J. Agric. Sci. Mansoura Univ., 25 (8): 4877 - 4889, 2000.

NUTRITIONAL EVALUATION OF DRIED OR ENSILED SUGAR BEET TOPS FOR GROWING LAMBS

Ahmed, M.H.
Department of Animal and Fish production, Faculty of Agriculture, (Saba Basha), Alexandria University

ABSTRACT

Twenty-seven Barki lambs, averaged 24.66kg body weight and aged 6 months were used to study the effect of feeding sugar beet tops on their growth performance, digestibilities, carcass characteristics and some blood constituents. Animals were divided equally into three groups, each of nine lambs and each animal was provided with a concentrate mixture at level of 40% of its nutritional requirements. In addition, the three groups were randomly allotted to be fed *ad lib*. on one of three experimental rations, berseem hay (ration A); sugar beet tops silage (ration B) and dried sugar beet tops (ration C).

The results obtained revealed that digestibilities of all nutrients were significantly ($P<0.05$) higher for ration (B) than those for rations (A) and (C) except the digestibilities of dry matter and crude protein which did not differ significantly between rations (B) and (A). Also the nutritive values of rations (A) and (B) were significantly ($p>0.05$) higher than those of ration (C). Voluntary intake (as TDN or DCP) from the experimental rations were significantly higher for rations (A) and (B) than from ration (C). These results were reflected on the body weights of animals, where lambs fed rations (A) and (B) gained more weights than those fed ration (C). Consequently, feed efficiency of these rations improved in the same trend. Feeding growing lambs on dried or ensiled sugar beet tops resulted in palpable decreasing in feeding cost for producing one kg body weight. Nitrogen intake, digested and retained N by lambs fed rations (A) and (B) were significantly all higher than those of ration (C). Carcass characteristics of lambs were not affected by feeding dried or ensiled sugar beet tops. On the other hand, feeding growing lambs on ration containing dried sugar beet tops (ration B) resulted in a significant increases in serum total protein, albumin, globulin and creatinin in comparison with those of lambs fed on rations (A) and (C).

Results of this study countenance using dried or ensiled sugar beet tops for feeding growing lambs.

Keywords: sugar beet tops - silage - hay - feeding values - carcass quality - serum metabolites.

INTRODUCTION

Livestock make important contributions to resource utilization and economical growth in developing countries. At the same time, it is well known that, there is a serious shortage in the available feedstuffs for animals in Egypt. Therefore, unconventional and/or agricultural by- products must be used to solve, at least, a part of this problem.

Sugar beet is planted in Egypt for sugar production and the tops of the plants are not used in any other purposes. Therefore, sugar beet tops (SBT) are produced in large quantities and are considered as green residues at the harvesting time. About 17 tons of SBT are produced from each feddan and 12.5 tons of SBT are left over (Bendary, *et al*., 1992 a). In Egypt, about half million tons of SBT are available each year (Taie, *et al*., 1996) The excess of SBT is suggested to be conserved as silage (Podkowka, 1983) due to its high moisture content. It was clear from the previous studies (Ghoneim, 1964; Kosar and Proksova, 1975; Brabander, *et al*., 1983; Koljajic, *et al*., 1983; Bendary, 1991, Bendary, *et al*., 1992 a, b, c, d; Baker, 1995 and Bendary, *et al.*, 1996) that SBT (dried or silage) is highly palatable roughage. Its feeding value was distinctly high and can be used successfully for feeding ruminants.

The present study aimed to investigate the effects of feeding dried or ensiled SBT on performance, digestibility, some blood component and carcass characteristics of growing Barki lambs.

MATERIAL AND METHODS

1- Animals and Management:

Twenty-seven, 6- months old, Barki lambs were divided into three groups (nine lambs per group) of an initial average body weight of 24.66$\pm$0.85 Kg. Each group was housed separately in shaded pen 4 x 4 meter, one week before the start of the experiment for acclimatization, during which animals were treated with antihelminitics. The three groups were assigned at random to the three experimental dietary treatments.

