International Journal of Innovation Scientific Research and Review
Vol. 04, Issue, 07, pp.3002-3007, July 2022
Available online at http://www.journalijisr.com
SJIF Impact Factor 4.95

ISSN: 2582-6131

Research Article

NUTRITIVE VALUE, NUTRIENTS DIGESTIBILITY AND PERFORMANCE OF DESERT LAMBS FED WITH ERAGROSTIS TREMULA IN NORTH KORDOFAN, SUDAN

[1,*] Salah Abdulgabar Salah Bukhari, [2] Alsamani Ali Mohammed Ali, [2] Randa AliHamad Mohammed, [1] Musa Ahmed Musa Tibin

[1]Department of Animal Production, Faculty of Natural Resources and Environmental Studies, University of Al Sallam, Al Fula Sudan.
[2]Department of Range and Forestry, Faculty of Natural Resources and Environmental Studies, University of Kordofan, Sudan.

Received 04th May 2022; Accepted 06th June 2022; Published online 20th July 2022

ABSTRACT

This study was conducted with objective elucidating the chemical composition, nutrients' digestibility of Eragrostistremula hay and lambs' performance. Fifteen of Desert lambs at the age of six months with an average weight of 17.500+ 0.250 kg were used. The animals were divided into three equal groups. The animals were vaccinated against diseases epidemic to the study area and drenched with abroad spectrum anthelmentics against internal and external parasites individually penned and were ear-tagged for identification during treatments. Ten days were allowed for adaptation for treatments and feed. The first group was fed Eragrostistremula while the second consumed the pasture natural and the third fed the groundnut haulms. Water was provided continuously. The initial weight was taken prior trial commencement and once weekly to the end of the experiment. Feed was weighed to determine the consumed amount daily. Eragrostistremula hay, NG and GNH were analyzed via proximate analysis as well as determination of in vitro and in vivo digestibility. The experiment was complete randomized design and the data were analyzed using the analysis of variance and the detection of differences among the means using least significant difference test (LSD). Feed intake was significantly ($P<0.05$) greater for the group on Eragrosticstremula (ET) than those on groundnut haulms, GH, or the natural grazing, NG. In vitro digestibility showed higher dry mater and organic matter digestibility coefficients for the GH followed by NG and lastly ET. In vivo organic matter digestibility showed the same trend. The body weight gain was greater for those animals on GH followed by animals on ET and lastly on NG. It was concluded that Eragrosticstremula had higher intake and lower digestibility coefficients and lower animal performance than GNH but better than NG when it is consumed alone. It was recommended that the plant be grown as field fodder crop for its short life of growth and greater amount of biomass produced and consumed. It is also recommended that it should be harvested at early stages and analyzed for nutritive value. Because of its greater consumption it is recommended that the hay be fed to lactating animals with suitable supplement be evaluated for performance.

Keywords: Natural pasture, lambs feeding, Eragrostistremula lamb performance.

