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ORIGINAL ARTICLE

Effect of Feeding Fodder beet (*Beta vulgaris* L.var.Crassa) on Fattening Efficiency of Sudan Desert Sheep

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ABSTRACT

A 35-day fattening trial was conducted at the farm of the Faculty of Animal Production –Sudan University of Science and Technology, to evaluate the effect of feeding fodder beet compared to fodder maize on fattening efficiency of Sudan desert sheep. Eighteen, 12-15 month old Sudan desert sheep (Dubassi type) of an equal average initial body weight (26.42 Kg) were randomly assigned to three groups (six heads per each): (1) the beet group (A), was fed on 100% beet tubers; (2) group (B), in which lambs were fed on 50% beet and 50% fodder maize (3) the control group was fed on 100% fodder maize. All animals in the three groups were given an equal amount of concentrate (groundnut cake, groundnut hulls, wheat bran, molasses and salt) per head per day. Water was offered *ad libitum* throughout the five weeks of the trial. The results showed a significant difference ($p \leq 0.05$) in total gain weight (43.13 ± 6.30 Kg) and average daily gain (0.35 Kg) favor of group (B). Total gain weights (41.26 and 39.96 Kg in group A and C, respectively) and average daily gains (0.27 and 0.20 Kg for group (A) and (C), respectively) did not differ ($p \geq 0.05$). The highly significant dressing percentage was obtained by group (B) (44.1 %) compared to group (A) (41.1 %) and (C) (40.7 %). No differences among groups were observed with regard to carcass composition and quality except for empty rumen and pancreas weights favor of group (B).

Key words: Fodder beet, Feeding, Fattening efficiency and Desert sheep

Introduction

Livestock production contributes largely to the national income in the Sudan. The estimated livestock number in 2008 was 140 million heads, comprising 41.4, 43.1, 51.1 and 4.4 million heads of cattle, goats, sheep and camels, respectively [3]. This puts the Sudan as a leading livestock producer in Africa and Arab countries. Animal production depends mainly on natural range which is affected by rain fluctuation and low quality grasses. This necessitates the production of irrigated forage crops of high yield and quality [13] such as fodder beet.

Sheep is of an economic importance because of its good productive and reproductive characters and merits, over the members of family Bovidae, like low flock expense, multipurpose of production (milk, meat, leather and wool), efficient grazer in arid and semi-desert, efficient use of agricultural bi-products, can be raised on low quality fodders, low labor cost, high reproductive efficiency and low cost of production and housing [1].

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Fodder beet (*Beta vulgaris* spp. Vulgaris), a member of the Chenopodiaceae, is popular in many countries such as USA, Denamark, Syria and Egypt; it offers a higher yield potential than any other arable fodder crop [2] and it is tolerant to salinity [18].

Fodder beet is not common in the Sudan, and no data is available on its effect on meat production, so there is a real need for scientific research concerning its feeding value under Sudan conditions.

The above and below growth parts (leaves and roots) are used to feed the animals, both for milk and meat production but, the main fodder is tuberous roots [12]. Beet tops and roots are succulent, palatable, easily digestible and liked by most livestock [6]. Its tubers are nutritious, could be a good source of carbohydrates and very rich in starch (NFE 81 % of DM) [17]. Its metabolizable energy is 11.8 MJ/Kg DM [15]. Moreover, fodder beet has been found to have replacement value relative to concentrate of 81% to 91% in sheep trials [9].

Fodder beet proved to have a potential success as a winter fodder crop in the Sudan and it is a good forage especially during the critical period of forage shortage such as late winter and early summer season in the Sudan [14] and other countries. The objective of this research is to study the effect of feeding fodder beet tubers on both fattening efficiency and carcass characteristics of Sudan desert sheep compared to fodder maize.

Materials and methods

Location:

The fattening trial was conducted at the farm of the Faculty of Animal Production, Sudan University of Science and Technology at Kuku in 2008. The feeding value of fodder beet in fattening efficiency for Sudan desert sheep was evaluated and compared to that of fodder maize.

Experimental animals:

Eighteen Sudan desert sheep (Dubassi type) were bought from El mwaleh market-west of Omdurman, of 26.42 Kg weight and free from diseases and in good health status.

