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UTILIZATION OF SUGAR BEET TOPS HAY AND SILAGE IN COMPARISON TO BERSEEM IN RABBITS FEEDING

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SUMMARY

Two experiments were conducted on rabbits, where sugar beet tops (SBT) was evaluated in two forms either as silage (SBTS) or as hay (SBTH) in comparison to berseem silage (BS) and hay (BH). In the1*st* experiment, four groups, each contained 4 mature male of New Zealand White rabbits, 6 months old, were utilized. Each group was fed, as a sole feed, one of the following four roughages : SBTS, BS, SBTH and BH to determine their chemical composition and nutritive value. In the 2 nd experiment, four equal groups of growing mixed sexes New Zealand rabbits, 6 weeks old, 12 rabbits each were used.

Diets were offered in combination with the commercial diet which represented 60% of the recommended allowance and the other 40 % representing the tested roughages. Animals fed the experimental diets for a 10-week experimental period. Body weigh, daily gain, feed intake, feed conversion, digestibility, nitrogen balance and, cecal microbial activity, carcass information and some blood parameters were determined.

Results indicated that all roughages had similar total digestible nutrients (TDN) values. Both SBTS and SBTH, however, had higher starch values. The highest value of digestible crude protein (DCP) was in SBTS followed by BH and BS and the least value was for SBTH. When rabbits fed the commercial diet supplemented with conserved berseem or suger beet tops, either as silage or hay, the highest average daily gain (ADG) was for BS diet, while the least ADG was for SBTS-supplemented. Feed conversion (FC) was significantly better for rabbits fed (SBTH) diet compared to the other groups. The digestibility of nutrients did not differ among the experimental diets. Diets, however, were differ in their DCP. Nitrogen balance was higher for BS diet followed by SBTS and SBTH-containing diets; the lowest was that of BH. The highest significant concentration of volatile fatty acids (VFA) and ammonia-N in cecum contents was found for rabbits fed BS diet followed by BH, SBTS and SBTH-diets. Either dressing percentage or chemical composition of meat did not differe significantly among the experimental groups. A significantly decrease of plasma cholesterol resulted when BS and BH-diets were fed.

Keywords: Rabbits, suger beet tops, silage, hay.

INTRODUCTION

It is well known that there is a serious shortage in the available foodstuffs for farm animals feeding. Therefore, animal nutritionists are trying every available source of unconventional and/ or agricultural by- products to cover at least a part of this problem. As some roughage sources may be expensive (e.g. hay meal per Kcal DE is more expensive than grain), it could be advantageous to use a roughage such as sugar beet tops (SBT). Sugar beet is planted in Egypt for sugar production and the tops of the plants are not used in any other perposes. Therefore, SBT are produced in large quantities as a green residue at the harvesting time; 17 tons of SBT are produced per each feddan and 12.5 tons of SBT are left over (Bendary *et al.*,1992a). This means that more than half a milion tons of SBT are available each year.

The access of SBT is suggested to be conserved as silage (Podkowka, 1983) due to its high moisture content. The posibility of using SBT silage and hay has been reported by Bendary *et al.* (1992b) as a roughage source in ruminent rations. Howevere, it seems that scares information exists in Egypt about the utilization of diets containing silage on rabbits performance. Rabbits are true herbivorous and has enlarged cecum and colon with high bacterial population. Therfore, rabbit is able to utilize forage and agricultural by-products (Cheeke, 1987 and Malhat, 1992).

To find-out to what extent sugar beet tops could be used in rabbit feeding, two experiments were carried out to evaluate the chemical composition and nutritive value of sugar beet tops conserved as silage and hay in comparison to berseem silage and hay and also to detect the effect of diets containing SBT silage or hay on rabbits productive performance, digestibility, nitrogen balance, cecum microbial activity, carcasse information and some blood parameters.

Materials and Methods

The present work was conducted on Sakha Experimental Farm, Kafr El Sheekh, Animal Production Research Institute and Animal Nutrition Laboratory of Animal Production Dept., Faculty of Agriculture Menoufia University. The study consisted of two experiments.

Sugar beet tops silage (SBTS) was prepared by adding urea (0.5 %), molasses (5 %) and 0.5 kg limestone/ton. Berseem silage (BS) was also supplemented with 5 % molasses on fresh basis. At the same time sugar beet tops and berseem were sun-dried to prepare hays (SBH or BH).

Experiment 1

Sixteen mature New Zealand White male rabbits, 6 months old, were distributed according to their body weight into 4 groups, 4 rabbits each, in individual feeding cages which allowed a complete separation and collection of feces and urine. Each group was given one of the four experimental diets (SBTS, BS, SBTH or BH) for 3 weeks as a preliminary period followed by 11 days collection period.

