Tiyo and 31% in Digelunatijo have <10 sheep. The remaining 19% in Tiyo and 5% in Digelunatijo have >20 head of sheep. Significance (*P*< .05)differences were seen on average number of sheep per hh between the study districts. As it is indicated in table 1 below, all hh interviewed were rear Arsi Bale Sheep breed.

Large number 61% in Tiyo and 64% in Digelunatijo of the hh interviewed have 11-12 sheep in number and 20% in Tiyo and 31% in Digelunatijohave <10 sheep. The remaining 9% in Tiyo and 5% in Digelunatijo have >20 head of sheep. In the present findings, majority of the hhs' interviewed were use sheep as source of cash income while a few of them rear to slaughter during festivals and holydays. This finding is in agreement with different reports Endale (2015)and Dhaba *et al*., (2012), that showed 78.9% of the respondents keep small ruminants for home consumption while 80% and 93% of the hhs responded sheep for income generation that conducted in Meta-Robi and Ilu-Abba-Bora areas, Ethiopia, respectively. Additionally, in agreement with the current study Tesfaye (2008) reported farmers that rear sheep mainly for income source 66.4% and both meat and cash 30.4% and for home consumption only 3.2% that was in western Harerghe,

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Table 1:Mean sheep holding and Purpose of keeping sheep in sampled households of the districts

Parameters	Districts				X^2	Sig.
	Tiyo	**Digelunatijo**	**Over all**			
Sheep breed	N	N	N	%		
Arsi Bale	100	100	200	100		
Other	0	0	0	0		
Total	100	100	200	100		
Number of sheep per hh	**N**	**N**	**N**		**10.60**	**0.01**
<10	20	31	51	25.50		

11-20	61	64	125	62.50		
>20	19	5	24	12		
Total	100	100	200	100		
Purpose of keeping	**N**	**N**	**N**		**39.50**	**0.00**
Use as source of cash income	67	100	167 (%)	83.50		
To be slaughtered	33	0	33 (%)	16.50		
Sign of wealth	0	0	0			
Total	**100**	**100**	**200 (%)**	**100**		

Hh= households; N= sample size, Sig.= significance level

3.2. Feed Resources and Sheep Feeding System

The major feed sources for sheep in the two districts are summarized below in Fig. 2.Natural pasture, crop residue (mainly barley straw), crop aftermath and others are the major feed sources in both the study areas. Among these feed resources, natural pasture contributes the largest proportion 53% in Tiyo and 55% in Digelunatijo which is followed by crop residue 30% and 33% in Tiyo and digelunatijo, respectively. Number of hhs use both natural pasture and crop residues are 16% in Tiyo and 10% in Digelunatijo, respectively. Only very few of hhs 1% in Tiyo and 2% use other feed resource like Atella and food left over. No farmers under interview prepare hay for their sheep and also there was no improved forage introduced in both the study sites.

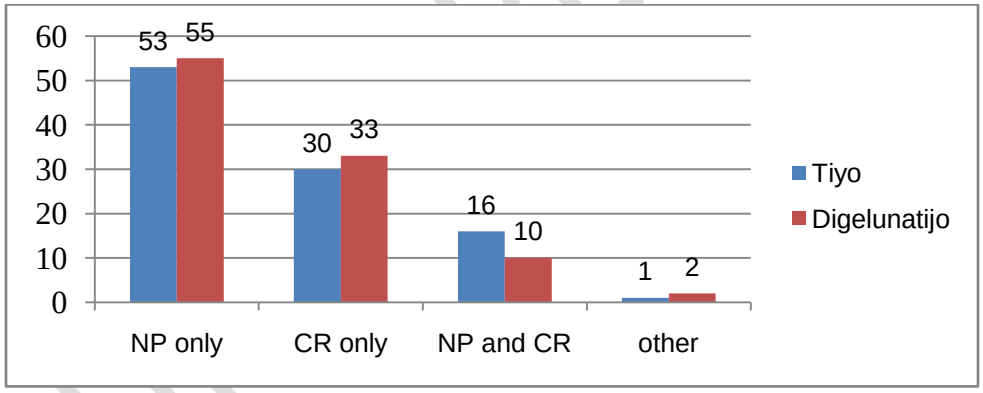

Fig. 2: The major feed resources for sheep in the study area NP= Natural Pasture, CR= Crop residue

