

Effects of Feeding *Alysicarpus Monilifer* Fodder of bucks on Feed Intake and Performance (Desert Goats) in Elobeid- Sudan

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Abstract:

This study was conducted at the University of Kordofan in El-obeid during the period from 2017 with the objective of studying the effects of consumption of *Alysicarpus monilifer* (*fraisha*) hay on Desert goatbucks. Twelve bucks of at 6-7 months with an average weight of 14 kg were divided into three similar groups each with four animals. The animals were vaccinated against endemic diseases and were drenched with a broad spectrum anthelmintics for the control of internal and external parasites. They were also ear-tagged for identification during treatments. The first group was fed natural grazing free of *Alysicarpus monilifer* (*fraisha*), the second consumed groundnut haulms while the third consumed *Alysicarpus monilifer* (*fraisha*) hay. After observing the cases of deadly diarrhea with the first group, the feeding pattern was modified with 50% natural grazing. Water was provided continuously. The animals were weighed at the beginning of the experiment and once every week to the end of the experiment. The last ten days were considered as the digestibility trial where feed intake, feces voided and their chemical composition were obtained and apparent nutrients digestibility coefficients were calculated. Chemical analysis and *in vitro* dry matter and organic matter digestibility were conducted according to the methods described by the AOAC,(2000). The experimental design was a complete randomized design and the data were analyzed using the analysis of variance and the detection of differences between the coefficients using less significant difference (LSD). The results showed that feeding *Alysicarpus monilifer* (*fraisha*) alone resulted in fatal diarrhea in bucks, although it did not lead to a decrease in consumption, and that the dry matter and organic matter digestibility was low for *A monilifer* group compared to the NG and groundnut haulms. The daily average weight gain was higher for the group on groundnut haulms followed for those on NG and finally for the group that was offered *A monilifer* mixed with the natural grazing. The daily weight gain reached to 45.300,23.450 and 11.250 grams per a day for groundnut haulms, natural grazing plus *A monilifer* and *A monilifer* alone due to diarrhea cases. The study concluded that *A monilifer* was highly palatable though it caused detrimental diarrhea. The study recommended further analysis to determine the components of that caused diarrhea and better use for this hay.

Keywords: natural grazing, *Alysicarpus monilifer*, goats nutrition,

Introduction:

Sudan has multiple climates that impact on the diversity of livestock. Small ruminants (sheep and goats) are important species raised in the country and they spread in all parts of Sudan. The importance of the livestock sector is well recognized by economists and planners. Sudan

food supplier animals (cattle, sheep, goats, camels) are estimated at 105 million heads (MARF, 2015). There are as well other animals and wildlife. The importance of livestock is attributed to their economic and social contributions(El-Hag *et al.*,2001).

Rainfall ranges in Sudan from almost zero to 75mm in arid areas to 1000 mm, at least while temperatures ranging between 45 degrees (in summer) to 10 degrees (in winter). Range lands provide 80-90 % feed for all species of livestock specially goats. Establishing a competing and sustainable program for exporting live animals and good quality meat is required in order to enable the Sudan facing the international trade parameters this entails a vital need to improve the livestock production systems based on natural feed sources mainly rangelands. It is important for this purpose to impose strict hygienic measures to provide healthy and wholesome meat to fulfill the international requirements' and domestic needs. Natural grazing from rangelands provides very good option for this purpose(Bunderson *et al.*,1984).

The rapidly growing livestock population imposes a continuing pressure on this shrinking range resource. On this limited area, livestock population is concentrated with communal continuous grazing. The eventual result is overgrazing where palatable species are excessively consumed leading to their disappearance. Since no systematic activities are carried out to collect seeds of such nutritive and palatable species, range land will be turned into areas covered with species that are known being of little acceptance to livestock species with low nutrients contents.To recommend for candidate species, those highly good quality and palatable species must be determined, their nutritive value be accessed before being selected for conservation (El-Haget *et al.*, 1985).