INTRODUCTION

Sudan owns about 101 million heads of cattle, sheep, goats, and camels and a wide range of wildlife species. About 80% of the total livestock feeds requirements in Sudan which is estimated as 92.9 million tons in 2011and this amount is derived from rangelands. There numerous constraints to sustainable utilization of range land s as feed source in Sudan. The decrease in the area and production of rangelands and pasture in 2009 and 2011 as compared to the average of the period 1985–1993 amounts to about 33 and 50%, respectively. In addition, many of the valuable or highly palatable range plants species are endangered. The majority of the plant species of high nutritive value are still wild or cultivated on small scale. The chemical composition, their feed value and distribution are not assessed and recorded by. Sudanese Desert sheep are on the other hand of great importance. More than 65% of the sheep in Sudan are of the Sudan Desert type (Ovisaries) (MFEP, 1994). (Suliman*et al.,* 1990), which is believed to be a descendant of a sheep of Egyptianorigin (Ovislongipes). They are distributed north of latitude 108N, extending eastwardinto Eritrea and westward into Chad (Wilson, 1991) and are raised under rangelandconditions in the eastern and western regions of the country. Sudan Desert sheep are further classi¢ed into tribal subtypes, e.g. Hamari, Kabashi, Shenbali in North and West Kordofan States (Mukhtar, 1985), Shugor, Dubasi and Watish in the Central States (Suliman*et al.,* 1990) and Bourug in the Butana area of eastern Sudan. In recent years, the use of Sudan Desert sheep as an export commodity hasincreased. In 1991/92, it contributed about $60 million to the national foreignexchange earnings at an annual o¡take rate of 600 000 head (LMC, 1992). Kordofanregion is the major source of sheep for export, mostly of the Hamari and Kabashi subtypes. It holds about 4.63 million head (20%) of the national sheep £ock, concentrated mostly in the northern and western states. None the less, the productioncharacter is tics of Sudan Desert sheep under the rangeland conditions of NorthKordofan have not been studied in detail. This paper summarizes the seasonal trendsin some production characteristics of Sudan Desert sheep under two husbandrysystems in North Kordofan, Suda More than 65% of the sheep in Sudan are of the Sudan Desert type (Ovisaries) (Suliman*et al.,* 1990), which is believed to be a descendant of a sheep of Egyptianorigin (Ovislongipes). They are distributed north of latitude 108N, extending eastwardinto Eritrea and westward into Chad (Wilson, 1991) and are raised under rangelandconditions in the eastern and western regions of the country. Sudan Desert sheep are further classi¢ed into tribal subtypes, e.g. Hamari, Kabashi, Shenbali in North and West Kordofan States (Mukhtar, 1985), Shugor, Dubasi and Watish in the Central States (Suliman*et al.,* 1990) and Bourug in the Butana area of eastern Sudan.In recent years, the use of Sudan Desert sheep as an export commodity hasincreased. In 1991/92, it contributed about $60 million to the national foreignexchange earnings at an annual o¡take rate of 600000 head (LMC, 1992).Kordofanregion is the major

***Corresponding Author: Salah Abdulgabar Salah Bukhari,**
1Department of Animal Production, Faculty of Natural Resources and Environmental Studies, University of Al Sallam, Al Fula Sudan.

