

Research Article

Effect of Using *Zornia glochidiata* (shelini) Meal in Replacement of Wheat Bran on Lamb Performance and Feeding Cost Decreasing

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Abstract

This trial was aimed to study the effects of replacing wheat bran with different levels of *Zornia glochidiata* meal on feed intake, general performance of Desert lambs and feeding cost decreasing. Twelve lambs of four months old and weighing 19.500 kg +500g were divided into three groups each with four animals. Feed intake and body weight change were monitored every ten days up to fifty days. The data were statistically analyzed via analysis of variance and the differences among means were detected least significance (LSD) test. The results indicated that voluntary dry matter intake significantly ($P < 0.05$) increased in the group that consumed a ration with 26% *Zornia glochidiata* meal (II) followed by those were on a ration with wheat bran only (I) and lastly that had a ration with 42% *Z. glochidiata* (III). Feed intake was 1090, 970 and 910 for group II, I and III, respectively. Similarly body weight gain was significantly ($P < 0.05$) higher in group II, (6.1 kg/50 days) followed by group I (4.9 kg/50 days) and group III with 4.3 kg/50 days. The daily weight gain was 98, 122, 89 g when the lambs consumed rations with 0.00, 26 and 42 % of *Z. glochidiata* meal, respectively. The cost of kilogram of the first ration was 6.8 SDG when only wheat bran was used, and it decreased to 5.7 SDG when 26% wheat was replaced by *Z. glochidiata* meal and when *Z. glochidiata* meal was increased to 41% the cost was further decreased to 5 SDG.

Introduction

Sudan is one of the largest animal population owners in Africa. This wealth was estimated to be several million heads among which cattle Sheep goat and camel were respectively, 29.4, 39.1, 30.5 and 4.6 million heads [1]. Over 60% of the estimated figure of sheep of the Sudan is Desert sheep which is will know for production of good quality meat for local consumption and export.

Meat is a vital food for human as it contributes into tissue building in addition to provision of energy vitamins

and minerals. it is an important item in the human diet of the Sudan. Beside the daily family consumption, there are many occasions and celebrations in Sudanese customs that necessitate slaughtering animals such as naming new borne wedding, religious festivals and deceased morning ceremonies. In all these occasions animals particularly sheep are always slaughtered (Elgaili.1970).

Sheep of Sudan are reared mainly for meat production and their economic importance arises from the fact that sheep are the major source of red meat for local consumption and for export [2].

Desert sheep is mainly raised under traditional pattern of management on natural grazing. Sheep husbandry system especially in Kordofan is varied between sedentary and nomadic flocks.

Feed quality and quantities are affected by seasonality where the determining factor is amount and distribution of precipitation. El Hag, *et al.* [3] reported that there are many subtypes of Sudan desert sheep in Kordofan state. The main subtypes are: Kabbashi and Hamari sheep. Ebrahiem [2] classified Sudan desert sheep under these main ecotypes: Gazera and Butana sheep this group includes (Shugor, Watic and Dubasi); Kabashi and Hamari sheep in Kordofan region; Medoub sheep; Albega sheep; Northern Nilotic sheep and Western Africa sheep this group include: Fulani and Zaggawa sheep. Idris, *et al.* [4] reported that, the nutritional limitation, low nutritive value of the range, high ambient temperature, scarcity of feed and water are have great effect on the reproduction and production performance of the sheep in semi -arid area of Kordofan state as compared to that in temperate regions. Desert sheep of the Sudan comprises seven sub-types, namely Kabashi, Hamari, Meidob, Beja, Butana, Gezira and Watish. The desert sheep is raised mainly under extensive nomadic conditions depending on natural grazing [5]. Kababish (the model of the ecotype) is further classified into tribal subtypes, Hamari, Kabashi, and Shanbali in West and North Kordofan and Darfur states. The tribal subtype Kabashi is raised in the northern and eastern parts of North Kordofan and Darfur States while Hamari subtype is found in the western part of Kordofan and Darfur regions with different grades of crosses between these two tribal subtypes in the middle of the region. The main colours of Kabashi are brown, light brown and spotted black or red and white.

In sedentary system the flocks are kept close to village with minimal movement compared to the nomadic system where movement is throughout the year [6]. El Hag, *et al.* [3] reported that husbandry system have some effects on production characteristics of Sudan Desert sheep and that mortality rate in breeding ewes was lower in sedentary flocks in nomadic ones.

The nomadic pastoralists represent 60% of the country total population and they possess almost 90% of the total livestock population under this nomadic open grazing system provides animals for slaughtering for provision of meat that is consumed at home and exported as the seasonal take of lambs and mature animals are brought to markets from areas of production for local consumption and for export .the livestock production system still contribute to almost 23% of the country national income [7].