The overall objective of this study was to assist in conservation, rehabilitation and development of the rangelands and sustain their productivity and ensure proper utilization of the resource as main feed source for the national herd.Specifically this study is proposed to examine The chemical composition of one of most promising range plant that is seen being potentially fodder crop. *Alysicarpus vaginalis* DC or (Fraisha) as it is locally known grows wildly on rangelands or as weed on field crops and harvested for sale or for feeding stocks. Its chemical composition is not investigated nor its feeding value and potential harms that may arise upon consumption of its biomass also to study the effects of feed *Alysicarpus monilifrvagialis* biomass to goats on feed intake, live body weight change and *in Vitro* digestibility and Possible adverse effects of ingestion of this plant hay if any.

Materials and Methods:

The study site:

The study commenced on 5th November and until first of December at the University of Kordofan farm in the city of Elobeid, which 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.

The Experimental Animals:

Desert goat bucks were used in study. The animals were divided into three similar groups each with four animals. The bucks were individually penned, equipped with feeding and drinking troughs. Prior to commencement of treatments the bucks were ear-tagged, vaccinated against diseases endemic to the study area such as anthrax and Hemorrhagic septicemia and drenched with broad spectrum anthelmintic (Ivomic) at 0.5cc/head. Ten days were allowed for bucks to be adapted for feed and treatments. The adaptation period was also necessary for removal of the effects of the feed previously taken. The bucks were weighed at the beginning of the trial and once every 8 week at the end of the trial to monitor their weight changes as affected by type of ration

The Experimental Feed:

Newly harvested and wilted biomass of *Alysicarpus monilifer* hay was used first as sole diet for one group and later the group was offered 50% the experimental hay and 50% of the natural grazing that was also harvested from the rangeland in the area. The second group was fed on ground haulms and the natural grazing *ad libitum*. The third group was completely left on the natural grazing. Feed intake and its effects were monitored for the first ten days. Noticing that the first group bucks started being with diarrhea reaching to mortality the treatment was modified to offer varying levels of *Alysicarpus monilifer* hay and the natural grazing free of the plant biomass *ad libitum*.

Chemical Analysis:

The natural grazing, the groundnut haulms and *Alysicarpus monilifer* biomass samples were analyzed using proximate analysis as described by the Association of the Official Analytical chemists (A O A C, 2000). In Vitro dry matter and organic matter was determined according to Telly and Terrie (1967).

Statistical Analysis:

The experimental design was a complete randomized design (CRD) that had three treatments with four replicates. The data was analyzed using analysis of variance (Steel and Torrie (1996). The difference among treatment means were detected using least significance difference (LSD) (Snedecor and Cochran, 1976).

Results:

Chemical composition of *Alysicarpus monilifer* harvested at late growth stages, natural grazing plus 50% of the studied plant biomass and groundnut haulms is presented in table (1). Dry matter was highest when the natural grazing was offered as sole diet (95.51%) and decreased to 93.21 and 91.25 % upon replacing some of the natural grazing with *Alysicarpus monilifer* at 50 and groundnut haulms respectively. While organic matter reached 88.23 % for the natural grazing alone to 81.14 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 11.07 and % 13.00% when *Alysicarpus monilifer* constituted 50 % of the total feed intake or the groundnut haulms was used. The plant biomass was highest in crude protein for the natural grazing and 50 % *Alysicarpus monilifer* but decreased to 4.11% for the natural grazing alone and to 13.34 % 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 35.76 and 34.85% respectively upon replacement of the natural grazing with groundnut haulms and 50 % of the study plant biomass. Ether extract was 1.23, 3.25 and 3.53 % when the biomass of the natural grazing alone, plus 50% *Alysicarpus monilifer* or 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, 11.07 and 13.00 % when the natural grazing was consumed solely, with Fraisha was 50% and that of groundnut haulms compared Nitrogen free extracts reached highest 48.10% when the natural grazing was analyzed alone and 38.75 with biomass of *Alysicarpus monilifer* at 50% compared with 30.06 for the groundnut haulms respectively.