source of sheep for export, mostly of the Hamari and Kabashi subtypes. It holds about 4.63 million head (20%) of the national sheep £ock, concentrated mostly in the northern and western states. None the less, the productioncharacter is tics of Sudan Desert sheep under the rangeland conditions of NorthKordofan have not been studied in detail. This paper summarizes the seasonal trendsin someproduction characteristics of Sudan Desert sheep under two husbandrysystems in North Kordofan, Suda More than 65% of the sheep in Sudan are of the Sudan Desert type (Ovisaries) (Suliemane*t al.,* 1990), which is believed to be a descendant of a sheep of Egyptianorigin (Ovislongipes). They are distributed north of latitude 108N, extending eastward into Eritrea and westward into Chad (Wilson, 1991) and are raised under rangelandconditions in the eastern and western regions of the country. Sudan Desert sheep are further classi¢ed into tribal subtypes, e.g. Hamari, Kabashi, Shenbali in North and West Kordofan States (Mukhtar, 1985), Shugor, Dubasi and Watish in the Central States (Suliemane*t al.,* 1990) and Bourug in the Butana area of eastern Sudan.In recent years, the use of Sudan Desert she ep as an export commodity hasincreased. In 1991/92, it contributed about $60 million to the national foreignexchange earnings at an annual o¡take rate of 600000 head (LMC, 1992). Kordofanregion is the major source of sheep for export, mostly of the Hamari and Kabashi subtypes. It holds about 4.63 million head (20%) of the national sheep £ock, concentrated mostly in the northern and western states. None the less, the productioncharacter is tics of Sudan Desert sheep under the rangeland conditions of NorthKordofan have not been studied in detail. This paper summarizes the seasonal trendsin some production characteristics of Sudan Desert sheep under two husbandrysystems in North Kordofan, Suda More than 65% of the sheep in Sudan are of the Sudan Desert type (Ovisaries) (Suliemane*t al.,* 1990),which is believed to be a descendant of a sheep of Egyptianorigin (Ovislongipes). They are distributed north of latitude 108N, extending eastwardinto Eritrea and westward into Chad (Wilson, 1991) and are raised under rangelandconditions in the eastern and western regions of the country. Sudan Desert sheep are further classi¢ed into tribal subtypes, e.g. Hamari, Kabashi, Shenbali in North and West Kordofan States (Mukhtar, 1985), Shugor, Dubasi and Watish in the Central States (Suliemane*t al.,* 1990) and Bourug in the Butana area of eastern Sudan.In recent years, the use of Sudan Desert sheep as an export commodity hasincreased. In 1991/92, it contributed about $60 million to the national foreignexchange earnings at an annual o¡take rate of 600 000 head (LMC, 1992). Kordofanregion is the major source of sheep for export, mostly of the Hamari and Kabashi subtypes. It holds about 4.63 million head (20%) of the national sheep £ock, concentrated mostly in the northern and western states. None the less, the productioncharacter is tics of Sudan Desert sheep under the rangeland conditions of NorthKordofan have not been studied in detail. This paper summarizes the seasonal trendsin some production characteristics of Sudan Desert sheep under two husbandrysystems in North Kordofan, Suda The estimated Sudanese national sheep flock is 23.04 million head (MFEP, 1994).It has been classified on the basis of morphology and distribution into four main groups: Sudan Desert, Sudan Nilotic, Sudan Arid Upland and Sudan Equatorial Upland (El Hag *et al.,* 1998; El Hag *et al.,* 2001; Wilson, 1991). Fused ecotypes from non-systematic crossbreeding at the boundaries of the ecozones have also been recognized. More than 65% of the sheep in Sudan are of the Sudan Desert type (Ovisaries) (Suliemane*t al.,* 1990), which is believed to be a descendant of a sheep of Egyptian origin (Ovislongipes). They are distributed north of latitude 108N, extending eastward into Eritrea and westward into Chad (Wilson, 1991) and are raised under rangeland conditions in the eastern and western regions of the country. Sudan Desert sheep are further classified into tribal subtypes, e.g. Hamari, Kabashi, Shenbali in North and West Kordofan States (El Hag *et al.,* 2001), Shugor, Dubasi and Watish in the Central States (Suliemane*t al.,* 1990) and Bourug in the Butana area of eastern Sudan. In recent years, the use of Sudan Desert sheep as an export commodity has increased. In 1991/92, it contributed about $60 million to the national foreign exchange earnings at an annual intake rate of 600000 head Khatir and Jadalla, 2014). Kordofan region is the major source of sheep for export, mostly of the Hamari and Kabashi subtypes. It holds about 4.63 million head (20%) of the national sheep lock, concentrated mostly in the northern and western states. None the less, the production characteristics of Sudan Desert sheep under the rangeland conditions of North Kordofan have not been studied in detail. This paper summarizes the seasonal trends in some production characteristics of Sudan Desert sheep under two husbandry systems in North Kordofan, Sudan. There are many areas in the Sudan which characterized by their livestock dense population, being breeding sites. Livestock which accounted for 101 million head drive 80% of their feed from range land, crop residue and by product constitute about 8% while irrigated forages and concentrates account for the remaining 7.5%. (Suleiman and Ali,1988).

Objective of this study

The overall objective of the study is to assist in development of sustainable production systems based on available resources in the area.Specifically it is aimed at rmination of: The nutritive value of *Eragrostistremula* Nutrients Digestibility of *Eragrostistremula* Effects of feeding *Eragrostistremula* biomass of feed intake of lambs and lamb **p**erformance

MATERIALS AND METHODS

the study area

This study is conducted in the city of Elobeid, Sheikan locality in North Kordofan state Sudan. The state lies between the longitude (29-34, 30-30 East) and the latitudes (12-25, 13-30 North) with an area of 8080 km2. This City is the capital of Sheikan locality and North Kordofan State.

Regional geography

Sheikan is characterized by undulating plains, depressions; sand covered with hilly areas and some mountain clusters.

