PRODUCTIVE PERFORMANCE OF GROWING LAMBS FED SILAGES OF SUGAR CANE TOPS, SUGAR BEET LEAVES AND GREEN MAIZE STEMS

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SUMMARY

This study was conducted to investigate the performance and nutrient digestibility of sheep fed silage of green maize stems(SGMS), silage of sugar cane tops (SSCT), or silage of sugar beet leaves(SBLS) with concentrate feed mixture (CFM). A total of 16 mature rams (40 – 45 kg live body weight) were used in digestibility trials using one way ANOVA. Twenty four growing Saidi male lambs were used in growth trails. Animals in each trail were randomly divided into four groups according to their body weight. Four diets were used in both experiments. Diet 1 (T1, CFM+berseem hay), diet 2 (T2, CFM+SGMS), diet 3 (T3, CFM+SSCT) and diet 4 (T4, CFM+SSBL). The CFM was used in T1, T2, T3 and T4 as 3 % of live body weight.

Diets containing silage had lower dry matter (DM),organic matter (OM), crude protein (CP), crude fiber (CF), ether extract (EE), and nitrogen free extract (NFE) digestibility coefficients compared to control diet. There were differences ($P<0.01$ and $P<0.001$)in total digestible nutrient (TDN), digestible and crude protein (DCP) among the studied diets Results of nitrogen balance (NB),nitrogen absorption (NA), NB/NA and NB / total nitrogen consumed (TNC) were significant ($P<0.001$) in favor of T1. The average daily gain, feed conversion, dressing percentage and other carcass traits were nearly similar among the studied diets. Sheep of T1 had the highest percentage of protein and the lowest percentage of fat in their carcasses meat compared to the other diets.

Keywords: Performance, growing lambs, by-products silages, sugar cane tops, sugar beet leaves, green maize stems

INTORODUCTION

Berseem (*Trifolium alexandrinum*) is the main legume winter green forage cultivated in Egypt. Lots of extensive research studies dealt with increasing it'sproductivity and utilization by farm animals even fed as a sole feed ingredient or in combination with other feed ingredients (Suliman, 2001).

In Egypt berseem is cultivated during September and October. The three first cuts are high in moisture content 73 - 85 %, therefore they are not suitable for ensiling (Hamdy*et al.*, 1989). A mixture of berseem / rice straw or berseem / wheat straw in a ratio of 4:1 gives better ensiling results (Gabra, *et al.*, 1994). Addition of molasses (4% of total biomass) improves the fermentation and quality of the silage as well (EL-Kholy, 1981). Berseem yield is estimated by 52 million metric tons per year. It represents 60% and 75% of energy and protein available year for ruminants feeding (El-Serafy, 1991). Mixing energy source of feed stuffs with berseem improve its feed utilization (Suliman *et al.*, 2004), which could be preserved as hay or silage (Talha, 1996).

Sugar cane tops contain less nitrogen than the required concentration for optimum fermentation in the rumen. It should be possible to augment the rumen fermentation of cane tops through the use of nitrogen rich supplement(s). Adding urea to cane tops improves the digestibility of organic matter. Cane tops are also poor in phosphorous (Hofke, 1992), which may lead to poor reproductive performance of animals when fed on large quantities without supplementation of phosphorous along with calcium as SCT. Oxalate content in SCT develops calcium utilization deficiency in animals feed.

Daniel (1983), Abd EL-Aziz *et al.* (1989), Schwarz *et al.* (1992) and Hermansen and Kirstensen (1993) showed that mixing some agriculture by-products with fodder beet roots is important for making good quality silage to adsorb considerable amount of water from the high moisture roots and reduce protein losses.

The objectives of this study were to determine the effect of feeding silage of green maize stems, sugar cane tops or sugar beet leaves on animal growth performance, feed efficiency and carcass characteristics.

MATERIAL AND METHODS

The present study was run at the experimental farm of Animal Production Department, Faculty of Agriculture, South Valley University, Qena during the period from March, 2009 to December, 2010). Digestibility trails were conducted to study digestibility, nutritive values, nitrogen balance, performance and carcass characteristics of Saidi lambs, fed different types of silage.

Silage Preparation

Green maize stems, sugar cane tops, sugar beet leaves, were collected and chopped before ensiling in stack of 2 x 1.5 x 1.75 meters. 1% common salt, 1.5% lime stone and 0.5% ground yellow corn were added. Three walls were prepared and spread with plastic sheet before ensiling. After preparing the whole green fodders, the plastic wings were collected together, compressed by a tractor and conserved by 25 cm layer of the ground to get the anaerobic conditions for 12 weeks.