2- Processing of sugar beet tops into hay and silage :

Fresh sugar beet tops were divided into two parts. One part was processed into hay by spreading over a high area covered with rice straw in not more than two layers for one week. Beet tops were shuffled upside down three times at two days intervals. The process of upsetting down was repeated if necessary to be sure that tops were completely dried. The other part of fresh sugar beet tops was processed into silage by spreading over a high area covered with rice straw for 2-3 days after which moisture percentage in the used tops was decreased to about 55%. Then tops were chopped (3-5 cm size) and compacted into layers in 9m^3 silos (3 x2x1.5 m). Molasses was spread over each layer, after well compacting, in percentage of 5% of sugar beet tops. The sugar beet tops silage was used after 6 weeks ensiling period. Three silos were used for this study.

3- Feeding and digestibility trials: -

Each lamb of the three groups was provided daily with 40% of its requirements from a commercial concentrate mixture according to allowances recommended by Kearl (1982). In addition, the first group (A), control group, was offered berssem hay *ad lib*., while the second group (B) was offered dried sugar beet tops *ad lib*. and the third group (C) was offered sugar beet tops silage *ad lib*. Each group of the experimental animals was fed twice daily at 8.00 a.m. and 3.00 p.m. Water was available during daytime. Lambs were weighed once a week, during the feeding trial that lasted for 91 days, before morning feeding and body weights were recorded for each animal. Voluntary intake from each experimental diet was recorded daily.

At the end of the feeding trials, four animals from each group were placed individually in metabolic cages for 15 days of which the last 7 days were devoted for total faeces and urine collection. During this period intake from each diet was recorded daily. The diet offered and refusals, if any, were sampled and kept for chemical analysis. Total faeces weight and urine volume were also daily recorded and sampled (10% of each) for chemical analysis.

3- Blood serum samples:

At the end of digestion trials, blood samples were collected from each animal two times during 3 days. Jugular blood samples were taken before feeding and at 3, 6 and 8 hours after feeding to determine the concentrations of total protein, albumin and creatinine of blood serum.

4- Slaughter and processing techniques:

Slaughter test was undertaken with four animals from each group after the feeding experiment. Prior to slaughter, animals were fasted for 12 hours and their weights were recorded. These animals were slaughtered, bled, denched, skinned and eviscerated. During the evisceration process, the stomach and intestinal tract were carefully removed and weighed full and empty. All the internal organs were removed and their weights recorded. The carcasses were split through the vertebral column into left and right sides and washed, the hot carcasses weights were determined. They were then chilled at 2-4ºC for 48 hours, then they were reweighed to determine the cold carcass weight. At that time, the carcasses were cut between the last two ribs to obtain the eye muscles.

5- Analytical procedures:

Samples of feeds, refusals and faeces were dried (at 105ºC). These dried samples were milled and a composite sub-samples of each was saved for proximate chemical analysis using the official methods (A.O.A.C. 1980). Total urinary nitrogen was estimated by using the Markham micro-distillation apparatus (Markham, 1942). The pH of silage was tested according to the procedure of Barinett (1954). Total VFA's, lactic acid and ammonia-N of silage were determined chemically according to Karafashenko and Prokopeinko (1988).

Serum total protein, albumin and creatinine were estimated by colorimetric methods using commercial kits supplied by Biomerieux (poains, France). The globulin values were obtained by subtracting the values of albumin from the corresponding values of total protein.

Data were collected and then statistically analysed according to SAS program (SAS, 1993).

