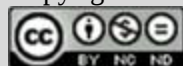


**Original Article****Evaluating Nutritional Values of Selected Grass Species in Chaffe area, Hawassa, Ethiopia****Maticha Korato¹  and Teramaj Abebe² **¹Department of Animal Science, Bonga University, Ethiopia²Department of Animal Science, Mekdela Amba University, Ethiopia**Abstract**

This study was conducted to evaluate nutritive value of grass species in Chaffe communally grazing area. According to the focus group discussion, three grass species (*Pennisetum clandestinum*, *Chloris gayana* and *Cynedem dactylon*) were selected for chemical composition evaluation due to their preference for animals in this area. The variables recorded were dry matter (DM), ash, crude protein (CP), neutral detergent fiber (NDF), acid detergent fiber (ADF), and acid detergent lignin (ADL). Data on these values were subjected to the general linear model (GLM) procedure of SAS statistical package and used Tukey test means comparison procedure to separate difference among species. As seen from this study, DM values were 95.09%, 94.23% and 95.11% for *Pennisetum clandestinum*, *Chloris gayana*, and *Cynedem dactylon*, respectively and showed no variation among species ($p > 0.05$). Current finding indicated 16.34%, 12.40% and 12.56% ash percentage for *Pennisetum clandestinum*, *Chloris gayana* and *Cynedem dactylon*, respectively and seen variation ($p < 0.05$) among species. It was also seen from current finding that CP values obtained 13.03%, 9.21% and 8.01% for *Pennisetum clandestinum*, *Chloris gayana* and *Cynedem dactylon*, respectively were significantly different ($p < 0.05$) among three grass species. Similarly, fiber contents (NDF 57.23%, 66.06% and 62.34% for *Pennisetum clandestinum*, *Chloris gayana* and *Cynedem dactylon*, respectively; ADF 26.33%, 32.27% and 33.41% for *Pennisetum clandestinum*, *Chloris gayana* and *Cynedem dactylon*, respectively and ADL 4.43%, 6.18% and 6.32% for *Pennisetum clandestinum*, *Chloris gayana* and *Cynedem dactylon*, respectively) indicated significant variation ($p < 0.05$) among grass species. However, *Pennisetum clandestinum* showed better quality among selected three grass species; according to standard the present study revealed high levels of detergent fibers for all three selected native grasses used mainly as forage for livestock in this area. So, this indicates need of improved forage and supplementary feed for livestock reared in this area to obtain better production for farmers from their animals.

Keywords: Ash, DM, CP, fiber content, Grass species, Chaffe, Hawassa**Corresponding Author:** Maticha Korato < matichakorato2008@gmail.com >**Cite this Article:** Korato, M., and Abebe, T. (2020). Evaluating Nutritional Values of Selected Grass Species in Chaffe area, Hawassa, Ethiopia. *Global Journal of Animal Scientific Research*, 8(2), 37-43.Retrieved from <http://www.gjasr.com/index.php/GJASR/article/view/44>**Article History:** Received: 2020-06-15 Accepted: 2020-08-06

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INTRODUCTION

As a major source of animal feeds in developing countries of Africa, fodder trees and shrubs are highly valued by farmers (Luseba and Vander, 2006). They play a significant role in arid areas where moisture is inadequate (Eshete, 2002). Pastoralists depend heavily on woody plants for multiple uses (Teshome *et al.*, 2012). These forage species contain appreciable amounts of nutrients that are deficient in other feed resources such as grasses during dry periods. They have deep root systems enabling the extraction of water and nutrients from deep in the soil profile (Terefe *et al.*, 2008). Most browse plants have high crude protein content, ranging from 10 to more than 25% on a dry matter basis (Moleele, 1998). This reliable protein resource can be used to develop sustainable feeding system and increase livestock productivity (Chepape *et al.*, 2011).