In the present study, shortage of feed is the major problem raised by all the respondents in both districts. All respondents in both districts mention as they face scarcity of feed during the dry season. This result is similar with the reports of different researchers (Bimrew, 2023; Adugna, 2007; Fetsum*et al*., 2009; Firew and Getnet, 2010) which were done in other parts of the country. Many authors described the seasonal

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feed shortages, both in quality and quantity, and the associated reduction in livestock productivity in different parts of the (Tsedeke, 2007, Getahun, 2008;Yeshitila, 2008).

Natural pasture and barley straw were the main sheep feed sources in the study districts. Results of Endale (2015)), also indicate that, the major feed resources in West Shoa of Meta-Robi district were natural pasture grazing 58.9%, crop residues of wheat straw, barley straw, Atella and crop aftermath. Similarly, (Lemma *et al*., 2002; Alemayehu, 2003; Tolera *et al*., 2012) explain the feed resources in most highlands of Ethiopia was comprised of all these. The results of (Kiflay*et al*, 2019) also indicated that natural pasture, crop residue, crop aftermath, hay, *atella* (by product from traditional brew) and concentrates (soybean meal and molasses) are the major feed sources in selected district of Tigray region. Significant number of hhs 75% in Tiyo and 84% in Digelunatijo, use free grazing system and 23% and 9% in Tiyo and Digelunatijo respectively use semi grazing and indoor feeding system and the remaining 2% in Tiyo and 7% in Digelunatijo use indoor feeding system.

3.3. Common Sheep production and Farming Systems in the Study Districts

Sheep production system is mostly 68%in Tiyo and 82% in Digelunatijo is the traditional production system (free grazing only) which is followed by partially modern (free grazing plus concentrate supplementation) 29% and 22% in Tiyo and Digelunatijo, respectively). Number of farmers follow modern (install feeding only) sheep production system in the area is very few 3% in Tiyo and 7% in Digelunatijo. There is no significance ($P > .05$), between the two districts on sheep farming system (Table 2).

Mixed crop-livestock production system is the dominant farming system in the study areas. Significant numbers 98.5% of the interviewed hhs were follow mixed crop-livestock production systems and only very few of them 1.5% were follow crop production only.This result was in agreement with the work of Keflay*et al*. (2019), who reported that mixed crop-livestock production system is the dominant farming system in the different selected zone of Tigray region. On the other hand, Frehiwot (2014),reported in the highland part of Ethiopia where the most dominant production systems were crop production only. Traditional sheep production system is the dominant production system in both districts of the present study. According to Matawork*et al.* (2017)), in central highland of Ethiopia, sheep depend mostly on grazing of fallow land, over grazed natural pasture and crop residue with no extra supplements and receive minimum health care which go hand in hand with this study.

Large number 75% in Tiyo and 84% in Digelunatijo use free grazing system followed by semi grazing 23% and 9% and indoor feeding 2% and 7% system in Tiyo and digelunatijo respectively. Similarly, reports ofEndale (2015), which was done in West Shoa Zone showed that majority of the hhs let their animal to free grazing. Teshager*et al*. (2013) also reported that the feeding system practiced in Ilu-Aba-

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Bora Zone was predominantly free-grazing system. In Jeldu district, about 94.5%, 4.4% and 1.1% of the respondents practiced let to graze, cut and carry and tethering, respectively (Bedasa, 2012).

Table 2. Sheep production and farming systems in the study area

	Tiyo	Digelunatijo	Total		X^2	Sig.
Production system	**N**	**N**	**N**	**%**	2.90	0.22
Traditional	68	72	140	**70**		
Partially modern	29	21	50	25		
Modern	3	7	10	5		
Total	**100**	**100**	**200**	**100**	3.00	0.25
Farming system	**N**	**N**	**N**	**Total**		
Mixed farming syste	98	99	197	98.50		
Crop production only	2	1	3	1.50		
Total	**100**	**100**	**200**	**100**		

N= sample size, Sig.: significance

Significant number of hhs75% in Tiyo and 84% in Digelunatijo, respectively use free grazing system and the remaining of them were use semi grazing and indoor feeding system (Fig.3).