Digestibility Trails

A total of 16 mature Saidi rams {40 - 45 kg live body weight (LBW)} were applied in digestion trails four animals for each treatment using one way ANOVA. Animals were kept in individual metabolic cages. Each trail lasted 21 days, 14 days as preliminary period and seven days for feces and urine collection. Through the preliminary period each animal was offered 3.5 kg fresh silage and was then reduced to 3 kg through the collection (to avoid any refusals) which was offered twice daily (10.00 am and 4.00 pm) into two equal portions. Fresh water mineral and vitamins mixture blocks were made available all the time. Before feeding, the total excreted feces were weighed and a sample of 10% of the total daily feces was collected for drying at 60° C oven for 24 hours. At the end of the collection period the seven daily fecal samples of each ram were ground and, mixed and kept in nylon bags for laboratory analysis. At the end of the collection period, 5% of the individual acidified daily urine samples were pooled and sub-samples were subjected for N- determination.

Feeding Trial

A sum of 24 growing male Saidi lambs, four months old and 24.4±1.70 kg LBW were distributed into four equal groups (n = six each). All were offered concentrate feed mixture (CFM) as 3% of their LBW as basal diet in addition to berseem hay (BH) for the control treatment (T1), silage of green maize stems (SGMS) for T2, silage of sugar cane tops (SSCT) for T3 and silage of sugar beet leaves (SBLS) for T4. Hay and silage were offered twice daily *ad-libtum* in two equal portions at 9.00 am and 3.00 pm. Offered forages were increased from 1.5 kg at starting of the experiment to 3.5 kg at the end of the experiment according to lamb's LBW. Water was made available all the time of the experiment, which extended for 124 days, while weighing was taken place before feeding every two weeks.

Carcass Characteristics

Three lambs from each group were randomly chosen for carcass characteristics examination. Lambs were fasted for 18 hrs and weighed before slaughtering. After bleeding, they were reweighed and the dressed carcass was longitudinally split into two equal sides. The right side was cut according to the English system of cutting mutton and lamb (Gerracl, 1953). The components of 9,10 and 11^{th} ribs (lean and fat) of the left side of each carcass were mixed and dried at 60°C till constant weight for moisture determination and preserved in deep freezer for analysis.

Economical Evaluation

Economical evaluation was done for the tested diet assuming that the price of one kg LBW of lambs was 22.00 Egyptian pound (LE) and the price of one kg DM of CFM, hay, SGMS, SSCT and SSBL were LE 2.00, 0.75, 0.75, 0.75 and 0.70, respectively. The cost of total dry matter intake DMI of CFM plus hay of T1 or silage of T2, T3 and T4 were LE 252.13, 256.73, 256.03 and 258.86, respectively. The experiment was terminated when lambs reached LBW of 40-45 Kg.

Laboratory Analysis

Analysis of feed, feces and carcass and N of urine samples were carried out according to A.O.A.C. (1990).

Statistical Analysis

Data are expressed as mean ±SE. Statistical analysis was performed using one-way ANOVA. The general liner model (GLM) was applied to test the differences among the four experimental diets. P-values less than 0.05 were considered to be statistically significant (SAS Institute, 2003). Duncan's test was used to examine the significance degrees among means (Duncan, 1955).

The statistical analysis was calculated using the following equation:

$$Y_{ij} = \mu + Ti + E_{ij}$$

Where:

Y_{ij} = Experiment observations;

μ = the overall mean;

Ti= the effect of dietary treatment;

i= 1= control, 2= CFM+ SGMS, 3= CFM+ SSCT and 4= CFM + SSBL;

E_{ij} = the experimental error.

RESULTSAND DISCUSSION

Proximate analysis of feeds

Chemical analysis on dry matter basis indicated that CFM and BH were rich in CP content compared with SSCT and SGMS and SSBL were low in CF (%) content compared with BH and other tested silages. CFM contained greater percentage of NFE than the tested silages.BH and SSCT were characterized by their low content of EE compared with CFM, SGMS and SSBL (Table 1). It is quite accepted that leaves contain greater portions of CP and lesser portion of CF (Taie, 1998 and Suliman *et al.,* 2001). Silages showed low percentage of NFE than CFM. Forages are characterized by it lower content of NFE and CP, but higher content of CF as a source of structural carbohydrate than concentrates (MARSS, 1997). Moreover some NFE were fermented through ensiling. These results agree with those reported by Suliman *et al.* (2004). Ash percent was higher in SSBL compared with other silages this may be due to the dust or ground during collecting the crop in the field or during chopping with the tractor, these results agree with Suliman *et al.* (2004).