In Ethiopia, livestock feed resources include natural pasture, crop residue, improved pasture and forages, agro-industrial by-products, other by-products like food and vegetable refusal, of which the first two contribute the largest share (Alemayehu and Sissay, 2003). Natural pastures are naturally occurring grasses, legumes, herbs, shrubs and tree foliage that are used as animal feed (Adugna, 2007). These natural pastures which cover the largest portion of animal feed is characterized by seasonal fluctuation in total dry matter (DM) production and nutritional quality as a result of the distinct seasonal variation in plant growth, in relation to the annual rainfall pattern. The size of natural pasture in the country is severely decreasing as a result of expansion of cropping land, urbanization and industrial development, all of which results in proportional decrease in grazing land (Alemayehu, 2006). But in Ethiopia, most pasturelands have been suffered by encroachment of crop production as consequence of the growing human population (Alemayehu, 1997). Thus, the pastures are practically those available only on steep slopes, field margins and roadsides (Ali, 2004). Consequently, the livestock are forced to concentrate on very limited pastureland. This resulted in overgrazing, which in turn leads to invasion by unpalatable plant species and finally a decline in the quality and quantity of pasture.

However, the population of livestock of Ethiopia is believed to be the largest in Africa, inadequacy of feed in terms of quality and quantity is considered to be critical among the constraints of livestock in the country (Alemayehu, 2006; Adugna, 2012). In certain areas where improved forage crops have been introduced, farmers failed to utilize them at the optimum developmental stages, which would ensure an appropriate balance between quality and quantity to satisfy livestock requirements and support reasonable animal production (Taye, 2004). Forage resources quality evaluation that ensure nutritive values are, therefore, one of the important measures that have to be done to identify their nutritive values for livestock grazing on them.

Knowing chemical composition will give information to species composition and quality of pasture (Birnin-Yauri *et al.*, 2012). Knowledge on quality of pasture is also important as it affects the fibrolytic activity of rumen microorganisms which may be restricted when ruminant animals feed on poor quality forage (Fondevila *et al.*, 1995). Palatability of forage may also be determined when the chemical composition is known because factors that relate to plants' palatability include chemical composition. Therefore, the present study was designed to investigate nutritive value of grasses collected from communally grazing area of Chaffe, Hawassa, Ethiopia.

MATERIALS AND METHODS

Description of the study area

This study was conducted in Chaffe area which belongs to Tula sub city in Hawassa, in the Ethiopian Rift Valley at latitude of 7° 17'N and longitude of 38° 72'E. It is located 275km south of Addis Ababa with an elevation of 1750 m.a.s.l. The area is characterized by moist to

sub-humid, warm subtropical climate with an average temperature of 15–20°C. Annual precipitation ranges from 1000 to 1800 mm in a bimodal distribution pattern (Dessie, 2007).

Group discussion

There was a group discussion with community members that was made to collect information on the types of grass species and their composition. These community members are people who live in study area and have adequate knowledge about forages found in this area. The selection was done together with extension workers in the Kebele. During the focus group discussions, the available grass species were listed and ranked according to animal preference and availability as livestock feed in the study area. As ranked during focus group discussions, the predominant grass species in the area were three (*Pennisetum clandestinum*, *Chloris gayana* and *Cynodon dactylon*).

Sampling procedure

Followed by focus group discussion, the above three predominant grasses species were selected. The samples of these grasses were taken during rainy season at blooming stage of grasses, since at this stage grasses reach good stand for harvesting (Crowder and Chheda, 1982). The samples were three for each grass species and they were taken randomly by using quadrat of 0.5m×0.5m from the diagonal of 10 meter difference for each of the species by cutting at approximately 2 cm above the ground (Mannetje, 1978). These samples were immediately weighed by sensitive balance on the field and placed in paper bags then taken to Animal Nutrition Laboratory, Hawassa University College of Agriculture for chemical analysis.

Chemical analysis

The sample of each grass species was dried partially in an oven at 60°C for 48 hrs. The partially dried samples were ground to pass through a 1mm screen at the laboratory. Then the ground samples were dried in an oven at 105°C overnight to determine percent dry weight before any analytical procedures. All the samples were kept in airtight containers before chemical analysis. The dry matter (DM), ash and crude protein (CP) of individual grass species were determined using the standard procedures of (AOAC, 1990). Acid detergent fiber (ADF) and neutral detergent fiber (NDF) in each grass species samples were determined using the method of Van Soest *et al.* (1991). Acid detergent lignin (ADL) was determined by solubilization of cellulose with H₂SO₄. Finally, all results were calculated on a DM basis.