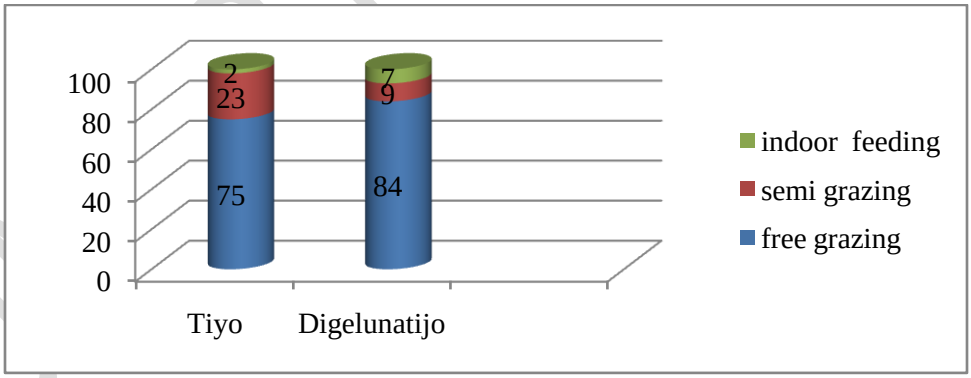

Fig. 3: Common sheep feeding system in the study areas

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Table 3: Chemical composition of natural pasture and barley straw in the two districts

District	Chemical composition of natural pasture								
	DM%	Ash%	CP%	NDF%	ADF%	ADL%	IVDMD%	IVOMD%	ME (KJ/kg DM
Tiyo	88.90	6.10[b]	21[a]	67.40	37.80	5.20	56.60	45.90[b]	7.30
Digelu/Tijo	90.20	4.60[a]	14.30[b]	69.70	36.50	4.80	55.00	41.60[a]	7.50
Average	89.50	5.90	68.50	68.50	37.10	4.90	55.50	43.50	7.40
CV (%)	4.60	10.90	7	4.40	2.40	2.40	4	1.30	12.30
District	**Chemical composition of barley straw**								
	DM%		Ash%	CP%	NDF%		ADF%	ADL%	ME (KJ/kg DM
Tiyo	90.90		5.40	6.50[a]	71.00		50.30[a]	10.00	8.60
Digelunatijo	90.90		5.80	4.20[b]	70.30		57.80[b]	9.10	7.90
Average	90.90		5.40	5.36	70.70		54.80	9.60	8.20
CV (%)	2.60		15.70	7.90	4.30		6.90	17.60	9.90

Means with different letter in the same column are significantly P<0.05) different; ADF: acid detergent fiber; ADL: acid detergent lignin; CV: coefficient of variation; CP: crude protein; DM: dry matter; NDF: neutral detergent fiber; IVDMD: In vitro dry matter digestibility; IVOMD: In vitro organic matter digestibility; ME: metabolizable energy.

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3.4. Nutritional Quality of Natural Pasture and Barley Straw

Beside feed evaluation in terms of biomass yield, determination of the potential of forages is important in estimating its nutritive values. Chemical composition is one of the approaches used by researchers to determine nutritive values of feeds. Table 3 shows nutrient content of natural pasture in Tiyo and Digelunatijo district.

3.4.1. Chemical Composition and Nutritive Values of natural pasture

Natural pasture was reported as the most important source of feed in the study area and results were presented in Table 3. The present results revealed that the mean DM content of the natural pasture was 86.9% in Tiyo and 90.2% in Digelunatijo districts and revealed a non-significant differences (*P*> .05), The ash content were also 6.1% and 4.6%, respectively for Tiyo and Digelunatijo districts and showed a significant differences (*P*< .05). The CP contents were 21.0% and 14.3% in Tiyo and Digelunatijo districts, respectively; and the mean NDF contents were 67.4% and 69.7% in Tiyo and Digelunatijo, respectively with no (*P*> .05). differences between the districts. The ADF content of the natural pasture was 37.8% and 36.5% in Tiyo and Digelunatijo districts, respectively and were not showed a difference (*P*< .05)between the districts. The ADL content of the natural pasture in Tiyo and Digelunatijo districts were 4.4% and 5.2%, respectively and was not different (*P*> .05).