Diets were offered *ad lib.* twice daily at 8 a. m. and 3 p.m. Fresh water was available at all times. Feed residuals were weighed daily and subtracted from the offered amounts to obtain the actual feed intake for each rabbit. Feces was collected quantitatively daily from each rabbit and bulked over the collection period for dry matter (DM) determination.

Experiment 2

Fourty-eight New Zealand White rabbits 6 weeks old of mixed sexes (750-790 g) were randomly distributed according to body weight into four comparable groups (12 rabbits each). Each group was then divided into two replicates (each of 6) and were housed in galvanized wire cages. Rabbits were fed the four experimental diets for 10-weeks.

Diets shown in Table 1 were formulated to include the commercial diet which represented 60 % of the recommended intake, while the other 40 % representing the tested roughages SBTS, BS, SBTH and BH, respectively. Vitamins and minerals premix was supplemented for all diets to be equale in their content of vitamins and minerals. Fresh water was automatically available all the time. All rabbits were kept under the same managerial hygienic environmental conditions. Live body weights and feed consumption were recorded at weekly intervals. Amount of feed intake was adjusted for body weight changes. Feed conversion was calculated during the experimental period. At the end of the experiment, digestibility and nitrogen balance were determined as described in experiment 1. Urine was collected in containers containing 10 ml of 6 N HCl, composite samples were frozen at -20 °C until analysis to obtain nitrogen balance. At the termination of the experiment, the dressing and carcass charasteristics were determined. Cecum was removed from each rabbit and weighed separately. The cecal contents were stored at -10 °C until analysis.

Blood samples were colected during sluaghter. Plasma was separated by centrifugation at 3500 rpm for 15 min. frozen at -10 °C until analysis.

Table 1. Chemical composition of the experimental ingredients.

Item (%)	Dietry treatments 1				
	SBTS	BS	SBTH	BH	C
Dry matter, DM	29.4	25	74.62	85	90
	(100)	(100)	(100)	(100)	(100)
Crude Protein, CP	5.31	3.75	8.69	12.48	18.07
	(18.06)	(15.0)	(11.65)	(14.68)	(20.08)
Ether extract, EE	0.99	0.98	1.76	2.14	(1.99)
	(3.37)	(3.92)	(2.36)	(5.52)	(2.21)
Nitrogen free extract, NFE	11.91	11.52	33.29	41.24	(51.37)
	(40.65)	(46.08)	(44.6)	(48.52)	(57.08)
Ash	8.08	3.3	22.1	11	7.7
	(27.48)	(13.2)	(29.62)	(12.94)	(8.56)
Crude fiber, CF	3.07	5.45	8.78	18.14	10.84
	(10.44)	(21.8)	(11.77)	(21.34)	(12.05)
pH	4.4	3.8	--	--	--
Neutral detergent fiber, NDF	9.04	9.37	29.49	33.71	32.62
	(30.78)	(37.48)	(39.53)	(39.67)	(36.25)
Acid detergent fiber, ADF	4.08	(5.0)	(12.01)	21.47	13.15
	(13.89)	(20)	(16.1)	(25.26)	(14.62)
Hemecellulose	4.96	4.37	17.483	12.24	19.46
	(16.89)	(17.48)	(23.43)	(14.41)	(12.63)

1 SBTS, Sugar beet tops silage; BS, berseem silage; SBTH, Sugar beet tops hay, and C; commercial diet. , Values between paranthesis are on DM basis.

Data were statistanalyzed according to Snedecor and Cochran (1982) and the multiple range test of Duncan (1955). The complete chemical composition of feed, feed residue, if any, and feces was determined according to the Official Methods of the A. O. A. C. (1994) and Van Soset (1963). Ash, crud protein and ether extract in meat samples were also determined by the A. O. A. C. (1994). Nitrogen in urine, feed and feces was determined by the micro-Kjeldahel method. Total volatile fatty acids (VFA) and ammonia-N on the wet cecal contents were determined according to Ahmed (1976). Plasma total cholesterol was determined by the method described by Watson (1960). Glucose was estimated according to methods of Seifter *et al.* (1950). Albumine and creatinine were determined according to Armstrong and Corr (1964).

RESULTS AND DISCUSSION

Experiment 1

Chemical composition value of the ingredients are presented in Table 1. On DM basis, results indicated that SBTS had more CP and EE than the SBTH which had more of the other nutrients. Similar results were reported by Malhate (1992) with rabbits and Eweedah (1986) with ruminants.