Data analysis

The data was first summarized using descriptive statistics for the whole samples. Data on nutritional values were subjected to the general linear model (GLM) procedure of SAS (2014) statistical package. Tukey test means comparison procedures were used to separate difference among species. The following statistical model was used for data analysis.

$$Y_{ij} = m + L_j + e_{ij},$$

Where

Y_{ij} = chemical composition of grasses

m = overall mean

L_j = the effect of j th species

e_{ij} = random error

RESULTS AND DISCUSSION

Chemical composition of grass species

Dry matter content

The DM content of the selected grasses from grazing land in study area showed no significant ($P > 0.05$) variation. The overall mean DM content of the samples was 94.81%, with values ranging from 94.23% for *Chloris gayana* to 95.11% for *Cynedem dactylon*. The overall mean of current study was similar with reported 94.8% for natural pasture from grazing land of Bale Zone in Ethiopia (Gashaw and Defar, 2017)

Total ash content

The ash content of the selected grasses from grazing land in study area showed significant ($P < 0.05$) variation. The mean ash content of selected three grass samples was 13.43%, with value of 16.34% for *Pennisetum clandestinum* showing significantly higher ash content than *Cynedem dactylon* (12.56%) and *Chloris gayana* (12.40%). This higher content of ash for *Pennisetum clandestinum* indicate presence of higher mineral contents of this grass than the rest two grasses in the study area. Therefore, *Pennisetum clandestinum* may satisfy mineral requirement of the animals grazing in this study area than *Cynedem dactylon* and *Chloris gayana*. Overall ash content obtained from present study is higher than Gashaw and Defar (2017) reported 10.99% and 9.89 for natural pasture from grazing land in Gasera and Ginnir districts respectively, in Bale Zone of Ethiopia.

Crude protein content

Grasses sampled from communally grazing land for current study were significantly ($p < 0.05$) varied in CP contents. Among sampled three grass species, *Pennisetum clandestinum* had higher CP value than *Chloris gayana* and *Cynedem dactylon*. The higher mean CP content of *Pennisetum clandestinum* grass indicates high nitrogen content of this grass than the rest two sampled grasses in the study area. The overall mean CP contents of grasses (13.43%) observed in the present study areas is comparable with (12.1 %) CP of forage reported (Zinash and Seyoum, 1991) and 13.1 % reported from Sinana district (Solomon 2008). However, it is higher than previously reported CP value of 5.03- 8.07 for natural pasture from Menesibu district of western Ethiopia (Diriba *et al.*, 2012), and 8.96% and 8.10% from Gasera and Ginnir districts respectively, (Gashaw and Defar, 2017). Similarly, Yihalem (2004) reported lower CP value than current from northern highlands of Ethiopia. In generally, feeds harvested from natural grass can support maintenance requirement of ruminants when CP content is above 7.2% (ARC, 1980). However, a minimum of 15% CP is required for lactation and growth of ruminants (Norton, 1982) and hence the entire grass species in the study area are below the requirement for production indicating the need for supplementary feed for animal reared in this study area.

Neutral detergent fiber content

Neutral detergent fiber (NDF) consists of the slowly digested hemicellulose and cellulose as well as indigestible lignin in the plant. Its estimate is important in ruminant nutrition to estimate feed intake and predict the susceptibility of the cattle fed the diet to stomach upset. From present study, neutral detergent fiber indicated significant difference ($p < 0.05$) among three selected grass species that could be resulted due to difference in species. It was ranged from 57.23 to 66.06% for selected grass species in the study area. As indicated current study, *Chloris gayana* and *Cynedem dactylon* had higher NDF content than *Pennisetum clandestinum* in the study area. Mean present NDF contents of grasses are lower when compared to the previous reports (above 70%) for natural pasture of central highlands of Ethiopia (Seyoum *et al.*, 2001) and Gashaw and Defar (2017) from Bale Zone of Ethiopia.