The ME content of feed is 7.3 and 7.5 (kJ/kg DM) in Tiyo and Digelunatijo districts, respectively revealed a non-significant (*P*> .05), differences between the districts. The two districts were significantly different (*P*< .05).in terms of IVOMD with composition of 45.9% in Tiyo and 41.6% in Digelunatijo districts. The mean IVDMD of the natural pasture was 55% in Tijo and 56.6% in Digelunatijo districts (Table 3).

Natural pasture was reported as the most important source of feed in the study area. The results revealed that the mean DM content of the natural pasture was 86.9% in Tiyo and 90.2% in Digelunatijo. This result is in agreement with Sisay (2006) who reported DM content of natural pasture ranging from 92.9 to 94.1% in northern Gondar Zone. Zewdie (2010) andTamene *et al*. (2022)also reported natural pasture DM content ranging from 91 to 92.4% in central Rift Valley of Ethiopia and in Haru district, Ethiopia respectively. However, the DM content of natural pasture of the present is higher than the result of Gashu*et al*. (2017) and Andualem*et al*. (2015) who reported DM values ranging from 35.17% to 44.97% in chire district, southern Ethiopia and Essera District Southern Ethiopia, respectively.

The ash content of natural pasture in the present study districts showed a significant (P<0.05) differences. These results are not in agreement with that of Habtamu *et al*. (2013), and who reported the ash content of natural pasture was ranged from 12.5%–16.7%. The CP content of native grasses in the present study

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is higher than the minimum level of 7% for animals in the tropics (Van Soest, 1994;Mlay *et al*., 2006). This result is contrary to finding of Gashu*et al.,* (2017),who report natural grass CP contents of 10 to 9.62% in Gasera and Ginnir, respectively, and Andualem*et al*. (2015)and Deribe *et al*. (2013)who reported natural grass CP content of 3.67–4.25 % and 8.38 % in Essera District Southern Ethiopia and southern Ethiopia, respectively. According toVan Soest (1994), feed with CP level less than 7% inhibit voluntary feed intake and declines the activity of microbial action, resulting in lower digestibility of roughages.

The mean NDF contents of natural grass were 67.4% and 69.7% in Tiyo and Digelunatijo, respectively with no (*P*> .05) differences between the districts. The NDF content reported in both districts of this study were more than 65% and can be categorized as medium in quality (Singh and Oosting, 1992). Besides, the ADF content of the natural pasture was 37.8% in Tiyo and 36.5% in Digelunatijo districts, respectively and it revealed a non-significant (*P*> .05) differences between the districts. The ADL content of the natural pasture in the study districts were 4.4% and 5.2%, respectively for Tiyo and Digelunatijo. Lignin is completely indigestible and forms lignin-cellulose/hemicelluloses complexes (due to physical encrustation of the plant fiber and making it unavailable to microbial enzymes (McDonald *et al*., 1995). However, the lignin contents of feeds in this study were lower than the maximum level of 7% that limits the DM intake and performances of animals.

3.4.2. Chemical Composition and Nutritive Values of Barley Straw

Barley straws were the main crop residue used in both district in study area. The chemical composition of barley straw is presented in Table3 above. The dry matter (DM) content of barley straw in the districts Tiyo and Digelunatijo was not different (*P*> .05) and 90.9%. The Ash content of barley straw was 5.4% in Tiyo and 5.4% in Digelunatijo and did not showed (*P*> .05)differences between the districts. Similarly, the NDF contents of 71% and 70.3%, respectively for the districts Tiyo and Digelunatijo also showed no differences (*P*> .05). However, the CP content of barley straw was 6.5% and 4.2%, respectively for Tiyo and Digelunatijo districts and were showed a significant (*P*< .05), differences in between. In the current study, barley straw had ADF contents of 50.3% in Tiyo and 57.8in Digelunatijodistricts and there was a significance (*P*< .05), differences in ADF contents of crop residues between the districts. The crop residues in the study areas had lignin contents of 10% and 9.1% in Tiyo and Digelunatijo, respectively and there is no significance (*P*< .05), difference on lignin content of barley straw between the two districts. The ME content of barley straw is 8.6 kJ/kg DM in Tiyo and 7.9 kJ/kg DM in Digelunatijo districts with no differences (*P*> .05)