RESULTS AND DISCUSSION

Chemical composition of feed ingredients:

Chemical constituents of the three roughage ingredients (table 1) indicated that the dried sugar beet tops and its silage attained about the content of crude protein (CP) of berseem hay. However, the sugar beet tops (dried or silage) had a higher content of ether extract (EE), nitrogen free extract (NFE), and ash. In addition it had lower content of crude fiber (CF) than berseem hay. On the other hand, there were small differences in chemical composition between the two methods of sugar beet tops conservation, however dried sugar beet tops had a higher content of CP, EE and CF than sugar beet tops silage. Such results agree with those reported by Mohi El-Din *et al*., (2000). The previous studies (Bendary *et al*., 1992 a, b, c, d; Baker, 1995 and Bendary *et al*., 1996) indicated that sugar beet tops (dried or silage) are highly palatable roughage with a good feeding value and can be used successfully for feeding ruminants.

Table (1): Chemical analysis of the experimental ingredients.

Feedstuffs	DM %	Analysis of DM (%)				
		CP	EE	CF	NFE	Ash
Commercial concentrate mixture*	90.00	14.50	4.90	17.60	53.20	9.80
Berseem hay	88.00	12.80	1.97	26.12	45.65	13.46
Sugar beet tops (silage)	25.20	11.68	3.80	9.98	48.79	25.75
Sugar beet tops (dried)	80.08	10.18	1.11	11.90	51.84	24.97

*** Consisted of: 25% undecorticated cotton seed meal, 25% yellow corn, 30% wheat bran, 15% rice bran, 2% molasses, 2% limestone and 1% common salt.**

Silage quality and fermentative characteristics:

Physical and fermentative characteristics of the ensiled sugar beet tops were as follow:

Physical and fermentative traits of sugar beet tops silage (% of DM)

Item	Physical characteristics		pH	Lactic acid %	Total VFA_1S %	NH_3-N %
	Colour	Smell				
Sugar beet tops silage	Golden Yellow	Normal Odor	4.09	4.82	4.40	0.12

It appeared that silage have optimum level of pH (4.09). This pH value of the silage was within the desirable range of pH of good quality silage (Mohsen and El Santiel, 1983). The concentrations of lactic acid, total VFA'S and NH_3-N indicated that the silage was well preserved and palatable (Bendary, *et al*., 1992 b), which was supported by it's pleasant aroma and normal colour (golden yellow)

Digestibility coefficients and nutritive value:

Apparent digestibilities of the experimental diets and their nutritive values are presented in Table (2). Data pointed out that there were no significant differences in the digestibilities of DM and CP between the control ration (A) and the ration containing sugar beet tops silage (B),while these digestibilities were significantly ($p<0.05$) lower for sugar beet hay ration (C). Also, CF and NFE of diet containing sugar beet silage were digested better

(P<0.05) than those of the other two experimental diets (A and C) . On the other hand, sheep fed sugar beet hay diet tended to digest EE much better (P<0.05) than those given sugar beet silage and control diets. These data, also, indicated that the nutritive values, as TDN and DCP, of the control ration (A) and sugar beet silage ration(B) was significantly (P<0.05) higher than those of sugar beet hay ration (C). This result was due to the high values of digestibility coefficients of most nutrients of these rations (A and B). It could be concluded that the ensiling process improved the quality of sugar beet tops. A similar result could be observed from the work of Bendary et al, (1992, a and b) when they fed Friesian calves on either hay or silage of sugar beet tops.

Table (2): Digestibility coefficients and nutritive values of the experimental diets using growing lambs

Rations*	Digestibility coefficient (%)					Nutritive value (%)	
	DM	CP	EE	CF	NFE	TDN	DCP
A	68.65 [a]	73.70 [a]	63.90 [c]	72.11 [b]	69.03 [b]	65.66 [a]	10.00 [a]
B	68.14 [a]	73.62 [a]	68.98 [b]	74.52 [a]	75.08 [a]	65.31 [a]	9.959 [a]
C	66.52 [b]	64.57 [b]	70.78 [a]	64.19 [c]	66.24 [c]	62.99 [b]	9.53[b]

*** A = Concentrate mixture + berseem bay.**
B = Concentrate mixture + sugar beet tops (silage).
C = Concentrate mixture + sugar beet tops (dried).
Within columns means with different subscripts differ significantly (p<0.05).