Silage and hay made from berseem contained almost similar percentages of all nutrients on DM basis. Values of BS and BH reported herein were similar to those reported by Others (Shahin, 1992 and Ahmed, 1992) PH values of good quality silage were reported to be ranged between 3.8 - 4.4 (Eweedah, 1986, Shahin, 1992 and Malhate, 1992). Similar results were obtained herein. Conserved materials of SBT silage or hay had less CF and more ash contents than those of berseem. The highest value of CP was that of SBTS (18.06) followed by BS and BH (15.0 and 14.68); the least CP contents was that of SBTH (11.65).

The average digestibilities and nutritive value are summarized in Table 2. Digestibility values are within those reported by other investigators (Eweedah,1986, Malhate, 1992 and Shahin, 1992). Digestion coefficients of hays were found to be higher than those of silage made from SBT (Eweedah,1986).

Table 2. Digestibility and nutritive value of SBTS, SBTH, BS and BH

Item	Ditery treatments ★			
	SBTS	BS	SBTH	BH
Digestion coefficient (%)				
DM	74.26 ± 2.13^{b}	62.98 ± 3.19^{c}	82.32 ± 0.67^{a}	66.50 ± 0.56^{c}
OM	70.40 ± 2.02^{a}	61.70 ± 3.45^{b}	78.80 ± 0.88^{a}	63.80 ± 0.53^{b}
CP	73.00 ± 2.28^{b}	65.50 ± 3.08^{b}	80.80 ± 1.32^{a}	71.50 ± 1.23^{b}
CF	63.20 ± 3.06^{a}	44.10 ± 4.97^{b}	68.60 ± 3.08^{a}	44.60 ± 0.98^{b}
EE	73.20 ± 1.42^{bc}	76.50 ± 1.55^{ab}	69.80 ± 3.08^{c}	78.40 ± 0.44^{b}
NFE	76.40 ± 1.91^{a}	68.80 ± 2.87^{b}	81.40 ± 0.11^{a}	70.00 ± 0.05^{b}
Nutritive Value (%) On DM basis				
SV	52.55 ± 1.34^{a}	$42.34 \pm .609^{ab}$	53.31 ± 1.78^{a}	45.37 ± 0.51^{b}
TDN	57.09 ± 1.37	57.18 ± 2.65	57.70 ± 1.81	60.14 ± 0.53
DCP	13.23 ± 0.35^{a}	10.84 ± 0.58^{c}	9.46 ± 0.35^{b}	11.46 ± 0.20^{b}

★ SBTS, Sugar beet tops silage; BS, berseem silage; SBTH, Sugar beet tops hay.

a, b, c Means on the same row with different letters differ significantly ($P < 0.05$)

The lower digestibility values of consumed berseem may be attributed to the higher CF content. Many investigators (Champe and Mauric, 1983; Radwan, 1991 and Soliman *et al.*, 1992) reported that as CF increased, the digestibility of almost all nutrients decreased.

Radwan (1991) stated that the high CF contents increase the digest flow rate, which lead to lower digestibility. Nutritive value was evaluated as TDN. All treated roughages had almost similar TDN values being on the average 57 - 60 %. However, when it was determined as SV, both SBTS and SBTH had higher feeding values (52.55 and 53.31 %). This was mainly due to the higher CF content (21 vs. 11 %) with the lower digestion coefficients (44 vs. 65 % on the average) for berseem than sugar beet tops.

Eweedah (1986) reported TDN values for SBTS and SBTH to be near those reported herein. Also, Ahmed (1992) reported a TDN value for BH to be 51 % while SV for the same product to be 36 %. The highest value of DCP was in SBTS (13.23) followed by BH (11.46), BS (10.84) and the least value for SBTH (9.46). Similar values were reported by (Eweedah, 1986).

Experiment 2

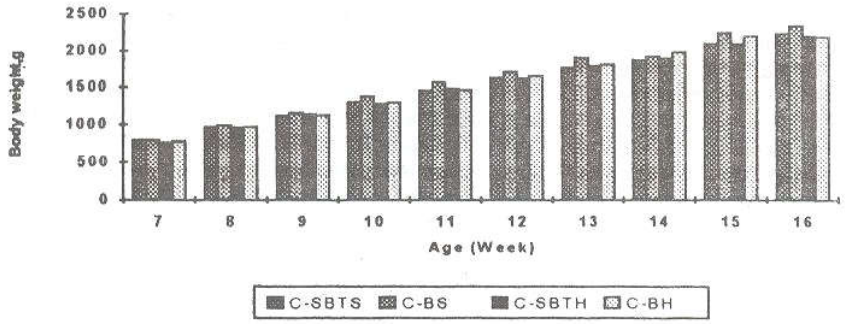
The effect of different treatments on the change in body weight (BW) throughout the experimental period is presented in (Table 3 and Figure 1). No significant different was found between initial weights. However, final body weight for rabbits fed SBTS was significantly ($P < 0.05$) higher compared with the other groups. All rabbits in all groups grew in an almost linear function with time (Figure 1) to reach the market weight (2.2 Kg) at 10 weeks after weaning. Similar results were reported by Zanati (1993) and Omara (1994).