Nutrients digestibility

Digestibility coefficients of DM, OM, CP, CF, EE and NFE of the different treatments are presented in (Table 2). Highly significant differences were observed in DM, OM, CP, CF, EE and NFE digestibility coefficients among the studied diets. T1showed higher values compared with other treatments in all nutrients. The lowest digestibility values for all nutrients were detected in T4 compared to T2 and T3. No significant difference was detected between T2, T3 and T1 in DM, CF, EE and NFE digestibility. T4 showed the same observation compared with T3 in CP, CF and EE digestibility coefficient except NFE where it was significantly lower inT4 than T3. Hay, SGMS, SSCT, SSBL were offered *ad -libtum* the amount consumed from these forages represent, 29.7, 44.6, 22.6 and 19% respectively of the total diet consumed in T1, T2,T3 and T4, respectively. This means that the CFM represents 70.3, 55.4, 77.4 and 81.0% of the total DMI.

The digestibility's of all nutrients were increased with increasing the concentrate level in the ration. They stated that increasing of dietary energy concentration improved the digestibility of all nutrients, except CF digestibility. Balancing the nutrient content of the diet is a major factor affecting digestibility (Suliman *et al.*, 2001).

Suliman *et al.* (2004) found no significant difference in OM, CF and EE when fed lambs berseem + SSBL or bean green waste + berseem or SSCT + berseem by 3:1 berseem to byproduct silage, but in CP and NFE there were highly significant difference ($P<0.05$ and $P<0.01$) among control and other treatments. The results were in favor of silage for CP digestibility. While, for NFE digestibility the figures were in favor of the control treatment.

The results of digestion coefficients can be explained in the light of proximate analysis and portions of silage consumption to CFM, which varied from 29.7:70.3, 44.6:55.4 and 22.6:77.4 to 19.0:81 for T1, T2, T3 and T4, respectively. The greater digestibility coefficients and feeding value of T3 may be due to the higher proportion of CFM in the diet (77.4 %). While the lower value for T4 may be due to high content of ash (15.72%) and lower digestibility of most nutrients.

Nutritive Value

Highly significant differences were detected among studied diets concerning TDN, and DCP, respectively. The highest values were recorded by T1 the lowest TDN value was found in T4. However, the lowest values of DCP were recorded by T2 (Table 2).

No significant difference between T1 and T3 was detected in TDN. .Suliman and Marzouk, (2006) stated that whole maize silage showed significant difference ($P<0.05$ and $P<0.01$) between CFM and whole maize silage in favor of silage. Such differences might be due to the silage combinations and experimental conditions. The results obtained in this study as TDN and DCP were in accordance with those found by (Abd EL-Baki *et al.*, 1997 and Suliman *et al.*, 2004). The nutritive values of tested rations can be explained in view of proximate analysis, portions of silage consumption to CFM and digestibility coefficients (Table 1 and 2).

Nitrogen Balance

Total nitrogen intake (TNI) differed significantly among the studied diets T1 showed the highest value, while the lowest was recorded in T2. TNI was significantly lower compared with T1 (Table 3).

Table 1. Proximate analysis of feeds and rations used in this experiment

Treatment	**Nutritional composition types on DM basis**					
	OM	**CP**	**CF**	**EE**	**NFE**	**ASH**
CFM	87.35	15.52	12.21	2.69	56.93	12.65
BH	84.66	15.36	31.37	0.95	36.98	15.34
SGMS	87.71	9.35	36.29	2.39	39.68	12.29
SSCT	86.98	6.14	31.85	1.60	47.39	13.02
SSBL	71.13	11.15	11.28	3.45	45.25	28.87
Diets						
T1 (CFM+HAY)	86.58	15.47	17.93	2.18	51.00	13.42
T2 (CFM+SGMS)	87.40	12.77	22.96	2.43	49.24	12.60
T3 (CFM+SSCT)	87.27	13.40	16.65	2.45	54.77	12.73
T4 (CFM+SSBL)	84.28	14.69	12.04	2.84	54.71	15.72

Where: CFM = concentrate feed mixture, BH = berseem hay, SGMS = silage of green maize stems, SSCT = silage of sugar cane tops, SSBL = silage of sugar beet leaves.

The concentrate feed mixture (CFM) consisted of (cotton seed meal 8%, rice gluten meal 7%, soybean meal 3%, wheat bran 21%, rice bran 18 %, ground maize 25 %, molasses 15 %, lime stone 2.5 % and salt 0.5 %).

