

# Feedlot performance and carcass characteristics of Sudan desert sheep fed on molasses based diets

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**Abstract-** Thirty castrated male Sudan desert sheep, *Hamari* ecotype were involved in this study. The animals were kept for a pre-experimental period of two weeks, during which they were fed on groundnut haulm only. The animals were sub- grouped into three groups namely A, B and C. Each animal group received different feed named as the group name (A,B,C) the feed was offered to the animal groups on ad libitum base, while groundnut haulm was offered as a source of roughage daily.

Diet A was comprised of 50% molasses, diet B was composed of 30% molasses, while diet C was composed of 0% molasses.

Feeding period was 56 days during which the daily weight gain was 65.05g, 104.47g and 98.21g for groups A, B and C respectively and the difference was not significant ( $p > 0.05$ ). Total muscle % was highest 56.66% for group C, bone % was highest for group A 21.40%, and fat was highest in group B 26.22%. The muscle: bone ratio was 2.55, 2.53, and 2.84 for groups A, B, and C respectively.

**Index Terms-** Feed lot molasses, dressing %, carcass%, weight gain, Sudan desert sheep

## I. INTRODUCTION

The feeding of high proportions of grains to animals especially ruminants, need to be re-evaluated as it is becoming more and more unjustifiable under the prevailing decreasing world food reserves, which has already resulted in their low availability and high cost.

In Sudan the area grown with sorghum – which is considered as the main grain for Sudanese – in addition its use as animal feed is estimated as 22,018,000 million feddans (1 feddan = 1.038 acres) with total production of about 4,524,000 metric tons (Bank of Sudan annual report 2013). The cost of agricultural production in Sudan tended to be high due to lack of labors and high cost of mechanization. High cost of animal feed production necessitates the search of other alternatives of high nutritional quality and lower cost.

Mcleroy (1961) classified sheep of Sudan into eight distinct ecotypes according to locality, tribe and origin. Of these ecotypes is the Sudan desert sheep which constitute 65% of the sheep population in the country. Jack (1955) stated that Sudan desert sheep is the best type in the country. They are large legged animals carrying a fine hair coat, the color is commonly light brown, often becomes white on the belly and legs.

A good desert sheep may weigh as much as 70 kg live weight. Mcleroy (1961) indicated that Sudan desert sheep included seven tribal breeds namely Watich, Meidob, North

riverine woolled, Beja, Butana, Gezira and Kababish which is considered as the prototype to which other types are compared.

In Sudan conventional crops as some sorghum varieties are not used in human food also melon seeds, karkadeh (*hibiscus* sp.) seeds in addition to agro-industrial by-products such as molasses can help in solving such animal feed deficit.

In Sudan a variety of cash crops are grown, some of their by-products can be used in animal feeding. They include cotton, groundnuts, sesame, millet, sorghum and sugar cane. Barreveld (1982) indicated that crop residues become a useful by-product when a profitable use is made of them, if this is not the case the residue becomes a waste which has to be disposed of.

Now a day the production of sugar is witnessing a considerable increase due to modernization and rehabilitation of sugar industries and establishment of new sugar factories in the latest years. El Fadil (1995) stated that molasses production 0.14 million tons per annum.

Black strap or final molasses is by-product of the cane sugar industry from which the maximum crystalline sugar has been extracted by the normal methods. It is the most used molasses in animal feed. The specific gravity of molasses is 1.39 kg/liter. Undiluted black strap molasses is usually between 80 and 90 Brix (Göhl 1975).

According to A.O.A.D. (2013) Sudan produces 78% of the total groundnut of the Arab world. The total production of groundnut was 1 million MT and the area grown was 2.07 million Ha with 492 kg/Ha yield.

The history of agricultural by-products as animal feed in Sudan is ancient. Elshafie and Mcleroy (1964) have used a ration composed of 26% cotton seed hulls, 20% cotton seed meal, 20% wheat bran, 20% dura grain, 13% molasses and 1% salt/mineral mix I a fattening experiment using 20 heads of Western baggara cattle. They found that the average daily gain was 1.1 kg.

Elkhidir et al (1988) fed high molasses, low molasses and high sorghum diets to three groups of Sudan desert lambs from an average 25.40 kg live weight to 40.70 kg average slaughter weight.

## II. MATERIALS AND METHODS

### Experimental animals:

Thirty castrated male sheep Hamari ecotype were utilized. The age of animals was in the range of two years with two pairs of permanent incisors. The sheep were subgrouped into three groups A, B and C with average induction weights of 41.6 kg, 42.3 kg and 41.3 kg respectively.