The climate

There are three climatic regions that cover North Kordofan State. These are dry, semi-arid dry and low rainfall savanna on sand areas. The long term average rain is between 250-400 mm. The maximum temperature is 40-42 mm and the minimum is 13°C. In the semi-arid region, rainfall is between 300-600mm and the maximum temperature is 39^0 Celsius.

Humidity

The humidity reaches 1175 during the dry season. In the autumn, the air humidity reaches 65-67% (Elobeid Meteorology Department office,1999).

Precipitation Patterns

Rain fall as sporadic showers in May and becomes regular from June to October. It usually heavier in July and reaches peak in August before declining in September to reach its lower pattern in October. Temperatures are modified by rain at this time though it is hot and humid in general. Temperature and precipitation drops from the

amount of evaporation in July and August and the highest rainfall recorded in 2010 was 620 mm (Sheikan locality, 2011).

Population activity

This city is also considered the largest market for gum Arabic, as primary and important market of livestock brought from different parts of western and Southern Sudan in a continuous movement of the presence of different types of animals. There are some food industries and Agro-industrial companies such as vegetable oil production and flour mills (local Sheikan 2011). Elobeid Petroleum Refinery is set at 10 km from the city center. In general this city is a main marketing city for the country. Rural areas are farming and livestock producing areas.

Vegetation of the Area

There are trees of Hashab (Acacia senegal), Marrekh (Bosciasenegalensis) and Seyal (Acacia tortilis) in the northern regions. Southern and central parts are covered with desert palm (Balanitesagyptiaca), Sidr (Ziziphusspinachristi), tebeldi (Adansoniadigitata) habeel (Combretumcordofanum), kitr (Acacia mellifera), ghobeesh (Quierasenegalensis), Haraz (Faiherbiaalbida), Arrad (Albizziaamara), Aradaib (Tamarindusindica) and many other trees and shrubs species of the zones indicated above. The under storey is dominantly covered with herbs such as Eragrostitstermula species (Fraisha), Zorniagleochidiata (lisaig), Cassia obtusiflora (Kawal), Cassia occidentals (Soreib), Amaranethesisflavicans (Lisaneltair), Blepharislinarrifolia(Beghail) and many others.Grasses dominant in this area Eragrostistremula (bino), Aristidapallida(gaw), Cenchrusbiflorus (Huskaneetkhashin) ,C. setigrus (HuskaneetNaeem) Pennisetumpedicellatum (Umdofofo), Sida alba (mugshasha) and others, (Khatir and Jadalla, 2014).

The Experimental Animals

Fifty (15) Desert sheep lambs are used in this study. The animals are divided into three similar groups each with five animals. Prior to commencement of treatments the animal are ear tagged and vaccinated against diseases endemic to the study area.One week is considered a preliminary adaptation period where the animals are to be adapted for feed and using internal and external anti-parasite treatments, the adaptation period is also necessary for removal of the effects of the feed previously taken. The animals are weighed at the beginning of trial, and once weekly until end the trial to monitor their weight change as effected by type of rations.

Estimation of nutrients digestibility

The lastten days were considered digestibility trial where canvas bag was attached to each lamb by harness to collect feces voided each day.the feces were dried under shade and composed on by was taken for chemical analysis the daily feed intake was the digestibility trial. dry matter,DM, organic matter, OM,crude protein cp. Crude fiber CP,ether extract EE and nitrogen free digestibility coefficients extract NFE were all determined by subtracting their amount feces the amount consumed for example.