Table 3. Performance of growing rabbits as affected by different dietary treatments.

Items	Dietary treatments ★			
	C-SBTS	C-BS	C-SBTH	C-BH
Intial body weight, g.	793.0	760.0	771.0	771.0
Final body weight, g.	2235.5^{b}	2345^{a}	2199.5^{b}	2281.0^{c}
Av. DM. feed intake, g/d	99.8^{c}	111.7^{b}	99.5^{c}	118.7^{a}
ADG, g/d	22.8^{c}	24.6^{a}	23.6^{b}	23.3c
Feed conversion g feed/g,gain	4.4^{c}	4.6^{b}	4.3^{c}	5.2^{a}

★ SBTS, Sugar beet tops silage containing diet, BS, berseem silage containing diet, SBTH, Sugar beet tops hay containing diet; BH, berseem hay containing diet.
a, b, c Means on the same row with different latters differ significantly ($p<0.005$).

Rabbits fed the commercial diet supplemented with conserved berseem, either as silage or hay were heavier in their body weight than those fed the commercial diet supplemented with SBTH or SBTS. This may indicate that rabbits utilize fiber efficiently and feeding value should be evaluated with rabbits as TDN rather than as SV. Abou Ashour and Ahmed (1986) reported that rabbits could utilize CF efficiently up to 23.62 % of the diet.

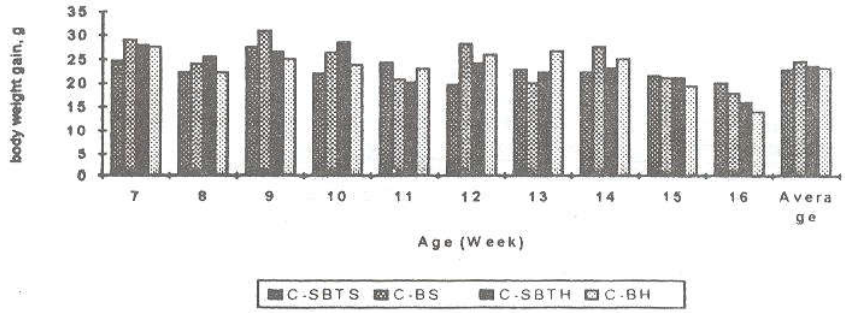


C-SBTS, Sugar beet tops silage containing diet, C-BS, Berseem silage containing diet, C-SBTH, Sugar beet tops hay containing diet, C-BH, Berseem hay containing diet

Figure1. Effect of feeding the different experimental diets on body weight of growing rabbits

Average daily gain (ADG) is presented in (Table 3 and Figure 2). Differences between groups in ADG were significant ($P < 0.05$). The highest ADG was (24.6 g) for BS-diet, while the least ADG was (22.8 g) for SBTS containing diet. Nearly the same ADG was obtained with both groups fed SBTH or BH containing diets. In general, the ADG was higher at the first few weeks and started to decline to reach the lowest rate at 10 weeks. This is a general trend reported by another investigators (Allam, 1979; Malhate, 1992; Zanati, 1993 and Omara, 1994).

C-SBTS, Sugar beet tops silage containing diet, C-BS, Berseem silage containing diet, C-SBTH, Sugar beet tops hay containing diet, C-BH, Berseem hay containing diet.

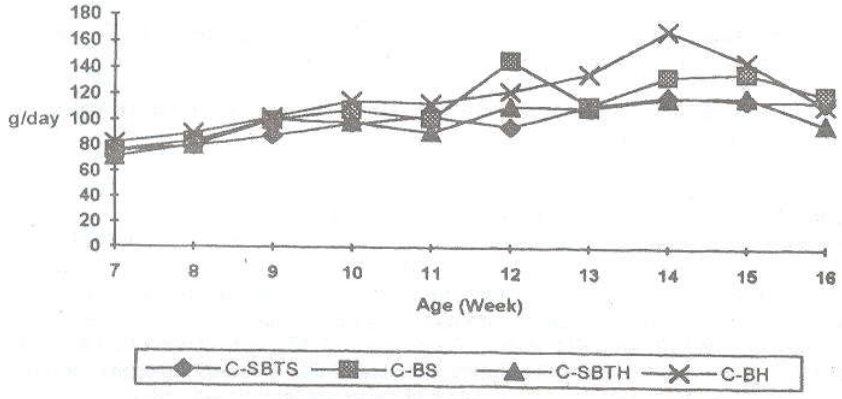


C-SBTS, Sugar beet tops silage containing diet, C-BS, Berseem silage containing diet, C-SBTH, Sugar beet tops hay containing diet, C-BH, Berseem hay containing diet

Figure 2. Effect of feeding the different experimental diets on average daily gain of growing rabbits.