Voluntary intake and growth performance:

Data on voluntary intake, weight gain and feed utilization are presented in Table (3). There were no significant differences in DM intake by lambs among the experimental diets. On the other hand, voluntary intake in terms of TDN and DCP were significantly (P<0.05) higher for animals offered the control and sugar beet tops hay diets (A and B) than those for animals given sugar beet tops hay diet (C). This result was reflected on the body weight changes of animals consuming these experimental diets. Sheep fed on diets (A) or (B) gained more (P<0.01) weights than animals fed on diet (C). Kosar and Proksova (1975) reported that bulls fed a ration containing sugar beet tops silage achieved higher daily gains than bulls fed a ration containing dried sugar beet tops. Bendary, *et al*., (1992, d) found the similar result with a Friesian calves.

[2] Economical efficiency = $\frac{\text{Money out put (the price of total live weight gain}}{\text{Money in put (price of feed consumed)}}$

The price of feeds consumed, was estimated on the basis of the following prices in Egyptian pounds per ton: concentrate mixture 550, berseem hay 550, dried sugar beet tops 11 and sugar beet tops silage 14. The price of 1kg body weight on selling was 8 Egyptian pounds.

Within rows means with different subscripts differ significantly (small letters, P<0.05, capital letters P<0.01).

Table (3): Performance of growing lambs fed on SBT (dried or silage) versus berseem hay

Item	Experimental rations[1]		
	A	B	C
No. of animals	9	9	9
Duration of trial (days)	91	91	91
Initial live weight (kg.)	24.70 ± 0.54	24.60 ± 0.67	24.70 ± 0.74
Final live weight (kg.)	40.25^a ± 0.38	40.35^a ± 0.81	38.20b ± 0.88
Total live weight gain (kg.)	15.55^A	15.75^A	13.50^B
Daily lives weight gain (kg.)	172.48^A	175.00^A	150.00^B
Feed intake, g/head/day:			
Concentrate mixture	487.40	487.40	487.40
Berseem hay	740.30	-	-
Sugar beet tops (silage)	-	2620.40	-
Sugar beet tops (hay)	-	-	793.70
Total feed intake	1227.70	3107.80	1281.10
Dry matter intake	1090.55	1099.00	1074.25
TDN intake	716.06^A	717.76^A	612.22^B
DCP intake	109.06^a	109.24^a	102.38^b
Feed efficiency, kg./kg gain:			
Dry matter	6.31^b	6.28^b	7.16^a
TDN	4.14	4.10	4.50
DCP	0.631^b	0.624^b	0.682^a
Economical efficiency[2]	2.05	2.60	3.47
Feed cost/kg gain (piaster)	390.80	305.60	230.00

[1] **A = Concentrate mixture + berseem bay (control).**
B = Concentrate mixture + sugar beet tops (silage).
C = Concentrate mixture + sugar beet tops (dried)

Regarding feed efficiency, as the amount of DM or DCP required to produce 1 kg of live weight gain, the results in Table (3) indicated that lambs fed diet containing dried sugar beet tops (C) were the least ($P<0.05$), as compared to the lambs fed the other two experimental diets (A and B). The better feed efficiency attained by feeding diets (A) and (B) may be attributed to the high concentrations of TDN and DCP in these diets compared to diet (C). This improvement of feed efficiency in the present study agrees with those on Friesian calves found by Bendary, *et al*, (1992 d).

From the economical point of view, data in Table (3) pointed out that feeding lambs on dried sugar beet tops or sugar beet tops silage along with concentrate mixture reduced the cost of feeding by 21.40 and 41.13%, respectively, as compared with lambs fed on the control diet (A). Moreover, diet (C) seemed to be the least in feed cost/1 Kg weight gain, producing the highest efficiency.