100* DM consumed %DMD =DM consumed –DM feces

The experimental feed

The study is proposed to using three types of rations for three group of lambs (A,B .C),

Group (A) Natural pasture with different plant species
Group (B) is using Eragrostistremula hay.
Group (C) is using and sorghum straw

The plant biomass was analyzed using proximate analysis according to procedure described by AOAC,(2000) and forage fiber analysis as described by (Van Soest,1967). and minerals using flame photometer, in vitro dry matter digestibility as outlined by Telly and Terrie (1967), in vivo digestibility according to McDonald et al., 2002 . Total digestible nutrient (TDN) was calculated using the following formula:

TDN Kg/100Kg DM= % CPX dig +%CF X dig+%EEX dig+%NFE X dig

Digestible Energy DE= TDN X 4400 and Metabolize able Energy ME = DE X .0

Statistical analysis

The experimental design was a complete randomized design (CRD) according to Sencedor and Cochran(1980) that had three treatments and five replicates. The three treatments consisted of natural grazing (NG) as control while treatment two was a Eragrostistremula biomass and the third treatment was groundnut haulms. The treatments were with five replicates. Data on comical composition of Eragrostistremula biomass, feed intake , nutrient digestibility, performance of sheep were analyzed using analysis of variance, the difference among treatments means were detected using least significance difference (LSD).

RESULTS AND DISCUSSION

Chemical composition of Eragrostistremula biomass

Chemical composition of Eragrostitstremula harvested at late growth stages, natural grazing plus 50% of the studied plant biomass and groundnut haulms is presented in table (4.1). Dry matter was highest when the natural grazing was offered as sole diet (95.51%) and decreased to 95 and 91.25% upon replacing some of the natural grazing with Eragrostitstremula at 50 and groundnut haulms respectively. While organic matter reached 88.23% for the natural grazing alone to 90.00% and 78.25%for inclusion of the tested plant biomass and that of groundnut haulms respectively. Hence ash was 7.28% for the natural grazing and 13.00% groundnut haulms and 5.00% when Eragrostitstremula constituted 50% of the total feed intake or the groundnut haulms was used. The plant biomass was highest in crude protein for the groundnut haulms13.34% and % Eragrostitstremula 9.37 but decreased to 4.11% for the natural grazing alone.34% for the groundnut haulms when was consumed as sole diet respectively. Crude fiber was the highest in samples of the natural grazing that was analyzed alone (37.25%) but decreased to 37.25% and 34.85% respectively upon replacement of the natural grazing with groundnut haulms and 50% of the study plant biomass. Ether extract was1.23, 2.27 and 3.53% when the biomass of the natural grazing alone Eragrostitstermulaor groundnut haulms respectively and it was 1.2% in the natural grazing free of the studied plant. The differences were significant ($P<0.01$) for EE in the three diets. The ash percentage was 7.28, 5.00 and 13.00% when the natural grazing was consumed solely, Nitrogen free extracts reached highest 48.10% when the natural grazing was analyzed alone and 44.33% with biomass of Eragrostitstremula compared with 30.o6 for the groundnut haulms respectively.

Table 1. Chemical composition of Eragrostistremula biomass

type of feed	DM	OM	CP	CF	EE	NFE	ASH
Natural grazing	95.51	88.23	4.11	37.25	1.23	48.10	7.28
Eragrostistremula	95.00	90.00	9.37	37.25	2.27	44.33	5.00
Groundnut haulms	91.25	78.25	13.34	34.85	3.53	30.06	13.00

Chemical analysis

The *In vitro* dry matter and organic matter digestibility (IVDMD) and organic matter IVOMD as affected by the intake of *Eragrostitstremula,* natural grazing and groundnut haulmsis presented in table (4.3).The coefficient of DMD was higher the groundnut haul was evaluated followed by that of the natural grazing free of *Eragrostitstermula* but lowest for the *Eragrostistremula*. The DMD for the groundnut haulms was 69.45% and that of the natural grazing was 66.45% compared to the *Eragrostitstremula* dry matter digestibility being (47.67%). Similarly *In vitro* organic matter digestibility was highest when the groundnut haulms was the best material followed by the natural grazing alone and last for *Eragrostitstermula*. The groundnut haulms had 70.65% *in vitro* dry matter digestibility, the natural grazing 67.55%. The *In vitro* organic matter digestibility was 50.51% when the *Eragrostistremula* was used alone,

Table (2). In vitro dry matter and organic Matter digestibility of Eragrostistremula

Feed type	Dry matter	Organic matter	SE±
Natural grazing alone	66.45	67.55	±3.46
Eragrostistremula	47.67	50.51	±2.46
Groundnut haulms	69.45	70.65	±4.46

