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RESEARCH OPINIONS IN ANIMAL & VETERINARY SCIENCES

# Effect of different levels of molasses on milk production and quality of lactating Sudan desert sheep

**Khalid, A. F.[1*], A.E. Guddal[1], K.M. Elamin[1], A.E. Amin[2], M.E. Mohammed[3] and M.D. Mohammed[1]**

[1]Faculty of Animal Production, University of Gezira; [2]Faculty of Veterinary Science, University of Khartoum; [3]Faculty of Agricultural Science, University of Gezira

## Abstract

This experiment was conducted to test the effects of different levels of molasses with or without Dura grains on milk production and composition in lactating desert sheep. Eighty ewes of 3.5 years of age were used in this experiment. Animals were allowed to graze freely from 6: 00 AM to 4:00 PM and then fed restricted 0.75 kg/day concentrates having 10 MJ/ME and 16% crude protein. Molasses and Dura were used in the ratio of 50:0, 40:10 and 30:20 for 21 days. Control group was not supplemented. Weekly body weighing and daily milking volumes were recorded. Milk composition was analyzed for protein and fat percentage. The results revealed that there were no significant ($P<0.05$) differences among the treatments in the body weights during early and late lactation, but some variations in milk yield and quality especially in the Dubasi ecotype in the late lactation was observed. The milk composition in this study was statistically similar for both ecotypes in both lactations. Both milk protein and milk fat percentages fell within normal range. Results revealed that high or low level of molasses could be fed in combination with grain to Desert sheep ecotypes with no ill effects on milk yield and composition.

**Keywords:** Sudan, desert ewe, milk, molasses, Dura

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## Introduction

Most of the world sheep population is found in Asia followed by Africa. Most of African sheep is found in Sudan which has been estimated to be 27 million dairy sheep and 9.3 million meat type (FAO, 2008).

Milk is the normal secretion of the mammary glands and is the only food that can be utilized and assimilated by young mammals during their early period of life. Ingredients in milk provide both energy and the building materials needed for growth (Bylund, 1995). Milk has a vital role in building healthy society and can assist in rural development, employment and slow down the migration of rural population (Sarwar et al., 2002). Milk is considered as a nearly complete food that contains all the essential nutrients in approximately balanced form (Kanwal, 2004). Sheep milk contain higher amount of protein (6.57%) compared to cow (5.23%) and goat (2.38%) milk and higher content of fat (8.96%) while cow (4.56%) and goat (4.73%) (Kanwal, 2004). Sheep milk is an excellent raw source for milk processing industry especially cheese production (Talevski et al., 2009). The shortage in animal protein is expected to shoot continuously in the developing countries due to increasing demand and low animal production. Methods to improve milk production rate through improved management and specific feeding system are needed (Gall, 1975). This experiment was conducted to determine the effects of supplementing lactating desert ewes with different levels of molasses, with or without grains on body weight, milk production and composition in early and late lactation.

## Materials and Methods

### Study area

This experiment was conducted at El-Huda Research Station, Ministry of Science and Technology,

**Corresponding author:** Khalid, AF, Faculty of Animal Production, University of Gezira

El Huda, Managil Locality, Gezira State. Experimental animals were lodged in Sheep Research Pens (8x16 m) bounded by mesh-wire supported by 1.5 m coral bars. A broken shaded area 5x11x2.5 m was divided into eight partitioned pens (each 4x4 m). Each group was supplied with one longitudinal barrel feeder and one concrete based drinker. The shed was coloured with spray paint and the animals were treated against internal and external parasites.

**Experimental animals**

Eighty ewes, 2.5–4.5 years of age of balanced numbers of either Dubasi (30–50±2kg) or Watish (25–40±2kg) pure ecotype were used in this experiment (forty ewes in early lactation and forty in late lactation). Ewes were purchased from different local animal markets in the Managil Locality. Healthy ewes were chosen to be in early lactation (ten days post delivery when colostrum was ceased). The ewes had good udder conformation.

The ewes were segregated according to their ecotypes i.e., Gezira type (Dubasi) and Ingasana type (Watish). Each ecotype was randomly divided into four groups (5 heads per group) of which one were control with three test groups.

**Animal feeding**

All experimental groups were freely allowed from 6:00 AM to 4:00 PM on available agricultural grasses. Additionally, they were supplemented sorghum stover (Gassab), groundnut hay and hulls and miscellaneous grasses. The three test groups were further supplemented daily with 0.75 kg/day concentrated diet (Table 1). The control grazing sheep nutritional plane was estimated at two thirds of the supplemented sheep i.e., 6 MJ/ME and 12% CP. Diets were formulated isocaloric (10 MJ/ME) and isonitrogenous (16% CP). Molasses/Dura (energy part) comprised 50% of the ration by weight and mixed at the ratio of 50:0, 40:10, 30:20 in the feed of the groups B, C and D respectively. Green fodder, either Abu-70 (Sorghum bicolor) or Clitoria (Clitoria ternate) was also supplied to the animals twice weekly.