Nitrogen utilization:

Data in Table (4) indicated that values of nitrogen intake, excretion and retention were significantly affected by the type of diet. Nitrogen intakes (NI) supplied by the sugar beet tops silage ration (B) and berseem hay ration (A) were greater ($P<0.05$) than that available from the dried sugar beet tops diet (C). This result was due to the high nitrogen content and dry matter intake from diets (A) and (B). It is also observed that digested nitrogen and nitrogen balance were significantly ($p<0.05$) greater for diets (A) and (B) than diet (C). A similar trend was found when nitrogen balance was related to either nitrogen intake or digested nitrogen. These results agree with those found by Eweedah (1986), Bendary *et al.,* (1992 d) and Taie (1996).

Table (4): Nitrogen utilization by lambs fed the experimental diets containing SBT (dried or silage) versus berseem hay.

Attributes	Experimental rations*		
	A	B	C
Nitrogen balance (mg.N/d/kg) :			
Nitrogen intake (NI)	25.61 [a] ± 1.4	26.81 [a] ± 1.51	21.75 [b] ± 1.44
Feacal nitrogen	6.93 [b] ± 0.31	7.07 [b] ± 0.60	7.84 [a] ± 0.28
Digested nitrogen (DN)	18.68 [a] ± 1.36	19.74 [a] ± 1.43	13.91 [b] ± 1.52
Urinary nitrogen	12.05 [a] ± 0.09	12.42 [a] ± 0.54	8.87 [b] ± 0.39
Nitrogen balance (NB)	6.63 [a] ± 0.28	7.02 [a] ± 0.30	4.04 [b] ± 0.42
NB% of NI	25.88 [a] ± 1.30	26.19 [a] ± 1.48	23.17 [b] ± 1.48
NB% of DN	35.48[a] ± 1.31	35.56 [a] ± 1.46	29.04[b] ± 1.36

*** A = Concentrate mixture + berseem bay (control).**
B = Concentrate mixture + sugar beet tops (silage).
C = Concentrate mixture + sugar beet tops (dried).
a,b,c = Values in the same row with different superscripts are significantly different (P<0.05).

Carcass characteristics:

The data concerning average carcass weight and dressing percentages of animals fed the experimental rations are shown in Table (5).

Table (5): Carcass traits of growing lambs fed the experimental rations containing SBT (dried or silage) versus berseem hay.

Attributes	Experimental rations		
	A	B	C
No. of animals	9	9	9
Fasting slaughter weight, kg	38.14 ± 1.0	39.15 ± 1.06	37.54 ± 1.10
Empty body weight, kg	33.29 ± 1.05	34.50 ± 1.17	33.20 ± 1.14
Hot carcass weight, kg	18.00 ± 0.75	18.75 ± 0.88	17.88 ± 0.91
Dressing percentage, %:			
Based on fasting weight	47.19 ± 0.89	47.53 ± 0.91	47.63 ± 0.82
Based on empty weight	54.07 ± 0.90	54.35 ± 0.87	53.86 ± 0.82
Dessecting the best ribs :			
Lean % (L)	52.82 ± 0.45	54.72 ± 0.55	52.75 ± 0.51
Fat % (F)	23.33 ± 0.44	21.87 ± 0.48	22.52 ± 0.50
Bone % (B)	23.85 ± 0.47	23.41 ± 0.52	24.73 ± 0.49
L/F ration	2.26 ± 0.39	2.50 ± 0.41	2.34 ± 0.37
L/B ration	2.21 ± 0.33	2.34 ± 0.39	2.13 ± 0.40

A = Concentrate mixture + berseem bay (control).
B = Concentrate mixture + sugar beet tops (silage).
C = Concentrate mixture + sugar beet tops (dried).