Apparent digestibility of nutrients

Apparent digestibility of nutrients as affected by the level of intake of Eragrostitstremula harvested from the natural grazing, pure range grazing and the groundnut haulms is presented in table (4.2). Dry matter digestibility was found being 69.45, 51.67 and 45.66% and it was the highest when the groundnut haulms ingested followed by that of the tested biomass with natural grazing and lastly those lambs which consumed Eragrostistremula plant biomass alone for the total intake. Organic matter digestibility similarly varied according to the type of the plant biomass ingested. At groundnut haulms, % OMD was the highest followed values obtained from lambs fed the groundnut haulms followed by those fed natural grazing alone and Eragrostitstremula when it was found to be sole diet compared to natural grazing alone. The value is respectively 69.45, 61.47% and 53.34% for the groundnut haulms and the natural grazing alone or Eragrostitstremula alone. Crude protein digestibility reached to 73.33 % in lambs consumed groundnut haulms followed by those fed the natural grazing (60.35%) and lastly Eragrostitstremula as sole biomass and that reached to 55.45% while for the natural grazing alone it was(60.35%) as indicated above. The differences were significant (P<0.01). Crude fiber digestibility has also shown similar trend. It was 39.25% when the Eragrostitstremula biomass constituted sole diet and became 35.45% and when natural grazing was offered and increased to 49.20% upon feeding lambs with the groundnut haulms. The digestibility of Ether extract was % and 77.25%, 59.30 and, 65.33% when the lambs were fed the natural grazing alone, groundnut haulms and Eragrostitstremula respectively.

Table (4.3) Apparent nutrients digestibility coefficients of Eragrostistremula biomass fed to lambs

Rations

Nutrients	I	II	III	SE
Dry matter	^{c}45.66	^{b}51.67	70.45^{a}	3±4.
Organic matter	53.34^{c}	61.47^{b}	69.45^{a}	1.5±
Crude protein	.45^{c}55	60.35^{b}	73.33^{a}	2.4±
Crude fiber	39.25^{c}	35.45^{b}	49.20^{a}	4.5±
Ether extract	65.33^{c}	59.30^{b}	77.25^{a}	2.6±
Nitrogen Free extract	50.20^{c}	71.13^{b}	68.34^{a}	3.5±

I=Eragrostitstermul a**II**=natural grazing **III =** groundnut haulms Eragrostitstremula **SE**= standard Error

*Values with different superscripts on the same row are significantly different (P<0.05)

Sheep Performance as affected by intake of Eragrostistremulabiomass

Performance of Desert sheep lambs as affected by the intake of Eragrostistremulain comparison of groundnut haulms and the natural grazing free of the studied plant is shown in table (4.2) shown. Final body weight it was highest (24.40)kg in group **III**,(19)kg in group **II** and)kg in group(**I**).Body weight Change (kg/60day) was highest (5.4)kg in group **III**, in group **II** and in group **I**. Weight Change g/d was highest (58)g in group I, (57)g in group I and (90g) in group IIIThe dry matter intake of lamb groups on rations containing biomass from different sources: groundnut haulms, natural grazing and Eragrostistremula, Bino is presented in table (4.1) dry matter per day when the Bino constituted the sole diet, groundnut haulms or the natural grazing was 1263.5, 1375.6 and 1377.4 g/d for group I, II, III, groups of lambs respectively. The groups consumed throughout the experimental period amounted to 75.810,82536 and, 86.442 kg for group I, II, III respectively. Lambs in general consumed biomass of the three sources rationally without reluctance and there has never been a need to get them adapted to taking Bino biomass, upon consumption of rations containing sole and harvested amounts of Bino, it was observed that lambs did not suffer from digestive disorders such as bloat, constipation or diarrhea.