One of the major sheep production constraints under rangelands condition is the unavailability of nutritious grazing resources on a year round basis. Biomass produced from rangelands is low quality roughage and the situation is further aggravated by overgrazing in most areas (90% of the vegetation) and the disappearance of legumes and perennials [8]. Normally farmers provide their animals with different Supplements during critical times of feed shortage necessary. Supplement used are mainly oil seed cakes and

cereal grains. These ingredients are competed for between humans and animals and their cost is high. To overcome feed shortage, there is a need to for studying towards making use of nonconventional feed resource and new feed resource for the growing sheep population in the country and the region.

Objectives of the study

Overall objective was to reduce feeding cost by using cheap ingredients that are available in the area and that cannot be used by humans.

As direct objective it is proposed to study the effect of replacement of wheat bran with *Zornia glochidiata* meal on feed intake, nutrients digestibility and body weight change.

Zornia glochidiata is a palatable range plant and produces a large amount of seeds and successful Utilization in replacing wheat bran that is an important ingredient in poultry rations and of high cost with assist in reducing the cost of diets and ration to feeding lambs.

Material and methods

Study area

This study was conducted in Elobeid in North Kordofan State Sudan. The locality lies in the semi-desert arid ecological zone, between latitudes 12°:25 - 30°: 45 N and longitudes 29°:35 - 30: 30 E. The climate of the area is arid and semi-arid. Highest annual temperatures recorded in April and May and July (40C°) while lowest values are recorded in December and January (15C°). The rainy season extends from July to October with an average annual rainfall of about 280 mm [1].

Vegetation cover in dominated by annual grasses forbs (El-Hag and El Wakeel 1998). Common grass species which found in this area are *Zornia glochidiata*, *Cenchrus biflorus*, and *Dactyloctenium aegyptium*. Some of the common tree species are *Acacia senegal*, *Acacia tortilis* *Balanites aegyptica* and *Adamnsonia digitata*. On sandy soil, whereas *Acacia mellifera* and *Acacia nubica* dominate in clay soils (El Tahir, *et al.* 1999).

Soil types vary from the predominant sandy soil, to loamy sand to clay. The main crops grown here are divided into: cereal crops like sorghum, cash crops like groundnut and other. Crop residues like groundnut, sesame cake and watermelon seeds are considered high quality concentrates. Livestock in the area play an important economical role together with agricultural production with animal population [1,9]. Most of these animals are kept by nomads depends on natural grazing and crop residues [8,10]. The livestock that were found in this area is sheep, cows and goats. Cows and goats were found in form household.

The human activity in the area study was rainy agriculture and irrigated agriculture as the fruit trees and vegetable, grazing animals were practiced and brick work.

Experimental animals

Twelve lambs were used in this experiment. They were at four months and the animal were divided into three groups



(I, II and III) each group with four animals. The animals were weighed at the beginning of the experiment and once every week.

Experimental feed and the rations

Three rations were formulated for this study. The first one was prepared using groundnut seed cake at 30%, sorghum grains at 35%, wheat bran 34% and 1% common salt and the second ration being formulated using groundnut cake at 30%, sorghum grains at 27% and wheat bran at 16%, *Z. glochidiata* at 26 % and common salt at 1%. The third ration (III) was prepared using groundnut cake at 27%, sorghum grains at 30%, *Z. glochidiata* at 42% and common salt at 1% (Tables 1,2).

Chemical analysis

The ingredients used in rations' formulation were analyzed via proximate analysis according to AOAC [11]. The nutrients' digestibility was determined according to procedures described by McDonald, *et al.* [12].

Statistical analysis

The data was statistically analyzed using one way analysis of variance according to Steel, *et al.* [13]. The differences among treatment means were detected using least significant differences (LSD) test.

Results and discussion

The experimental rations

Percent ingredients used in formulation the experimental rations were shown in Table 1.

Chemical composition of the ingredients used in rations

The dry matter was the highest in ration three (94.9%) followed by ration II (93.8%) and was the lowest in ration I (92.2%). The highest organic matter was in ration III (87.3%)

Table 1: percent ingredients used in formulation the experimental rations.

Ingredients	I	II	III
Sorghum grains	35	30	30
Groundnut cake	30	27	27
Wheat bran	34	16	0
<i>Zornia glochidiata</i>	0	26	42

I= wheat bran only II= ration with 26% *Zornia glochidiata* III=ration with 42% *Zornia glochidiata*

Table 2: Rations chemical composition on affected by % *Zornia glochidiata* meal in the ration (%).