It is evident from these results that lambs fed ration B (sugar beet tops silage) attained the highest values in dressing percentage, either related to fasting or empty live weight, compared with the values of lambs fed ration A (control ration) or ration C (dried sugar beet tops). This was mainly due to the high pre-slaughter weigh of lambs fed ration (B). However, these differences were not significant. The percentage values of lean, fat and bone for the best ribs were not affected by the type of ration and there were no significant differences. These results were in the range of values reported by Latif and Abd El-Salam, (1988) and Taie, (1996).

Data in Table (6) show that weight of organs of sheep fed sugar beet tops silage (ration B) were higher than those of sheep received rations A or C. There was a significant effect (P<0.05) of feeding sugar bet tops silage on the weights of lungs and tail for these Barki lambs comparing with those of lambs fed the other two experimental rations (A and C). In general the organ weight values were in the same trend of the data reported by Latif and Abd El-Salam, (1988).

Table (6): Offals weight of growing lamb fed the experimental rations containing SBT (dried or silage) versus berseem hay.

Organs (kg.)	Experimental rations [1]								
	A			B			C		
Liver	0.70	±	0.11	0.74	±	0.13	0.70	±	0.10
Kidneys	0.11	±	0.04	0.13	±	0.03	0.12	±	0.04
Heart	0.21	±	0.05	0.23	±	0.03	0.22	±	0.04
Lungs	0.65^{b}	±	0.15	0.70^{a}	±	0.16	0.64^{b}	±	0.14
Spleen	0.08	±	0.02^{b}	0.10	±	0.04^{a}	0.08	±	0.01^{b}
EDT[2]	3.74	±	0.23	3.83	±	0.25	3.73	±	0.23
Head	2.87	±	0.57	2.94	±	0.52	2.84	±	0.54
Feet	0.92	±	0.20	0.98	±	0.21	0.92	±	0.18
Pelt	4.00	±	0.78	4.15	±	0.70	4.11	±	0.77
Tail	0.71^{b}	±	0.36	0.83^{a}	±	0.32	0.70^{b}	±	0.35
Tests	0.35	±	0.12	0.36	±	0.10	0.34	±	0.12

[1] A = Concentrate mixture + berseem bay (control).
B = Concentrate mixture + sugar beet tops (silage).
C = Concentrate mixture + sugar beet tops (dried).
[2] EDT = Empty digestive tract
*** Within rows means with different subscripts differ significantly (P<0.05).**

There were no significant differences in the weights of bone-in, edible-meat and bone of whole sale cuts of lambs fed the different experimental rations (Table, 7)

Table (7): Weights of whole sale cuts of the growing lambs dissected into their major tissues as effected by the experimental rations.

Whole sale cuts and its major tissues	Experimental rations [1]		
	A	B	C

Leg: (Kg)			
Bone-in	2.92 ± 0.50	3.10 ± 0.48	0.90 ± 0.51
Edible-meat	2.44 ± 0.51	2.50 ± 0.46	2.41 ± 0.49
Bone	0.60 ± 0.25	0.65 ± 0.26	0.61 ± 0.23
Shoulder: (Kg)			
Bone-in	1.81 ± 0.52	1.90 ± 0.54	1.83 ± 0.50
Edible -meat	1.37 ± 0.28	1.47 ± 0.29	1.45 ± 0.26
Bone	0.40 ± 0.12	0.42 ± 0.11	0.40 ± 0.14
Loin: (Kg)			
Bone-in	0.95 ± 0.23	1.00 ± 0.25	0.93 ± 0.21
Edible -meat	0.75 ± 0.25	0.78 ± 0.27	0.74 ± 0.27
Bone	0.23 ± 0.18	0.25 ± 0.20	0.21 ± 0.19
Rack: (Kg)			
Bone-in	1.10 ± 0.29	1.20 ± 0.31	1.08 ± 0.32
Edible -meat	0.80 ± 0.21	0.84 ± 0.19	0.79 ± 0.22
Bone	0.51 ± 0.31	0.54 ± 0.30	0.50 ± 0.33
Neck: (Kg)			
Bone-in	0.98 ± 0.28	1.02 ± 0.26	0.95 ± 0.30
Edible -meat	0.70 ± 0.20	0.75 ± 0.21	0.70 ± 0.18
Bone	0.25 ± 0.12	0.28 ± 0.14	0.23 ± 0.11
Flank: (Kg)			
Bone-in	0.57 ± 0.10	0.58 ± 0.10	0.56 ± 0.12
Edible -meat	0.55 ± 0.11	0.56 ± 0.09	0.55 ± 0.10
Bone	0.01 ± 0.01	0.02 ± 0.00	0.01 ± 0.01