Table (4) Performance of Desert sheep on affected by the level of Eragrostistremula

Parameters	I	II	III
No of animals	4	5	5
Days on trial	60	60	**60**
Initial body	17.600	17.800	19.000
Final body weight	21.000^{b}	21.250^{b}	24.400^{a}
Body weight change (kg60days)	^{b}3.4	. 3.45^{b}	5.4^{a}
Weight change (g/day)	57^{b}	^{b}58	90^{a}
Feed intake (g/day)	^{b}1263.5	1375.6^{a}	1377.4^{a}

* Values with different superscripts on the same row are significantly different (P<0.05)

Chemical composition of Eragrostistremulahay

The constituents of ingredients used in this study have shown no significant differences in their dry matter content when they were analyzed after being shade dried. This is attributed to their natural of growth on similar environmental conditions. However organic matter varied with type of biomass analyzed and so the ash fraction. The OM was higher in the Eragrostistremula that had lower ash content followed by the groundnut haulms and lastly the natural grazing. Similarly Mahala, (2009) has reported that forbs were lower in their ash content than grasses in Sudan. Protein content was higher in groundnutfollowed by the groundnut Eragrostistremula and then the natural grazing that was comprised mostly of grasses. Jadalla (1995) reported that natural grazing at late maturity stage was low in its CP content reaching as low as 4.11% and the groundnut haulms up to 13.34%. Crude fiber content was higher in the natural grazing and similar in Eragrostistremula biomass and groundnut haulms. Due to high percentage of grasses in the natural grazing it was normal to observe such higher CF content in that biomass. Mohamed and Salih

(1991) concluded that natural grazing at late maturity stage had had highest CF.The Ether extract was highest in the biomass of groundnut haulms followed by the Eragrostistremula and lowest in the natural grazing. Grasses are always low in EE fraction than in legumes and herbs.

Effects of ingestion of Eragrostistremula on In vitro dry matter and organic Matter digestibility

The in vitro dry matter digestibility was highest in groundnut haulms followed by the biomass that constituted 50% Eragrostistremula and finally the natural grazing. Similar trend was observed in vitro organic matter digestibility coefficients. The lower IVDMD. The lower in vitro digestibility coefficient for Eragrostistremula biomass might be attributed to its higher content of tannins as reported by Ørskov and McDonald(1979) who carried out an estimation of protein degradability in the rumen from incubation measurements weighted according to rate of passage and found that tannin content could jeopardize in vitro dry natter and organic matter digestibility in ruminants. Tannin content was not determined in the studies biomass types but it is known that grasses do not contain any substantial amounts of tannin and the level of tannin in groundnut haulms contained only 4.3% tannin according to Jadalla *et al.,*(2012).

Effects of ingestion of Eragrostistremula on Apparent Nutrients Digestibility

Apparent nutrients digestibility coefficients in diet of Eragrostistremula natural grazing and groundnut haulms varied significantly and were greater in the lambs that were on groundnut haulms**.** Consumingbiomass of the studied plant showed lower coefficients and that could be attributed to higher anti-nutritional content of that biomass. Those substances were not detected in laboratory, but it was reported that it might contain such ingredients. The animals got diarrhea upon ingestion of Eragrostistremula biomass as sole hay and high mortality % was recorded in the group on that biomass and could be stopped when the feeding pattern was changed to include natural grazing containing dominantly grasses.

Effects of consuming Eragrostistremula on Performance of sheep

Changes in body weights of animals during the experimental period have shown that the group that was fed Eragrostistremula biomass as sole hay did not gain weight, all lambs did not get diarrhea leading to mortality. When part of that biomass was replaced by the natural grazing of grasses, their performance improved and they gained weight. The weight gain was higher for the group on groundnut hay. There was significant ($P<0.01$) increase in body weights of all groups along the experimental period with the exception after taking the tested biomass as supplement. The feed intake was not significantly ($P>0.05$) in the three groups and it seems that the biomass of Eragrostistremula was of good palatability to the two groups.