Average feed consumption (as DM) is shown in (Table 3 and Figure 3). The results reveal that feed consumption for all groups increased gradually to a maximum value at weaning, then decreased until 10 weeks of age.

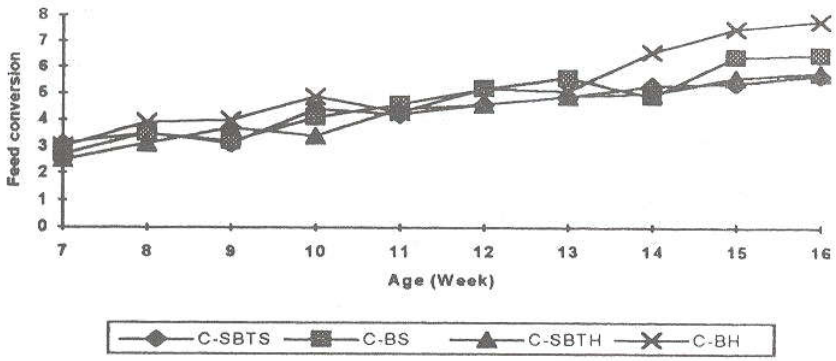
The higher (118.7 g) was for rabbits fed BH-containing diet. While the lower (99.5 g) was for rabbits fed SBTH-containing diet. Differences were significant ($P < 0.05$) for rabbits fed BS and BH-containing diets compared to the SBTS and SBTH-containing diets which were nearly similar. DeBlas *et al.*, (1981) reported that high fiber content was obtained with high DM intakes. As it is shown in the present study, BH and BS contained more CF than the other diets. Davidson and Spreadbury (1975) observed that fattening rabbits consuming six different diets, in which the CF content ranged from 3 to 19 %, adjusted their intake to keep growth rate constant.



C-SBTS, Sugar beet tops silage containing diet, C-BS, Berseem silage containing diet, C-SBTH, Sugar beet tops hay containing diet, C-BH, Berseem hay containing diet

Figure 3. Effect of feeding the different experimental diets on DM intake

The average feed conversion (FC) is presented in (Table 3 and Figure 4). The FC was significantly ($P < 0.05$) better for rabbits fed (SBTH) diet compared to the other groups. Higher FC ratio (less efficient) was found for rabbits fed BH-diet (5.2) followed by BS (4.6) and SBTS (4.4) which was nearly similar to SBTH-diet (4.3). This indicates that the higher growth rate obtained with rabbits fed BS or BH-containing diets was mainly due to the higher feed intake which indicate that conserved berseem (hay or silage) was more palatable than those of hay or silage made from SBT. Results in Table (3) and Figure (4) also indicate that rabbits utilize this feed more efficiently at the earlier ages and the feed efficiency declines as the animals grow up to 10 weeks after weaning.



C-SBTS, Sugar beet tops silage containing diet, C-BS, Berseem silage containing diet, C-SBTH, Sugar beet tops hay containing diet, C-BH, Berseem hay containing diet

Figure 4. Effect of feeding the different experimental diets on feed conversion of growing rabbits.

Soliman et al., (1992) reported that the best rabbits performance was obtained when the dietary energy : protein ratio ranges from 150 to 156 K cal ME/ g CP. The present ratios were 154, 172, 162 and 175 for SPTS, BS, SBTH and BH-diets, respectively.

Data presented in Table (4) indicate that the digestibility of DM did not differ among the experimental diets. However, it was greatest in SBTH-diet (73.34) followed by SBTS and BH -diets (73.29 and 71.17) and it was least in BS-diet (68.83). The results concerning the digestibility of OM followed the same pattern as DM. The highest value of CP digestibility was obtained with SBTS-diet (79.16) followed by SBTH and BH-diets (77.65 and 73.18) and the lowest in BS-diet (70.34).