Table (1). Chemical composition of *Alysicarpus monilifer* hay, groundnut haulms and Natural grazing.

TYPE OF FEED	NUTRIENTS						
	DM	OM	CP	CF	EE	NFE	Ash
natural grazing	95.51	88.23	4.11	37.25	1.23	48.10	7.28
<i>Alysicarpus monilifer</i>	93.21	82.14	15.45	35.76	3.25	38.75	11.07
Groundnut haulms	91.25	78.25	13.34	34.85	3.53	30.06	13.00

The *In vitro* dry matter and organic matter digestibility (IVDMD) and organic matter IVOMD as affected by the level of *Alysicarpus monilifer* hay is presented in table (2). The coefficient of DMD was higher the natural grazing free of *Alysicarpus monilifer* but it was the highest for the groundnut haulms 67.45 % and last biomass of the natural grazing plus 50% *Alysicarpus monilifer* biomass (45.67%). Similarly *In vitro* organic matter digestibility was highest when the groundnut haulms. The natural grazing alone had 56.45 % *in vitro* dry matter digestibility. The *In vitro* organic matter digestibility was 57.55, 48.61 and 69.65 % when the natural grazing was used alone, NG with 50% *Alysicarpus monilifer* biomass and the groundnut haulms respectively.

Table (2). *In vitro* dry matter and organic Matter digestibility of *Alysicarpus monilifera* hay

Feed type	Dry matter	Organic matter	SE±
Natural grazing alone	56.45	57.55	3.46
+ <i>Alysicarpus monilifer</i>	45.67	48.61	2.46
+Groundnut haulms	67.45	69.65	4.46

Apparent digestibility of nutrients:

Apparent digestibility of nutrients as affected by the level of intake of *Alysicarpus monilifer* harvested from the natural grazing, pure range grazing supplemented with 50% % of the tested plant biomass and the groundnut haulms is presented in table (3). Dry matter digestibility found being 45, 41 and 65 % and it was the highest when the groundnut haulms ingested followed by that of the tested biomass with natural grazing at 50 % and lastly those bucks which consumed the plant biomass alone for the total intake. Organic matter digestibility similarly varied according to the level of the plant biomass ingested. At groundnut haulms, % OMD was the highest followed values obtained from bucks fed the natural grazing alone and the NG with 50% *Alysicarpus monilifer* when it was found to be 50 % compared to natural grazing alone the value are respectively 49. 46 and 67.% for the groundnut haulms and the natural grazing with % *Alysicarpus monilifer* and NG alone. Crude protein digestibility reached to 70 % in bucks consumed groundnut haulms followed by those fed *Alysicarpus monilifer* as half biomass and that reached to 50% while for the natural grazing alone it was 50% only . The differences were significant (P<0.01). Crude fiber digestibility has also shown similar trend. It was 30 % when the level of *Alysicarpus monilifer* biomass constituted 50.% and became 34% and when it was alone and upon feeding bucks with the groundnut haulms it was 45%. The digestibility of Ether extract was 60,54.and 77% when the bucks were fed the natural grazing alone, NG with 50 % *Alysicarpus monilifer* and groundnut haulms respectively.

Table(3). Apparent nutrients digestibility coefficients of *Alysicarpus monilifer* hay as a Supplement to Natural grazing for bucks Elobeid, Sudan

Nutrients	Rations			SE
	I	II	III	
Dry matter	45	41	65	±3.4
Organic matter	49	46	67	±1.5
Crude protein	55	50	70	±2.5
Crude fiber	34	30	45	±4.5
Ether extract	60	54	77	11.3
Nitrogen Free extract	45	66	68	15.4

I= *Alysicarpus monilifer* II= groundnut haulms III= natural grazing plus *Alysicarpus monilifer* SE= standard Error.