CONCLUSIONS

It was concluded that:

1. The Biomass of Eragrostistremula at the growth stage analyzed can be classified as low quality roughage from its chemical composition where its crude fiber content is 37.25 and nitrogen free extract being 44.33. It can used only with or supplements for ruminants feeding.
2. In this study it has been discovered that ingestion of Eragrostistremula as sole diet could not initiate diarrhea that might lead to mortality. Restricted use has shown that animals could eat more.
3. In vitro dry matter and organic matter digestibility were depressed in biomass with higher levels of Eragrostistremula. In vivo digestibility was also affected similarly. That affects might be attributed to high tannin content.

Recommendations

More research to take advantage of the Eragrostistremula in feeding ruminants and other species to reduce the cost of nutrition. It is also recommended that they plant be grown as fodder crop and cut at different stages of growth and determine its chemical composition and make use of its good palatability and moderate digestion. The plant can produce large amount of biomass and can be used for feeding ruminants to reduce don't high increases weight of sheep. Eragrostistremula was shown to compete other non palatable species when sown and produce well as it has been observed.

REFERENCES

AOAC (2000).Official Methods of Analysis, 19th Edition AOAC Inter. Inc. Washington, DC Pp 1219.

El-Hag F M, Fadlalla B and El madih M A(1998). Effect of strategic supplementary feeding on ewe productivity under range conditions in North Kordofan, Sudan.Small Ruminant Research 30:67-71.

El Hag FM, Fadllala B, Mukhatar HK (2001) Some production characteristics of Sudan Desert sheep under range conditions in North Kordofan, Sudan. TropAnim Health and Prod 33: 229-239. Link: https://bit.ly/2XHbe3Z

Jadalla J B (1995). The effects of supplementation of the dry Season grazing withground nut haulms on Nutrients Utilization and desert Sheep Performance.M.Sc. Thesis, Faculty of Animal Production, University of Khartoum, Sudan.

Khatir, A.A and J.B. Jadalla (2014).Assessment of rangelands biomass using Remote Sensing and Geographical Information System (GIS) in Kordofan, Sudan.University of Kordofan Journal of Natural Resources and Environmental Studies, UKJNRES, 1(1): 60-70,www.kordofan.edu.sd

MARF, Ministry of Animal Resources and Fisheries (2015). Department of the animals statistics and Economics, Annual report.

Mohamed, T. A. and Salih, F. E (1991). The Effects of the Stage of maturityon Nutritive Value of Low rainfall woodland savannah pasture Sudan. Journalof Animal Production, 4:23-36.

Ørskov, E.R.; Mcdonald, I.(1979). The estimation of protein degradability in therumen from incubation measurements weighted according to rate of passage.J. Am. Sci.1979, 92, 449–453. [Google Scholar] [CrossRef]

Sheikan locality, (2011). Annual report for the activities and general situation of the locality, North Kordofan State Achievements

Snecedor GW, Cochran WG (1980). The Statistical Methods the Iowa StateUniversity Press. USA.

Suleiman, M. and Ali, Ali Darrag (1988).Training Course in Range Management and Rang Improvement. Range and Pasture Administration. Sudan. 47pp.

Suleiman A H, Sayers A R and Wilson K T. (1990).Evaluation of Shugor, Dubasiand Watish subtypes of Sudan Desert sheep at the El-Huda National SheepResearch Station, Gezira Province, Sudan. ILCA Research Report 18. ILCA(International Livestock Centre for Africa), Addis Ababa, Ethiopia. 38 pp.

Telly, J. M. A., and Terry, R. A. (1967). A Two-Stage Technique For The In Vitro Digestion of Forage Crops First Published: June 1963https://Doi.Org/10.1111/J.1365-2494.1963.Tb00335.XVolume18, Issue2 June 1963 Pages 104111.

Wilson, T. (1991).Management and productivity of sheep and goats in traditionalsystems of the tropics. Int. Symp. on Anim. Prod. In the Tropics. Univ. ofGezira, Wad Medani, the Sudan, 21-25 February 1981.

Mahala, A.G., Nsahlai, I.V., Basha, N.A.D. and Mohammed, L.A. (2009) NutritiveEvaluation of Natural Pasture at Early and Late Rainfall Season in Kordofan and Butana, Sudan. Australian Journal of Basic and Applied Sciences, 3, 4327-4332.

****