Berseem hay diet expressed the highest digestibility value for CF (49.37) followed by the diet containing SBTH (39.24), BS (36.56) and the lowest value was (30.45) in SBTS-diet. Similar digestibility values were reported by Eweedah (1986), Allam, (1979), and Ahmed (1992). In general, digestibility of CF in the present study was lower than that obtained when the tested roughages were fed as a sole feed. This may have been due to the commercial supplementation which usually depresses the pH value of the cecum lower than 6.3, the level at which celluloytic bacteria usually being inhibited (Mehrez,1995).

All the experimental diets had almost similar feeding values expressed either as SV or TDN. This was expected since all diets were iso-caloric and had similar nutrient digestibilities. Feeding values ranged between 59 - 63 % SV and 64 - 68 % TDN. Diets, however, differ in their DCP contents being 15.73, 13.24, 14.53 and 13.3 for SBTS, BS, SBTH and BH diets, respectively. Difference may indicate variations in N utilization by rabbits due to the N sources. The difference in DCP lead to different energy : protein ratio (Table 4). Dietary treatments SBTS, BS, SBTH and BH had calculated DE and ME (K cal/Kg DM) values of 3028 and 2422; 2845 and 2276; 2950 and 2360 and 2914 and 2331, respectively.

Table 4. Digestibility and nutritive value of different diets fed to growing rabbits.

Item	Dietary treatments ★			
	C-SBTS	C-BS	C-SBTH	C-BH
Digestion coefficient (%)				
DM	73.29± 2.44	68.83± 3.47	73.34± 3.39	71.17± 0.87
OM	74.0 ± 2.38	69.63± 3.33	73.51± 3.33	71.05± 0.90
CP	79.16± 2.35	70.34± 2.85	77.65± 2.95	73.18± 1.51
CF	30.45 ± 6.3	36.56± 6.93	39.24± 7.44	49.37± 1.44
EE	85.95± 1.81	78.9 ± 3.99	84.09± 3.14	83.31± 1.81
NFE	80.95± 1.67	77.69 ± 2.6	79.64± 2.58	75.93± 0.77
Nutritive value (%)				
SV	63.85± 2.11	59.14± 2.63	62.15± 2.97	60.46± 0.77
TDN	68.82± 2.15	64.65± 2.68	67.05± 3.02	66.23± 0.79
DCP	15.73±.46^{a}	13.24±.53^{b}	14.53±55^{ab}	13.30±0.27^{b}
Calculated DE, K cal/Kg *	3028	2845	2950	2914
Calculated ME, K cal/Kg	2422	2276	2360	2331
Calculated C/P ratio	154	172	162	175

★SBTS, Sugar beet tops silage containing diet; BS, berseem silage containing diet; SBTH, Sugar beet tops hay containing diet; BH, berseem hay containing diet. a, b, c and d values not sharing the same supercript within column are significantly different (p<0.005). * According to: Church, 1977.

Experimental results of the nitrogen balance (NB) are presented in Table (5). When NB was related to either N-intake or N-digested, both followed a similar pattern being higher for BS group followed by SBTS and SBTH; the lowest was for BH. Similar N balance values were reported by Eweedah (1986)for hay and silage made from SBT.

Table 5. Nitrogen balance as affected by the different dietary treatments.

Item	Dietary treatments ★			
	C-SBTS	C-BS	C-SBTH	C-BH
N-intake (NF), g/h/d	3.86 ± 0.2b	3.86± 0.35b	4.05± 0.05b	4.71± 0.05a
Fecal-N	0.81± 0.04c	1.15 ± 0.1b	0.91± 0.01c	1.27± 0.01a
Urinary-N	2.1± 0.12cb	1.73± 0.14d	2.33 ± 0.1b	2.68± 0.13a
Total N-excreted, g/d	2.91± 0.16c	2.88± 0.23c	3.25± 0.11b	3.95± 0.15a
N-digested (ND)	3.05± 0.16b	2.71± 0.24c	3.14± 0.04b	3.44± 0.03a
N-balance (NB)	0.94 ±0.06b	0.98±.16ab	0.80 ±0.07b	0.76 ±0.1b
NB N-intake %	24.44 ± .27bc	24.99±2.55ab	19.84±2.11cd	16.17 ± 2.32d
NB-N-digested %	30.94± 1.61bc	35.58±3.62ab	25.6 ± 2.73cd	22.13 ± 3.17d

★SBTS, Sugar beet tops silage containing diet; BS, berseem silage containing diet; SBTH, Sugar beet tops hay containing diet; BH, berseem hay containing diet. a, b, c and d values not sharing the same supercript within column are significantly different (p<0.005).

Table 7. Carcass traits of growing rabbits fed the different experimental diets.