Grooming:

The lambs were groomed with body brush, dehorned and claw cared.

Deworming:

The flock of lamb was dewormed against internal parasites with pandazol substance twice, the first dose after one week and the second one after 15 days.

Grouping:

The experimental lambs were divided in to three groups of six animals each, two test groups: A and B, control group was C.

Marking and Identification:

Each group was marked with ear tags (A, B, C).

Housing:

The experiment was carried out in a shelter house, each equipped with two feed troughs, one for green forage and the other for the concentrate. The pens were cleaned.

Feeds and Feeding:

The experimental feeds were fodder beet tubers, fodder maize and concentrate on as fed-basis (Table I).The lambs were allocated to three dietary treatments: 1.7 Kg of fresh beet tubers was given to the treated group. Beet tubers were chopped manually using a sharp knife. The other treated group was fed on 0.8 Kg beet tubers and 0.8 Kg fodder maize (50:50). While the control group was fed on 0.8 Kg of maize forage. The roughages (beet and maize) were offered once a day. Concentrate supplements were given to the three groups once a day. The lambs had *ad libitum* access to water throughout the duration of the trial. The adaptation period lasted for three days and the experimental feeding period was five weeks.

Weighing:

weight/ head (Kg) of each group was taken separately and recorded weekly using a hooked scale balance. Dressing percentage, body gain weight and final weight were also measured.

Statistical Analysis:

Data was statistically analyzed as Completely Randomized Design (CRD) by standard analysis of variance (ANOVA). Treatments means were separated by the Duncan Multiple Range Test at 5 % level according to Gomez and Gomez [11] using SPSS Computer Program.

Results and disscussion

Feedlots performance:

Table (II) shows the feedlots performance for the lambs fed on the two fodders (beet and maize)

during the fattening period (2008). The results revealed a significant ($p \leq 0.05$) difference in body gain weight (o.35 Kg) and total weight (43.13 Kg) at slaughter time favor for group (B) (50 % beet + 50 % maize).This may be due to complementary effect when fodder beet and maize were fed together to the lambs [7].

Lambs fed on 100 % beet scored insignificantly higher gain weight and total weight (0.27 and 41.26 Kg, respectively) than those raised on 100 % fodder maize (0.20 and 39.96 Kg, respectively). The dry matter of beet (15 %) was less than that of maize (25 %), even though, feeding on beet resulted in higher gain weight .This may reflect the higher feeding value of beet [14].

Carcass composition:

No significant differences concerning cold and hot weight of carcass composition were observed between the three groups (Table II). Group (B) obtained the highest hot and cold weights (21.40 and 19.8 Kg, respectively) followed by group (A) (hot weight 19.75 and cold weight 18.85 Kg, respectively), while the lowest hot weight (17.6 Kg) and cold weight (16.45 Kg) were recorded for the control group ©.

Dressing percentage:

A highly significant ($p \leq 0.01$) difference in dressing % was observed between the three groups (Table II). The lambs on the beet with maize diet (B) achieved the highest dressing % (44 %) compared to other groups. The least percentage was obtained by the control group (C). This may be attributed to the higher energy content of the beet tubers [16] which is needed for fattening [8] and so, higher body fat deposits and dressing percentage. Also, these results are in line with those reported by Buhaif [5] who found a lower dressing percentage (42.66%) using agricultural by-products for desert sheep fattening during drought season.

Carcass quality:

Table (III) shows the effect of fodder beet on non carcass components. The three groups of lambs were not significantly different in non carcass components except for empty rumen and pancreas weight ($p \leq 0.05$). Group (B) recorded the higher significant empty rumen weight (1.95 Kg) and pancreas weight (0.09 Kg) compared to groups (A) and (C) which were not significantly different. Flanagan [10] reported that lambs on the fodder beet diet produce heavier carcasses compared to those on grass.

Table 1: composition (as fed) of the concentrate ration fed to lambs during the fattening period (2008).