All animals were treated for internal parasites by drenching with Albendazole.

**Feeds and feeding:**

Three iso-caloric feeds A,B and C were used. The feed ingredients (as fed %) and chemical composition are shown on the tables below.

**Table 1. Feed ingredients proportions**

Ingredients	Concentrate A(as fed %)	Concentrate B(as fed %)	Concentrate C(as fed %)
Sorghum	-	20	40
Molasses	50	30	-
Wheat bran	40	40	40
Groundnut cake	5	5	18
Urea	3	3	-
Salt	1	1	1
Lime stone	1	1	1

**Table 2. Feed ingredients chemical compositions**

Chemical composition %	Concentrate A	Concentrate B	Concentrate C	Groundnut haulm
Dry matter	80.70	97.60	93.90	93.70
Crude protein	22.80	28.00	21.80	8.13
Crude fiber	5.80	7.20	7.90	31.50
Ether extract	0.30	2.10	3.74	3.05
Ash	6.30	7.40	5.00	15.81
Nitrogen free extract	64.80	55.30	61.56	41.34
Metabolizable energy (Mj/kg) *	12.11	12.19	12.28	7.80

\* calculated by the equation

$$ME = 0.012CP + 0.031EE + 0.05CF + 0.014 NFE$$

Source : technical Bulletin 33 (1976). Energy Allowences and feeding systems for ruminants . London Her Majesty's stationery office.

**Experimental feeding:**

Concentrate mixes were offered on ad libitum base, while groundnut haulm was offered at a rate of 1/kg/head/day. Concentrate mixes were offered 3 p:m daily while groundnut haulm was offered 7 a:m daily.

Feed consumption was recorded daily as the difference between feed offered and refusals.

**Live weight & growth:**

The induction live weight was recorded for each animal at the beginning of the trial, then the animals were weighed individually every week at 8 am after 12 hours deprived from feed.

Total body weight gain was recorded during the whole trial, and the average daily gain was computed.

**Feed intake:**

The feed intake of each group was recorded daily as difference between amount offered and the refusals, the dry matter values from both roughages and concentrate mixes was used to calculate the dry matter intake.

**Slaughter procedure and slaughter data:**

At the end of the ffe lot period twelve animals were slaughtered four from each group following the local Muslim practices. The skin, feet as well as the thoracic and visceral organs were individually weighed, gut fill was determined as the difference in weight between the full and empty alimentary tract. The kidneys and kidneys' knob and channel fat were left intact in the carcass. The carcasses were weighed warm and then chilled at 4°C for 24 hours, thereafter the cold carcasses were reweighed.

The tail was removed from its base and weighed. The kidney knob and channel fat were removed and weighed . the carcass was then halved along the vertebral column into left and right sides, the left side was weighed and broken into whole sale cuts according to M.L.C. procedure (1976), which include head, neck, breast, leg and chump, single short quarter, loin, best end of neck and tail.

Each cut was weighed and dissected into muscle, bone, fat and trim. The weight of each tissue was determined and recorded.

**Statistical procedure:**

Simple randomized design was used in the experimental procedure. Difference between means (LSD) was computed according to Duncan's multiple rang test (Snedecor and Cochran, 1980)

III. RESULTS AND DISCUSSION

**Table 3. Feedlot performance data**

Item	Group A	Group A	Group A	S.E.	Level of significance
Number of animals	10	10	10	-	-
Induction weight (kg)	41.60	42.30	41.30	0.57	NS
Final body weight (kg)	43.65 d	48.15 e	45.60 de	0.55	**
Feedlot period (days)	56	56	56	-	-
Total live weight gain (kg)	3.64	5.85	5.50	0.45	NS
Daily live weight gain (g) <sup>1</sup>	65.05	104.47	98.21	8.09	NS
Total concentrate intake (kg) <sup>2</sup>	1.12	1.46	1.07	-	-
Total roughage intake (kg) <sup>2</sup>	0.94	0.94	0.94	-	-
Total D.M. intake <sup>2</sup>	2.06	2.40	2.01	-	-
Feed conversion ratio <sup>3</sup>	16.61	15.75	16.82	1.39	NS
Gut fill (%)	14.57	12.92	11.93	0.79	NS

<sup>1</sup> g/head/day

<sup>2</sup>kg/head/day

<sup>3</sup>feed/kg gain

**N.B.** in this and subsequent tables means on the same line having similar superscripts are not significantly different.