**Data collection**

Initial weight was recorded on the first day of experimental feeding using a sheep balance (to the nearest 0.1 kg) and thereafter at the end of every week. Weights were recorded early in the morning before grazing. Average weekly body weights were calculated. Milking was done twice daily (morning before grazing and evening before concentrate feeding). Yield was measured in milliliters. Only one udder quarter was milked saving the other for suckling lambs. Daily milk yield was the sum of one quarter morning and evening milking multiplied by two. The weekly morning (0.5 kg) and evening (0.5 kg) composite milk samples from each group of either Dubasi or Watish were collected and cooled to freeze until laboratory analyses. Milk was analyzed chemically for crude protein according to Kjeldahl method (Anonymous 1990) and crude fat percentage using the Gerber method (Association of Official Agriculture Chemists (AOAC, 1975).

**Table 1: Percent of ingredients (as fed) to Dubasi and Watish experimental groups**

| Group→ Ingredients ↓ | A | B | C | D |
|---|---|---|---|---|
| Molasses | - | 50.00 | 40.00 | 30.00 |
| Dura | 50.00 | - | 10.00 | 20.00 |
| Groundnut cake | 20.00 | 20.00 | 18.00 | 16.00 |
| Groundnut hulls | 16.00 | 16.00 | 18.00 | 20.00 |
| Wheat bran | 10.00 | 10.00 | 10.00 | 10.00 |
| Urea (46% N) | 02.00 | 02.00 | 02.00 | 02.00 |
| Common salt | 01.00 | 01.00 | 01.00 | 01.00 |
| Limestone | 01.00 | 01.00 | 01.00 | 01.00 |
| Total | 100.00 | 100.00 | 100.00 | 100.00 |

## Results

Table 2 shows the mean and standard deviations of the performance during early lactating Dubasi and Watish sheep. There was no significant difference between body weights of both the breeder under the effect of different treatments. Milk yield was significantly high in group D in both the breeds.

The average milk composition of the early lactating Dubasi and Watish sheep is shown in Table 3. There was no significant difference in milk fat and protein between the milk compositions of the two breeds.

There was no significant difference in body weight between the two breeds during late lactation. Milk yield was significantly high in group B in Dubasi sheep. Similarly, the milk protein percentage was significantly low in group B of Dubasi sheep. There was no

**Table 2: Average (Mean ± S.D.) performance of early lactating Dubasi and Watish sheep**

| Ecotype | Item | Groups | | | |
|---|---|---|---|---|---|
| | | A | B | C | D |
| Dubasi | Body weight (kg) | 39.39± 3.77$^{a}$ | 42.41± 4.00$^{a}$ | 38.52±4.29$^{a}$ | 46.29±3.77$^{a}$ |
| | Milk yield (ml)/day | 532.69± 88.38$^{a}$ | 657.59± 173.59$^{b}$ | 687.07±147.06$^{b}$ | 789.05±90.67$^{a}$ |
| Watish | Body weight (kg) | 33.97± 4.52$^{a}$ | 34.84± 3.78$^{a}$ | 34.22±3.79$^{a}$ | 29.90±0.70$^{a}$ |
| | Milk yield (ml)/day | 299.76± 72.49$^{a}$ | 477.99± 141.89$^{b}$ | 433.77±129.88$^{b}$ | 567.34±82.87$^{a}$ |

Means with different letters in the same row are different (P>0.05)

Group A: molasses and grain ratio 50:00, Group B: molasses and grain ratio 40:10, Group C: molasses and grain ratio 30:20

**Table 3: Average (Mean ± S.D.) milk composition of early lactating Dubasi and Watish sheep**

| Ecotype | Item | Groups | | | |
|---|---|---|---|---|---|
| | | A | B | C | D |
| Dubasi | Milk protein % | 6.00±0.20[a] | 6.00±0.80[a] | 6.00±0.52[a] | 6.46±0.55[a] |
| | Milk fat % | 5.00±0.20[a] | 5.46±1.05[a] | 4.76±0.25[a] | 4.96±0.55[a] |
| Watish | Milk protein % | 5.86±0.25[a] | 5.80±0.80[a] | 5.90±0.65[a] | 6.30±0.65[a] |
| | Milk fat % | 4.53±0.50[a] | 5.43±0.6[a] | 5.03±0.45[a] | 5.53±0.50[a] |

Means with different letters in the same row are different (P>0.05)
Group A: molasses and grain ratio 50:00, Group B: molasses and grain ratio 40:10, Group C: molasses and grain ratio 30:20