Generally, according to Van Soest and Robertson (1985), NDF content above 55% was reported to limit DM intake. Hence NDF content of the grasses species in this study was above 55% and could affect feed intake, which directly limits productivity of animals.

Acid detergent fiber content

Acid detergent fiber (ADF) indicated significant difference ($p < 0.05$) among three selected grasses indicating difference in species. The mean ADF content was 26.33, 32.27 and 33.41 % for *Pennisetum clandestinum*, *Chloris gayana* and *Cynedem dactylon*, respectively the study area. Among selected three samples grass species *Chloris gayana* and *Cynedem dactylon* had higher ADF than *Pennisetum clandestinum*. ADF values for sampled three grass species were lower when compared with report of Yihalem (2004) that ranged from 39.97-52.23% for natural pastures from northern highlands of Ethiopia. Similarly, Gashaw and Defar (2017) reported higher mean ADF content 45.62% than obtained 30.33 overall mean from current study.

Acid detergent lignin content

Acid detergent lignin (ADL) indicated significant difference ($p < 0.05$) among three selected grass species. Accordingly, ADL content (6.32%) of *Cynedem dactylon* and (6.18%) of *Chloris gayana* were significantly higher than ADL content (4.43) of *Pennisetum clandestinum*. This difference could be resulted due to difference in species. Similar to current study, Gashaw and Defar (2017) reported mean ADL that ranges 5.65 to 7.82% for natural grass which is not far from current study. According to McDonald *et al.* (1995) if the pasture contains 5%, 80% of the fiber (cellulose and hemicellulose) may be digested but if it contains 10% lignin, the proportion of the fiber digested may be less than 60%. Thus, lignin contents of the *Pennisetum clandestinum* among three selected three grass species in this study area was low enough (below 5%) to limit DM intake. On the other hand, ADL of *Cynedem dactylon* and *Chloris gayana* foud between 5% and 10% so that this indicates proportion of the fiber digested to be above 60% but less than 80%.

Table 1: Mean nutritive values of the three selected grass species in the study area

Grass Spp	Variables					
	%DM	%Ash	CP	%NDF	%ADF	%ADL
<i>Pennisetum clandestinum</i>	95.09 ^a ±0.31	16.34 ^a ±0.03	13.03 ^a ±0.02	57.23 ^b ±0.01	26.33 ^b ±0.01	4.43 ^b ±0.01
<i>Chloris gayana</i>	94.23 ^a ±0.01	12.40 ^b ±0.04	9.21 ^b ±0.03	66.06 ^a ±0.01	32.27 ^a ±0.01	6.18 ^a ±0.02
<i>Cynedem dactylon</i>	95.11 ^a ±0.01	12.56 ^b ±0.01	8.01 ^b ±0.01	62.34 ^{ab} ±0.01	33.41 ^a ±0.01	6.32 ^a ±0.01
Overall mean	94.81 ±0.01	13.73 ±0.03	10.75±0.02`	61.88 ±0.01	30.66±0.01	5.31 ±0.01

CONCLUSION AND RECOMMENDATION

As chemical analysis indicated from current investigation, three species of grasses (*Pennisetum clandestinum*, *Chloris gayana* and *Cynedem dactylon*) selected from communally grazing land of the study area have shown significant difference ($p < 0.05$) among species in chemical composition except that DM showed no variation. Among the three selected grass species *Pennisetum clandestinum* had significantly higher ash and CP content than other two grass species. In case of fiber content (NDF, ADF and ADL) *Chloris gayana* and *Cynedem dactylon* had higher values than *Pennisetum clandestinum*. So, this made *Pennisetum clandestinum* to be better for mineral and protein content over other two selected grass species in this area. However, when compared with standard, all three present study grass species categorized as low quality that had high structural fiber levels as confirmed by

the laboratory analysis. From this it is suggested to introduce improved forage and provide supplementary feed for livestock reared in this area to ensure high productivity of animals.

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