Ration	Nutrients					
	DM	OM	CP	CF	NFE	EE
I	92.2	86.9	18.2	7.7	54.3	4.7
II	93.8	86.9	19	12.7	47.1	4.6
III	94.9	87.3	25	15.5	42.9	4.4

DM= Dry Matter; OM= Organic Matter; CP= Crud Protein; CF= Crud Fibre; EE= Ether Extraction; NFE= Nitrogen Free Extraction

and was similar in rations I and II (86.9% each). The crude fiber was the highest in ration III (15.5) % followed by that of ration II (12.7%) and lowest in ration I (7.7%). The nitrogen free extracts (NFE) was highest in ration I (54.3%) followed by that in ration II, (47.1%) and the lowest in ration II and (42.9%). Ether Extracts was 4.7% in ration I, and 4.6 % in ration II and 4.4% in ration III with non significant differences at $P>0.05$ (Table 2).

The results of the proximate analysis results have indicated that the chemical composition of *Z. glochidita* meal that included predominantly seeds and other parts in small fractions was comparable to the convention feed ingredients used in formulation of small ruminants rations. Protein content of *Z. glochidita* was 25.76 % compared to 14.5% in wheat bran and EE 3.74 % compared to 4.3 in wheat bran. Consequently the rations had 18.2, 19 and 25% crude protein when rations constituted *Z. glochidita* meal at 0, 26 and 42% respectively. The high protein % in the third ration could be attributed in higher protein content of *Z. glochidita* meal (Table 3).

General performance of the experimental animals

Performance of Desert lambs as affected by the level of *Z. glochidia* meal in rations is presented in Table 4. Final body weight it was the highest (25.6 kg) in group II ,(23.9) kg in group I and (23.8)kg in group III .Body weight Change (kg/50day) was highest (6.1)kg in group II ,(4.9) in group I and (4.3) in group III . Weight Change g/d it was highest (122g) in group II , (98)g in group I and (86) in group III.

Voluntary dry matter intake of lambs as affected by the level of *Z. glochidiata* in the rations

The dry matter intake of lamb groups on rations containing deferent levels of *Z. glochidita* in presented in table (1). The lambs consumed 500, 500,500g dry matter per day when the shellini constituted 0, 26, 42% of the ration for I , II , III , groups of lambs respectively. The groups consumed throughout the experimental period amounted to 25kg to per group (I, II, III) respectively (Table 4).

Lambs in general consumed rations rationally without reluctance and there has never been a need to get them adapted to taking *Z. glochidita* ration, upon consumption of rations containing different levels of *Z. glochidita*, it was observed that lambs did not suffer from digestive disorders such as bloat, diarrhea in group I and II, just one lambs suffer from diarrhea and death in group II and one lamb suffer from Urine retention and death in group I (Table 4).

The chemical composition of the experimental rations

The results found that the chemical composition an affected by *Z. glochidita* meal used in rations, were crude protein in ration 18.2 , 19 and 25 % in rations for group I , II , and III respectively .showed higher crude protein 25% in ration III ,explained that rate of *Z. glochidita* meal it was 42% in ration III , 26% in ration II crude it was 18.2% and crude protein 19% in ration III when the ration 0% *Zornia* the animal groups performance

**Table 3:** Chemical composition of the ingredients used in formulation of rations.

Nutrients contents								
Feed	ME	DM	OM	CP	CF	NFE	EE	ASH
Sorghum grain	12.9	94	91.9	13.2	2.3	73.9	2.5	2.0
G.N.cake	11.9	96	87	44	10	25	8	9
Wheat bran	9.5	89	83.5	14.2	11.4	53.7	4.3	5.5
<i>Zornia glochidiata</i>		96.32	85.61	25.76	28.19	27.92	3.74	10.71

ME= Metabolism Energy; DM= Dry Matter; OM= Organic Matter; CP= Crude Protein; CF= Crude Fibre; EE= Ether Extraction; NFE= Nitrogen Free Extraction; ASH= inorganic Matter

Table 4: Performance of Desert sheep lambs on affected by the level of *Zornia glochidia* meal in ration.

Parameters	I	II	III
No of animals	4	4	4
Days on trial	50	50	50
Initial body	19	19.5	19.5
Final body weight	23.9	25.6	23.8
Body weight change (kg/50days)	4.9	6.1	4.3
Weight change (g/day)	98	122	86
Ration intake (g/day)	500	500	500
Roughage intake	470	590	410
Total feed intake(g/day)	970	1090	910
Price of feed(SDG/kg)	6.8	5.7	5

I= Wheat bran only II= Ration with 26% *Zornia glochidiata* III= Ration with 42% *Zornia glochidiata*

as affected by the level of *Z. glochidiata* meal in rations that is presented in table (4) shows that the overall performance of the experimental animal was similar. The groups were similar in their initial weight at the beginning of the trial (Table 2).