Discussion:

Goats performance as affected by ingestion of different Levels of *Alysicarpus monilifer* hay

Bucks overall performance as affected by ingestion of different Levels of *Alysicarpus monilifer* hay is presented in table (4). During the preliminary period the biomass of the plant was given to one group as sole diet and after three days it was observed that bucks started showing good appetite and ingested substantial amount of the biomass followed by diarrhea that could not be explained and all samples analyzed and treatments used were found ineffective. Three animals were lost as mortality started. At that moment the feeding pattern was then changed by reducing *Alysicarpus monilifer* biomass to half and that stopped diarrhea. The performance is summarized in table (4).

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 might be 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 *Alysicarpus monilifer* hay that had lower ash content followed by the groundnut haulms and lastly the natural grazing. Similarly Ellis (1999) had reported that forbs were lower in their ash content than grasses in Sudan. Protein content was higher in *Alysicarpus monilifer* followed by the groundnut hay and then the natural grazing that was comprised mostly of grasses. Mohamed and Salih (1991) and Jadalla (1995) reported that natural grazing at late maturity stage was low in its CP content reaching as low as 4 % and the groundnut haulms up to 7%. Crude fiber content was higher in the natural grazing and similar in *Alysicarpus monilifer* 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. Ether extract was highest in the biomass of *Alysicarpus monilifer* followed by the groundnut haulms and lowest in the natural grazing. Grasses are always low in EE fraction than in legumes and herbs. .

Table (4).Bucks performance as affected by the level of *Alysicarpus monilifera* hay

Parameters	I	II	III	SE
No of Animals	4	4	4	-
Days on trial	60	60	60	-
Initial weight	11.35	11.25	11.45	-
Final weight	12.850	11.800	13.50	2.34
Total feed intake (kg)	45	35	35	2.55
Daily feed intake (g)	750	583	583	11.25
Daily weight gain (g)	11.250	45.300	23.450	2.350

I= *Alysicarpus monilifer* II= groundnut haulms III= natural grazing plus *Alysicarpus monilifer*

Effects of ingestion of *Alysicarpus monilifera* 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 % *Alysicarpus monilifer* and finally the natural grazing. Similar trend was observed in *in vitro* organic matter digestibility coefficients. The lower IVDMD. The lower *in vitro* digestibility coefficient for *Alysicarpus monilifer* 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 matter 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 *Alysicarpus monilifer* on Apparent Nutrients Digestibility

Apparent nutrients digestibility coefficients in diet of *Alysicarpus monilifer* hay, natural grazing and groundnut haulms varied significantly and were greater in the bucks that were on groundnut haulms. Consuming biomass 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 *Alysicarpus monilifer* 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 *Alysicarpus monilifer* on Performance of Goats

Changes in body weights of animals during the experimental period have shown that the group that was fed *Alysicarpus monilifer* biomass as sole hay did not gain weight, all got 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 *Alysicarpus monilifer* was of good palatability to the two groups.

Conclusions:

It was concluded that:

the Biomass of *Alysicarpus monilifer* at the growth stage analyzed can be classified as a good quality roughage from its chemical composition where its crude fiber content is 8.6 and nitrogen free extract being 67.45%. So if further analyses prove it being free of serious anti-nutritional factors, it can be used with for ruminants feeding.

In this study showed that ingestion of *Alysicarpus monilifer* hay as sole diet could initiate diarrhea that might lead to mortality. In vitro dry matter and organic matter digestibility were depressed in biomass with higher levels of *Alysicarpus monilifer*.

It is recommended that:

Advanced analyses to determine anti- nutritional content of the plant biomass.

Factors initiating diarrhea in goats upon ingestion of *Alysicarpus monilifer* biomass be determined.

Mineral content of the tested plant hay be investigated.

Factors affecting In vivo and In vitro digestibility be determined.

Farming practices concerning production of *Alysicarpus monilifer* as fodder crop be studied since this plant biomass is now harvested from rangelands and sold as fodder crop. It grows well with other field crops and it is always seen as a type of intercropped species.\

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