NS not significant

\*p< 0.05 a,b,c

\*\*p<0.01 d,e,f

\*\*\* p<0.001 g,h,i

**Table 4. Slaughter weight and carcass characteristics**

Item	Group A	Group B	Group C	SE	Level of significance
Slaughter weight (kg)	44.00 a	47.50ab	44.38a	0.44	*
Hot carcass weight (kg)	22.10a	25.00ab	23.15b	0.34	*
Cold carcass weight (kg)	21.13a	24.00ab	22.55b	0.30	*
Cold side weight (kg)	10.13a	11.63ab	10.25a	0.21	*
<b>Dressing %</b>					
Hot carcass wt/live wt base	50.27g	51.85gh	59.24h	0.61	***
Hot carcass wt/empty body wt	58.84a	60.09ab	59.24b	0.96	*
Cold carcass wt/ live wt	48.04	50.27	50.82	0.63	NS
Cold carcass wt / empty body wt	56.25	57.70	57.79	3.46	NS
Total muscle %	56.12ab	50.38a	56.66b	0.79	*
Total bone %	21.40	19.95	19.96	0.37	NS
Total fat %	20.15	26.22	25.24	1.46	NS
Total trim %	5.70	5.75	6.43	0.19	NS
Muscle / Bone ratio	2.55	2.53g	2.84h	0.02	***
Muscle / Fat ratio	2.83	1.96	2.36	0.17	NS
Gut fill %	14.57	12.92	11.93	0.79	NS

**Table 5. Yield of whole sale cuts (as % of cold side weight)**

Joint	Group A	Group B	Group C	SE	Level of significance
Leg and chump	33.11	32.93	33.89	0.76	NS
Single short	30.78	30.35	30.39	0.58	NS

forequarter					
Loin	11.81	11.64	11.44	0.34	NS
Best end of neck	9.03	7.82	8.53	0.18	NS
breast	6.40	6.46	6.85	0.21	NS
Neck	6.99	6.53	7.14	0.24	NS
tail	6.64	8.45	7.81	0.69	NS

**Table 6.Meat chemical composition**

Item	Group A	Group B	Group C	SE	Level of significance
Moisture %	72.84d	67.57de	70.94e	0.4	**
Protein %	22.32e	23.38de	22.10e	0.03	**
Fat %	2.31h	4.80gh	2.99h	0.08	***
Ash %	1.58g	1.04gh	1.12h	0.04	***

It was found that group B which utilized 30% molasses scored the highest feed intake 2.4 kg/ DM / Day than the other groups A and C which consumed 2.06 and 2.01 kg/ DM / Day respectively.

The above findings were higher than those reported by Mansour (1987) who fed diets containing groundnut hulls at a rate of 38-43 % resulted in feed intake values as 1.02,1.13 and 1.40 kg/DM/Day.

The daily live weight gain was not significantly different among treatment groups . Group B (30% molasses) showed the highest daily weight gain 104.47 g/day while Group C (0% molasses) gained 98.21 g/day while group A (50% molasses) had the highest gain 65.05 g/day. The results obtained in this study are lower than those reported by Elkhidir et al (1988) who fed three groups of Sudan desert lambs with high molasses % , low molasses % and high sorghum diets. The mean daliy live weights were 161 g/day, 196 g/day and 179 g/day respectively.

The results obtained are also lower than those obtained by Gaili and Ali (1985) who reported average daily gain of Sudan male sheep as 125 g/day when fed on diet containing sorghum 35%, wheat bran 15%, cotton seed cake 20%, groundnut hulls 29% and salt 1%.

The obtained results are higher than those reported by Elkhidir et al (1984) who reported feed conversion ratios of 8.10 and 9.60 for two groups of ewes fed on molasses-peanut hulls and dura grain based diets

The values for FCR are high which reflects some factors leading to loss of feed. These factors could be the poor design of the feeding troughs which permit the animals to throw away some of the feed while searching their diets. The other factor could be the loss of moisture from the molasses containing feed due to the high summer temperature.

The dressing percentages of hot carcass on slaughter weight basis in this study were 50.27%, 51.85% and 59.24% for groups A, B, and C respectively. The results obtained are comparable with those reported by Gaili et al (1972) who recorded dressing % of 52.25% for mature Sudan desert sheep. Gut fill results are comparable with findings reported by Itidal (1989) .

In this study the whole sale cuts produced no significant differences among the three treatments and the values are

comparable to Elkhidir (1989) for Sudan desert sheep fed on high concentrate diet containing groundnut hulls.

#### IV. CONCLUSION

The study concluded that feeding diets containing molasses 30% performed good in feedlot and produced better carcass characteristics when compared with others fed diets with 50 % molasses.

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