In general the three rations and treatment groups and their feedlot performance and live body weight gain are shown in table (4) the average initial body weight were 19, 19.5 and 19.5 kg for group I, II and III respectively. The average weight was not significantly ($p < 0.01$) different. The final body weight was 23.9, 25.6 and 23.8 respectively as the affects of inclusion of *Z. glochidita* at different proportion is sheep rations. Weight gain were 98, 122 and 86 g for group I, II and III respectively. Roughage intake were 470, 590 and 410 g for group I, II and III respectively. Roughage intake was higher in group II 590 g, 470g in group I and 410g group III. Ration intake were 500g similar for all groups affected by the level of *Z. glochidita* in ration. Total feed intake were 970g, 1090g and 910g for group I, II, and III respectively. The highest feed intake was 1090g in group II, decreased to 970g in group I and low 910g in group III.

Conclusion

The study concluded that the meal can be used 26% *Zornia glochidia* with 16% Wheat Bran to increase the weight while reducing the cost of nutrition, although reduced consumption of lambs for feed at 42%, but the intake of feed was sufficient to maintain the rates of gain in live weight.

References

- MAWF -Ministry of Animal Wealth and Fisheries (2019) Department of statistic and information, Annual Report, Khartoum, Sudan
- Ebrahiem MA (2019) The Effect of Husbandry and Management System on Sudan Desert Sheep Leather Production and Quality. *Vet Sci Res* 4: 000175. [Link: https://bit.ly/3CQP7qZ](https://bit.ly/3CQP7qZ)
- El Hag FM, Fadlalla B, Mukhatar HK (2001) Some production characteristics of Sudan Desert sheep under range conditions in North Kordofan, Sudan. *Trop Anim Health and Prod* 33: 229-239. [Link: https://bit.ly/2XHbe3Z](https://bit.ly/2XHbe3Z)
- Idris AO, Elemam MB, Kijora C, El-Hag FM, Salih AM (2010) Effect of dietary supplementation, sex and birth type on body weight of desert ewes and their lambs' growth performance in semi-arid area of Kordofan State, Sudan. *Livestock Research for Rural Development* 23. [Link: https://bit.ly/2WgF6Uq](https://bit.ly/2WgF6Uq)
- Ebrahiem MA, Bushara I, Mekki DM, Turki IY, Haroun HE (2015) The effect of breed on Skin\ Leather Quality of Sudan Desert Sheep. *Global Journal of Animal Scientific Research* 3: 6-10. [Link: https://bit.ly/3CTgUHR](https://bit.ly/3CTgUHR)
- Eltahir BA, El Hage FM, Mekki MA (1999) Review of pastoral and Agro pastoral system in North Kordofan, Sudan. Special assignment report –SOS –Sahel Inter UK and El-Ain natural forest management project. Elobied Sudan 30.
- Khalaffalla AM, Sulieman YR (1992) Some observations on reproductive traits in a flock of sudan desert sheep. *Sudan J Animal Production* 5: 81-86. [Link: https://bit.ly/3CSmrOC](https://bit.ly/3CSmrOC)
- Tatman WR, Judkins MB, Dunn TG, Moss GE (2017) Luteinizing Hormone in nutrition restricted ovarietomized ewes. *J Anim Sci* 8: 1097-1102. [Link: https://bit.ly/3CPargE](https://bit.ly/3CPargE)
- Ciotti EM (2016) Adaptability of forage crops in Corrientes, Argentina. *Facultad de Ciencia, Agrarias Universidad Nacional del nordeste, Corrientes Argentina. Pasturas Tropicales Boletin* 8: 170-18.
- Glimp HA, Hart SP, Vontungelm D (2015) Effect of altering nutrient Density concentrate to roughages and restricting energy intake on rate, efficiency and composition of growing lambs. *J Anim Sci* 76: 865-871. [Link: https://bit.ly/3m9QwCB](https://bit.ly/3m9QwCB)
- AOAC -Association of Official Analytical Chemists- (2000) *Official Methods of Analysis*, 16th ed. AOAC, Washington DC, USA.
- McDonald KM, Schukltz E, Albin L, Pineda N, Lonhart J, et al. (2010) *Care coordination measures atlas*. Rockville, MD: Agency for Healthcare Research and Quality 3. [Link: https://bit.ly/3m2Dqql](https://bit.ly/3m2Dqql)
- Steel RGD, Torrie JH, Dicky DA (1997) *Principles and Procedures of Statistics, A Biometrical Approach*. 3rd Edition, McGraw Hill, Inc. Book Co., New York 352-358. [Link: https://bit.ly/3ig1Mfv](https://bit.ly/3ig1Mfv)

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