(1) **A = Concentrate mixture + berseem bay (control).**
B = Concentrate mixture + sugar beet tops (silage).
C = Concentrate mixture + sugar beet tops (dried).

Blood serum parameters :

The effects of feeding sugar bet tops (silage or dried) on some blood constituents of growing Barki lambs are shown in Table (8). Results indicated that the type of ration significantly affected all studied blood serum components. Lambs fed sugar beet tops silage showed significant ($P<0.05$) increases in serum total proteins, albumin and creatinin as compared with lambs fed the control diet or dried sugar beet tops diet. Several factors seem to affect serum total proteins, the status of animals, nutritional status of species, health status of animals and the dietary protein consumption (March *et al*., 1969, O'Kelly, 1973 and Kumar *et al.*, 1980). The higher values of serum total proteins of animals fed sugar beet tops silage may be due to changes in the turnover of proteins and urea or its back-diffusion (Marshal, 1991). Also, this result indicated that the experimental ration that contained sugar beet tops silage had sufficient level of proteins to maintain animal health and performance.

Table (8): Blood serum parameters of growing lambs fed rations containing SBT (dried or silage) versus berseem hay.

Item	Experimental stations*		
	A	B	C

Total protein, g/100ml.	7.02[b]	±	0.05	7.13[a]	±	0.03	6.75[C]	±	0.13
Albumin, g/100ml.	3.11[b]	±	0.10	3.22[a]	±	0.09	3.00[C]	±	0.11
Globulin, g/100ml.	3.80[b]	±	0.12	3.92[a]	±	0.1`2	3.74[C]	±	0.10
Creatinin, g/100ml.	1.35[b]	±	0.13	1.66[a]	±	0.18	1.23[C]	±	0.15

* **A = Concentrate mixture + berseem bay (control).**
B = Concentrate mixture + sugar beet tops (silage).
C = Concentrate mixture + sugar beet tops (dried).
a,b,c = Means in the same row with different superscripts differ significantly (P<0.05).

Results of serum albumin concentration revealed that they were higher (P<0.05) for lambs fed sugar beet tops silage by about 3.42 and 6.83% than for those fed the control diet and dried sugar beet diet, respectively. However, these concentrations are in the range of serum albumin values, 3.00-3.74 mg/100ml serum, which were reported by several investigators (Garther, *et al*, 1966; Kholif, 1989; Abo El-Nor, 1991 and El-Ashry, *et al*., 1997)

The highest serum globulin, (P<0.05), value of 3.92 g/100ml was recorded for sheep fed on sugar beet tops silage (B) whereas the lowest value of 3.74 g/100 ml was shown for sheep which received dried sugar beet tops diet (C). However, the values of serum globulin in the present study were within the range of values recorded by Abo El-Nor, (1991) and El-Ashry, *et al*., (1997). Serum creatinine of sugar beet tops silage group was significantly (P<0.05) higher by 18.68% and 25.90% than those of control and dried sugar beet tops groups (A and C), respectively. This may possibly be related to the increase in dietary protein intake. In general, the values of studied serum parameters confirm that the experimental animals were healthy under our treatment arrangement. No deleterious effect could be observed on growing lambs receiving the rations containing dried or silage of sugar beet tops.