**Table 4: Average (Mean ± S.D.) performance of late lactating Dubasi and Watish sheep**

| Ecotype | Item | Groups | | | |
|---|---|---|---|---|---|
| | | A | B | C | D |
| Dubasi | Body weight(kg) | 38.83±8.28[a] | 41.07±1.46[a] | 41.23±2.53[a] | 32.60±2.49[a] |
| | Milk yield (ml)/day | 195.98±70.40[b] | 306.50±67.18[a] | 256.87±58.07[b] | 231.90±9.77[b] |
| Watish | Body weight(kg) | 30.71±3.5[a] | 35.63±6.58[a] | 32.13±1.54[a] | 32.42±3.75[a] |
| | Milk yield (ml)/day | 176.11±64.18[a] | 217.49±59.89[a] | 233.57±73.28[a] | 227.29±49.48[a] |

Means with different letters in the same row are different (P>0.05)
Group A: molasses and grain ratio 50:00, Group B: molasses and grain ratio 40:10, Group C: molasses and grain ratio 30:20

**Table 5: Average (Mean ± S.D.) milk composition of late lactating Dubasi and Watish sheep**

| Ecotype | Item | Groups | | | |
|---|---|---|---|---|---|
| | | A | B | C | D |
| Dubasi | Milk protein % | 5.83 ±0.29[a] | 4.77 ±0.45[b] | 4.93 ±0.66[a] | 5.13 ±0.71[a] |
| | Milk fat % | 5.40 ±0.55[a] | 5.73 ±0.30[a] | 5.10±0.10[a] | 5.40±0.12[a] |
| Watish | Milk protein % | 5.00 ±0.66[a] | 4.40 ±0.53[a] | 5.20 ±0.40[a] | 5.60 ±0.60[a] |
| | Milk fat % | 5.73 ±0.47[a] | 5.93 ±0.30[a] | 5.37 ±0.66[a] | 5.67 ±0.005[a] |

Means with different letters in the same row are different (P>0.05)
Group A: molasses and grain ratio 50:00, Group B: molasses and grain ratio 40:10, Group C: molasses and grain ratio 30:20

significant difference between the milk compositions of Watish sheep as shown in Table 4.

## Discussion

It is evident from the performance data that there were no significant differences among the treatments in the average body weights at different lactation periods. Amin (1982) reported that the daily milk yield of Sudan Desert sheep ranged between 215-237 ml/day. The differences in body weights might be due to differences in age, type of the diet, ecotype of animals used, and system of feeding, rearing and seasonal conditions (Ahmed, 1988).

There were variations among animals in lactation characteristics. Total milk yield in Watish sheep in early lactation (567.34 ± 82.87 ml) was lower than in Dubasi sheep (789.05 ± 90.67 ml). Similar observations were reported by Devendra and McLeroy (1982) in comparing average yields per lactation of Desert ecotype sheep. There was no adequate information on sheep milk production to allow

comparison, however, it was lower than 128.8 kg reported in Hamdani and 116.3 kg in Awassi but close to Karadi (750 ml/day) in Iraq (Abdelrahman et al., 1988). Higher milk yields are generally associated with higher initial yields, persistency and lactation length. Peak milk yield in Sudan Desert sheep was relatively late than that reported by Abdelrahman et al. (1988) in the first week post-lambing in Awassi sheep in Iraq and in the fourth week in some American breeds. Data were close to the reported 4-5 weeks post-lambing in Hamdani sheep in Iraq (Abdelrahman et al., 1988).

The results of milk yield showed that at the early lactation experiment, feeding combinations of 30% molasses and 20% dura gave significantly more yield in both Dubasi and Watish ecotypes, while at late lactation only the Dubasi ecotype fed combinations of 30% molasses and 20% Dura gave significantly more yield. The presence of a high propionate (the glucogenic SCVFA) in comparison with the butyrate (ketogenic SCVFA) favoured more energy compared to other experimental feed combinations (Preston and Willis, 1974). Higher milk yield at late lactation of the Dubasi ecotype in this experiment was seen at the expense of its average body weight, being lower than the control while the opposite was seen in the Watish ecotype at late lactation. Watish are known low yielder compared to Dubasi and can reach as low as 1.0- 1.4 kg/day for the Nilotic or Zaghawa sheep (Abdulazyim, 1996). These results are generally higher than the figures reported at Elhuda Research Station, Gezira State, where Desert sheep pure breeds (mainly ecotypes Watish, Dubasi and Ashgar) basic information concerning milk yield, milk

curve and milk composition were studied under different seasonal conditions (Sulieman, 2002).

The results showed that desert sheep milk composition in this study was statistically similar for both ecotypes at both lactations. There were no variations in absolute values of protein and fat percentage within ecotypes in early or late lactations. Both milk protein and milk fat percentages fell within ranges stated by Ling (1961), Ashton et al. (1964) Abdelrahman et al. (1988) and Ash (1987). The variations in milk composition are usually due to the genetic, nutritional and physiological factors.

## Conclusions

High or low levels molasses feed combinations can successfully be fed to Desert sheep ecotypes Dubasi and Watish with no ill effects or noticeable depression in performance. Comparable to all high level molasses feeding systems, the higher the combination with grains the better performance attained. As the milk yield is always tied to the level of energy intake and utilization, milk composition is not much affected due to the genetic control at similar management conditions.

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