Item		Experimental diets			
		C-SBTS	C-BS	C-SBTH	C-BH
No. of rabbits		4	4	4	4
Live body weight g		2383.7 ±88.4	2466.3 ±59.6	2485 ± 119.7	2490±68.8
Slaughtered body wt.g		2325 ± 83.5	2402 ±61.9	2448.7±114.3	2441.8±73.7
	%	97.5 ± 0.21	97.3 ±0.24	98.2 ± 0.18	98.02±0.24
Dressing,	g	1226.2±118.9	1187.5 ±41.5	1201.2 ± 62.5	1233.7±35.2
	%	51.12±3.12^{ab}	48.07±0.65^{b}	48.3 ± 0.43^{b}	49.5±0.42^{b}
Skin,	g	282.5 ± 6.02	283.7 ±18.5	286.2 ± 20.7	283.7±20.9
	%	11.9 ± 1.53	11.1 ± 0.21	11.4 ± 0.25	11.2± 0.43
Legs,	g	67.5 ± 3.22	73.7 ± 6.88	75 ± 2.04	75 ± 2.04
	%	2.8 ± 0.15	2.8 ± 0.22	3.02 ± 0.14	3 ± 0.04
Head,	g	151.2 ± 13.9	143.7 ± 3.75	143.7 ± 2.39	163.7±11.43
	%	6.37± 0.43	5.85± 0.27	5.8 ± 0.66	6.25± 0.29
Liver,	g	61.25± 6.57	62.5 ± 5.20	66.25± 5.15	66.25±2.39
	%	2.5 ± 0.17	2.5 ± 0.14	2.62± 0.14	2.67± 0.16
Lungs,	g	12.5 ± 1.44	16.25± 1.25	23.75± 2.39	22.5 ± 3.22
	%	0.52±0.04^{c}	0.65± 0.05^{c}	0.97± 0.11^{a}	0.8±0.12^{a}
Kidneys,	g	12.5 ± 1.44	15 ± 0	20 ± 2.04	18.75±1.25
	%	0.52±0.07^{b}	0.6 ± 0^{b}	0.77± 0.07^{a}	0.75±0.05^{a}
Heart,	g	5 ± 0	5 ± 0	6.75± 0.62	8.75± 1.25
	%	0.2 ± 0	0.2 ± 0^{c}	0.27± 0.02^{b}	0.37±0.02^{a}
Meat without bone	g	968.75±125.6	855.0 ±29.01	900.0±39.37	912.5±9.46
	%	40.2±3.95	34.6±0.49	36.2±0.29	36.7±0.71

★SBTS, Sugar beet tops silage containing diet; BS, berseem silage containing diet; SBTH, Sugar beet tops hay containing diet; BH, berseem hay containing diet. a, b, c and d values not sharing the same supercript within column are significantly different (p<0.005).

Table 8. Chemical composition of meat of growing rabbits fed the different experimental diets.

Item	Experimental diets			
	C-SBTS	C-BS	C-SBTH	C-BH
Chemical analysis %				
Dry matter	31.92±0.58	32.82±0.98	31.05 ± 0.52	31.47±0.68
Crude protein	15.01±0.48	19.68±0.84	16.82 ± 0.45	16.21±0.63
Ether extract	13.14±0.91	9..31± 0.58	10.26 ± 0.53	11.26±0.25
Ash	3.77 ± 0.18	3.8 ± 0.07	3.97 ± 0.125	4.0± 0.33

★SBTS, Sugar beet tops silage containing diet; BS, berseem silage containing diet; SBTH, Sugar beet tops hay containing diet; BH, berseem hay containing diet. a, b, c and d values not sharing the same supercript within column are significantly different (p<0.005).

The plasma parameters of rabbits fed the experimental diets are summarized in Table (9).The results reveal that there are no significant differences between values of the experimental groups in albumin and creatinine. However, differences were significant between diets of SBTS, BS and SBTH for values of cholesterol. Both BS and BH significantly decreased plasma cholesterol. Usha *et al.*, (1984) and Lo *et al.*,

(1987) found that high levels of neutral detergent fiber (NDF) or CF in the diet coused low plasma cholesterol. The chemical analysis data in (Table 1) indicated that BS and BH diet have highest levels of CF and NDF than the other two experimental dies. Values of glucose concentration were 100.32, 94.64, 104.88, and 88.9 mg/ 100ml serum for the dietary treatments of C, SBTS, BS, SBTH and BH, respectively.

The concentration of glutamic pyruvic transaminase (GPT) was significantly ($P<0.05$) higher in groups fed either SBTH or BS compared with each of SBTS and BH-diets which were quite similar. Similar results of blood parameters were obtained by Malhate (1992) for rabbits fed diets containing SBT silage and hay.