The DM content of barley straw was 90.9% in Tiyo and 90.9% in Digelunatijo districts and showed no significant (P>0.05) differences between the districts. The DM content of barley straw in the current study is lower than that of the national average value of 91.9% that reported by Adugna (2007). However, the

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current report was in agreement with that ofTamene *et al*. (2022), Zewdie (2010) and Girma *et al*. (2014), who reported the DM content of crop residues higher than 90%, 93.6% and 91.7%, respectively. The NDF content of barley straw was 71% in Tiyo and 70.3% in Digelunatijo districts and showed no difference (*P*> .05).

The NDF content of roughage feeds with less than 45% is categorized as a high quality feed and 45–65% as medium quality feed(Singh and Oosting, 1992). Based on these categories, the NDF content of barley straw in this study was high. NDF content of feeds above 55% was reported to limit the DM intake of ruminants (VanSoest, 1982). Similar with the current result, Solomon *et al.* (2010),reported for a study in Sinana sub-district of Bale highland that all the crop residues had higher (70%) NDF content. The CP content of barley straw in the present study districts showed significance (P<0.05) difference and was higher than the findings of Wonchesa*etal.* (2018), who reported 2.63% CP in barley straw. However, it was similar with the findings of Tamene *et al.* (2022), who reported 4.86% CP of barley straw. The value of CP content of barley straw found in the present study is below the minimum level required for normal rumen microbial physiology (VanSoest, 1982). In the current study, barley straw had the highest ADF contents of 50.3% in Tiyo and 57.8in Digelunatijodistrict, which was in line with results from in the south-west Shoa zone. However, compared to crop residues in the Tanqua-Abergelle districtDesta, D., *et al. (*2013) barley straw in the present study had the highest ADF contents.

The crop residues in the study areas had lignin contents 10% and 9.1% in Tiyo and Digelunatijo, respectively. Which were almost equivalent to 10.4% Alemu (2023) in East Gojjam. However, the lignin content of barley in the current study was greater than the lignin content of the barley straw in the Tanqua-Abergelle region, which ranged from 5.6 to 6.6%Silasie, (2013) in North west of Ethiopia. According toBewket and Teferi (2019), lignin is the single most important factor in limiting feed intake, the rate of organic matter fermentation, the number of microbial cells produced per unit of fermented organic matter, and the proportion of propionate to acetate in the products of fermentation. The energy content of barley straw was 8.6 MJ/kgDM in Tiyo and 7.9 MJ/kgDM in Digelunatijo with no significance difference (P>0.05) between the districts. The energy contents of barley straw in this study were within the range reported by Seyoum and Fekede (2018), in West Shewa zone of Ethiopia.

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4. CONCLUSION AND RECOMMENDATION

The results indicated that the major feed resources in the study areas were natural pasture, crop residues and crop aftermath. Most of hh interviewed were use free grazing which is followed by semi-grazing feeding system. Number of hhs that practice indoor feeding system were very few. Natural pasture in the study areas were composed of a huge DM yield and the CP content of natural pasture was found to be above the critical level (7% CP) that required for maintenance, optimum rumen function and feed intake. The structural constituents (NDF, ADF and ADL) were optimum and natural pasture in both districts was categorized asmedium in quality. The barley straw was also found to have low contents of CP which is an important nutrition for animals. It also has significant quantities of NDF which might influence the feed intake and animal performances. So, improving qualities of barley straw in order to maximize feed intake is important. Studies should be conducted on identification and contribution of important natural grass and other feed for sheep feeding during different seasons in the area.

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