The results of this study encourages the recommendation of conserving sugar beet tops either by drying or ensiling for feeding Barki growing lambs with appreciable reduction in feeding costs and without any health troubles or affecting meat quality.

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التقييم الغذائى لعروش بنجر السكر (جافة أو سيلاج) بواسطة الحملان النامية

محمد حسن أحمد
قسم الإنتاج الحيوانى والسمكى – كلية الزراعة الزراعة – سابا باشا – جامعة الإسكندرية

استخدم 27 حولى برقى بمتوسط وزن 24.66 كيلو جرام وعمر ستة شهور لدراسة تأثير التغذية على عروش بنجر السكر وذلك على كفاءة النمو والهضم وصفات الذبيحة وبعض مكونات

الدم.قسمت الحوالى إلى ثلاثة مجاميع (9 حولى بكل مجموعة) وغذى كل حولى على عليقة مركزة ليغطى 40% من احتياجاته الغذائية، بالإضافة إلى التغذية للشبع على ثلاث علائق تجريبية هى دريس البرسيم (عليقة كنترول أ) وسيلاج عرش بنجر السكر (عليقة ب) ودريس عرش بنجر السكر (عليقة ج).

أوضحت النتائج أن معاملات هضم العناصر الغذائية كانت مرتفعة معنويا بالنسبة للحوالى المغذاة على العليقة المحتوية على سيلاج عرش بنجر السكر (عليقة ب) بالمقارنة بالعليقتين الآخرتين (أ، ج)، إلا أن معاملى هضم المادة الجافة والبروتين الخام لم يختلفا معنويا فى العليقتين(أ،ب) كما أن القيمة الغذائية للعليقتين المقارنة (أ) والمحتوية على سيلاج عرش بنجر السكر (ب) كانت أعلى جوهريا عن القيمة الغذائية للعليقة المحتوية على دريس عرش بنجر السكر. وقد انعكست هذه النتائج على معدلات النمو للحوالى المغذاة على هذه العلائق التجريبية حيث حققت الحوالى المغذاة على العليقتين (أ،ب) معدلات نمو مرتفعة معنويا عن تلك المغذاة على العليقة (ج). كما تأكد ذلك من نتائج تجارب الأتزان الآزوتى لهذه الحوالى حيث احتجزت الحوالى المغذاة على العليقتين (أ،ب) قدراً أعلى جوهريا من الأزوت عن تلك الحوالى المغذاة على العليقة (ج). وقد أدى تغذية الحوالى على علائق محتوية على عروش بنجر السكر (جافة أو سيلاج) إلى انخفاض ملحوظ فى تكلفة التغذية اللازمة لإنتاج كيلو جرام من وزن الجسم بالمقارنة بالعليقة المقارنة (أ).

كما وجد أن صفات الذبيحة من حيث وزن الذبيحة ونسبة التشافى ووزن بعض الأعضاء الداخلية ومحتوى بعض أجزاء الجسم من اللحم والعظم لم تتأثر بتغذية هذه الحوالى على علائق محتوية على عروش بنجر السكر بالمقارنة بالعليقة التقليدية (أ). وقد وجد أن التغذية على سيلاج عرش بنجر السكر أدى إلى زيادة معنوية فى تركيز محتويات سيرم الدم من البروتينيات الكلية والألبيومين والجلوبيولين والكرياتينين بالمقارنة لهذه التركيزات فى سيرم دم الحيوانات المغذاة على العليقة المقارنة (أ) أو العليقة المحتوية على دريس بنجر السكر (ج).

ونستنبط من نتائج هذه الدراسة أنه يمكن استخدام عروش بنجر السكر فى صورة جافة (دريس) أو سيلاج فى تغذية الحملان النامية بدون أى تأثيرات على جودة لحومها مع خفض كبير في تكاليف تغذيتها.