Rations	30 %
Ground dura grains	19 %
Groundnut seed cake	20 %
Wheat bran	30 %
Groundnut hulls	1 %
Salt	

Table 2: Feedlots performance (2008).

parameters	Means			F-test
	A	B	C	
Total weight(Kg)	41.26± 6.48 b	43.13± 6.30 a	39.96± 4.26 b	*
Weight gain(Kg)	0.27± 0.07 b	0.35± 0.08 a	0.20±0.09 b	*
Cold weight(Kg)	18.85± 2.85a	19.8± 0.7 a	16.45± 0.45 a	NS
Hot weight(Kg)	19.75± 2.75 a	21.40± 1.60 a	17.6± 0.4 a	NS
Dressing %	41.1± 0.6 b	44.1± 1.5 a	40.7± 0.2 b	**

Data are means of six animals± SD
NS: not significant *: significant at 5 % level **: significant at 1 % level

Table 3: Effects of fodder beet on carcass quality (non carcass components).

Parameters	Means			F-test
	A	B	C	
Blood weight	1.65± 0.2 a	1.78 ± 0.23 a	1.45 ± 0.15 a	NS
Head weight	2.68± 0.43 a	2.58± 0.8 a	2.25 ± 0.15 a	NS
Legs weight	1.10± 0.01 a	1.03± 0.03 a	1.08± 0.04 a	NS
Skin weight	3.13± 0.48 a	3.13± 0.23 a	2.8± 0.25 a	NS
Full rumen wt	4.53± 0.43 a	10± 1.5 a	9.25± 0.76 a	NS
Empty rumen wt	1.15± 0.15 b	1.95± 0.55 a	1.18± 0.8 b	0
Full intestine wt	2.25± 0.25 a	2.48± 0.03 a	2.33± 0.28 a	NS
Empty intestine wt	1.4± 0.4 a	1.00± 0.0 a	1.00± 0.0 a	NS
FAT intestine	0.43± 0.03 a	0.4± 0.1 a	0.3± 0.0 a	NS
Liver wt	0.58± 0.08 a	0.4± 0.1 a	0.3± 0.0 a	NS
Heart wt	0.21±0.08 a	0.18± 0.03 a	0.13± 0.03 a	NS
Spleen wt	0.14±0.01 a	0.13± 0.03 a	0.13± 0.03 a	NS
Lung wt	0.46±0.24 a	0.83± 0.08 a	0.85± 0.05 a	NS

Table 3: Continue

Pancreas wt	0.05±0.0 b	0.09± 0.01 a	0.05± 0.0 b	0
Testes wt	0.53±0.23 a	32± 0.05 a	0.25± 0.0 a	NS

NS: not significant/ *: significant at 5%

Table 4: Effects of fodder beet on cuts.

Parameters	Means			F-test
	A	B	C	
Loin trimmed	0.63± 0.08 a	0.73±0.13a	0.6 ± 0.05a	NS
Flank weight	0.38± 0.03 a	0.40± 0.1a	0.28 ± 0.03a	NS
Ribs weight	0.65± 0.025a	0.75±0.05a	0.73± 0.03a	NS
Breast weight	1.62± 0.42 a	1.60± 0.0a	1.23± 0.03a	NS
Shoulder weight	2.50± 0.5 a	2.48± 0.3a	2.50± 0.0a	NS
Leg cut carcass	2.73± 0.33 a	2.75± 0.1a	2.23± 0.08a	NS

NS: not significant

Cuts:

The three groups of lambs showed no significant differences in all cuts components (Table IV). Even though, it seems that inclusion of beet tubers in the diet of the lambs improved the cuts weights.

Carcass Shrinkage Rate:

In this study, the carcass shrinkage rate was the same (1.5 %) for groups (A), (B) and (C). Ashmawi and Salim [4] stated that the shrinkage percentage was 0.77 % using sunflower seeds as source of protein for desert sheep fattening.

Conclusions and Recommendations:

- Feeding on fodder beet either wholly (100%) or partially (50% beet+50% maize) improved the fattening efficiency of Sudan desert sheep.
- Animals fed on beet tubers with maize (1:1) showed significant gain weight and highly significant dressing percentage, so it is recommended to fed beet and maize together for sheep fattening to obtain higher gain weight
- Generally, beet has positive effects on sheep fattening because of its high energy content, it could provide a suitable alternative to many traditional feeds such as grains.
- It is better to chop beet tubers for best performance and finishing.

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