Table 9. Effect of feeding the different experimental diets on blood constituents of growing rabbits.

Item	Experimental diets			
	C-SBTS	C-BS	C-SBTH	C-BH
Albumin g/ml	2.76±0.07	2.62±0.11	2.75±0.11	2.66±0.07
Cholesterol mg/dL	$87.72±1.68^{a}$	$30.18±2.11^{c}$	$59.66±2.06^{b}$	26.08±3.0a
Creatinine mg%	1.79±0.13	2.11±0.22	1.83±0.12	$2.33±0.07_{b}$
Glucose mg%	$100.32±1.49^{a}$	$94.64±2.29^{a}$	$104.88±5.97^{a}$	$68.9 ±6.76^{b}$
GPT µ/L	$21.86±2.2^{a}$	$27.26±1.9^{b}$	$38.01±1.22^{c}$	$19.2 ±0.42^{a}$

*SBTS, Sugar beet tops silage containing diet; BS, berseem silage containing diet; SBTH, Sugar beet tops hay containing diet; BH, berseem hay containing diet. a, b; c and d values not sharing the same supercript within column are significantly different ($p<0.005$).

It could be concluded that SBT as (hay or silage) could be successfully used for growing rabbits in such areas where SBT are produced in large quantities, besides berseem is not readily available and higher in price. Therefor, SBT (hay or silage) can be used instead of berseem (hay or silge) in rabbit diets at the level of 40% without any addverse effect.

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الاستفادة من عروش بنجر السكر المحفوظة على صورة دريس وسيلاج مقارنة بالبرسيم فى تغذية الارانب

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أجريت تجربتان وذلك لغرض التقييم الغذائى لعروش بنجر السكر فى صورة دريس او سيلاج لاستخدامها فى تغذية الارانب

التجربة الاولى: تمت على ٤ مجاميع من ذكور الارانب النيوزيلندى الابيض عمر ٦ شهور . غذيت كل مجموعة على عليقة خشنة من العلائق الاربعة الآتية: سيلاج عروش بنجر السكر ، سيلاج برسيم ، دريس عروش بنجر السكر ، دريس برسيم. لغرض تقييم المكونات والتحليل الغذائى

التجربة الثانية : أجريت على ٤ مجاميع متساوية بكل مجموعة ١٢ أرنب نامى – مختلطة الجنس – فى مكررتين ، عند عمر ٦ أسابيع غذيت الارانب على ٤ علائق مختلطة مكونة من ٤٠٪ من العليقة الخشنة السابق تقييمها بالاضافة إلى ٦٠٪ من عليقة الارانب التجارية لمدة ١٠ اسابيع والتى تم خلالها تقدير وزن الجسم و معدلات النمو والكفاءة الغذائية ومعدلات الهضم وميزان الآزوت والنشاط الميكروبى للاعور وصفات الذبيحة وبعض صفات الدم . وكانت اهم النتائج ما يلى: لايوجد اختلاف معنوى فى مجموع المواد الغذائية المهضومة فى العلائق الخشنة المختبرة. بينما زاد معادل النشا عند التغذية على علائق عروش بنجر السكر . قيم البروتين الخام المهضوم كانت عالية عند التغذية على علائق سيلاج عروش البنجر ويتبعها دريس البرسيم وسيلاج البرسيم وأقلها كانت فى دريس عروش بنجر السكر. عند تغذية الارانب النامية على العلائق الخشنة المختلطة مع العليقة التجارية كانت اعلى قيمة لمعدل النمو اليومى للارانب المغذاة على العليقة المختلطة مع سيلاج عروش بنجر السكر. وأظهرت مجموعة الأرانب المغذاة على عليقة بها سيلاج بنجر السكر أعلى معدل تحويل غذائى (كفاءة غذائية). أظهرت المجاميع المغذاة على العلائق المختلطة اختلافا معنويا فى البروتين الخام المهضوم . كان ميزان الآزوت مرتفعا لمجاميع الأرانب المغذاة على العلائق المختلطة مع دريس البرسيم . إزداد تركيز الأحماض الدهنية الطيارة والامونيا فى المجاميع المغذاة على العلائق المختلطة مع سيلاج البرسيم ويليها العلائق المختلطة مع دريس البرسيم ثم سيلاج عروش بنجر السكر ثم دريس عروش بنجر السكر . لم يحدث تغيير معنوى فى نسبة التصافى والتحليل الكيماوى للذبائح .

لوحظ نقص معنوى فى كوليسترول الدم نتيجة تغذية مجاميع الأرانب على كل من سيلاج ودريس البرسيم.