Table 2. Least square Means ± standard errors Nutrients digestibility coefficients and nutritive values for rams fed on different types of silage

	Nutrients digestibility coefficients				± SE	Sig
	T1	T2	T3	T4		
No. of animals	4	4	4	4		
Digestibility (%)						
DM	63.96^{a}	54.45^{b}	57.12^{ab}	46.95^{c}	2.28	**
OM	64.20^{a}	53.08^{cb}	56.95^{b}	46.30^{c}	2.24	***
CP	60.90^{a}	43.55^{b}	51.39^{b}	43.93^{b}	2.94	**
CF	50.66^{a}	47.20^{a}	42.28^{ab}	32.75^{b}	3.06	**
EE	62.28^{a}	53.54^{ab}	52.11^{ab}	51.23^{b}	3.56	*
NFE	69.74^{a}	57.74^{b}	64.43^{a}	57.12^{b}	2.11	***
Nutritive Values						
TDN	57.12^{a}	47.76^{bc}	54.09^{ab}	44.91^{c}	1.95	**
DCP	9.42^{a}	5.56^{c}	6.89^{b}	6.45^{b}	2.20	**

T1= control (CFM + berseem hay), T2= (CFM+SGMS), T3= (CFM+SSCT) and T4 = (CFM+ SSBL)
CFM was used in T1, T2, T3 and T4 as 3 % of live body weight.
a,b,c means within the same row with different litters differ significantly at P<0.05.
* Significant 0.05), ** Significant (P<0.01), *** Significant (P<0.001)

Table 3.Least square Means ± standard errors of nitrogen balance and nitrogen absorption values for rams fed on different types of silage

Parameters	**No**	**T1**	**T2**	**T3**	**T4**	**± SE**	**Sig**
Nitrogen intake							
Nitrogen in hay or silage g/day	16	6.22^{a}	4.82^{b}	2.01^{c}	3.06^{c}	0.26	***
Nitrogen in CFM	16	21.13^{b}	17.93^{c}	22.41^{a}	22.41^{a}	0.00	***
Total nitrogen. intake (TNI)	16	27.35^{a}	22.75^{c}	24.42^{b}	25.47^{b}	0.26	***
Nitrogen execration							
Nitrogen in feces	16	10.69^{b}	12.38^{ab}	11.88^{b}	14.83^{a}	0.65	**
Nitrogen in urine	16	5.79^{c}	5.14^{b}	5.00^{b}	3.75^{a}	0.14	*
Total Nitrogen execration	16	16.48^{b}	17.52^{b}	16.88^{b}	18.58^{a}	0.72	***
Nitrogen balance (NB)	16	10.87^{a}	5.23^{c}	7.54^{b}	6.89^{b}	0.86	***
Nitrogen absorbed (NA)	16	16.66^{a}	10.37^{c}	12.54^{b}	10.64^{c}	0.79	***
NB/NA	16	65.25^{a}	50.43^{b}	60.13^{a}	64.76^{a}	1.59	***
NB/ TNI	16	39.74^{a}	22.99^{c}	30.88^{b}	27.05^{c}	2.90	***

T1= control (CFM + berseem hay), T2= (CFM+SGMS), T3= (CFM+SSCT) and T4 = (CFM+ SSBL) CFM was used in T1, T2, T3 and T4 as 3 % of live body weight.
^{a,b,c} Means denoted within the same row with different superscripts are significantly differ at P<0.05.
* Significant (P<0.05), ** significant (P<0.01), *** significant (P<0.001)

Results of nitrogen excreted in feces differed significantly among treatments. The highest value of nitrogen balance was recorded in T1, while the lowest value was recorded in T2. T1 showed higher (P<0.001) value of nitrogen balance (NB), balance/nitrogen absorbed (NB/NA) than T2 (Table 3).

The results of nitrogen Balance (NB) gm/ day, NB/nitrogen absorbed (NA) % and NB/total nitrogen intake % (TNI) were in accordance with proximate analysis, nitrogen digestibility and DCP (Tables 1 and 2). Lambs fed T2 (SGMS) showed the lowest value of NB 5.23 g/head /day, DCP 5.56 gm/head/day, total CP consumed 22.75 gm/head/day among other treatments. The lowest value of N- consumed and the lowest digestibility of CP observed in rams fed T2 than other treatments may explain the significant depression in N-balance and DCP when rams fed T2. These results were in agreement with those of Gunter *et al.* (1998) and Ghanem *et al.* (2000).

Feeding Trial

Average daily gain

Significant (P<0.05) differences were found among the experimental groups in total body weight gain the figures (Table 4). The final body weight (FBW) values were slightly higher for hay containing diets compared with those fed silages plus CFM; subsequently the daily gain came out greater in lambs fed hay than the other treatments. This phenomena may be due to the higher digestibility, feeding value and intake of TDN and DCP in T1 than other treatments, and efficient utilization of hay and it's rumen fermentation products volatile fatty acids, NH_3 and microbial protein (EL-Bedawy *et al.*, 1994).

Table 4. Least square Means ± standard errors of growth performance and feed conversion for rams fed on different types of silage

Items	No.	T1	T2	T3	T4	± SE	Sig
IBW (kg)	24	23.33	25.83	24.17	24.17	1.7	NS
FBW (kg)	24	44.17	41.67	44.17	43.33	1.15	NS
TG (kg)	24	20.83^{a}	15.33^{c}	20.00^{a}	19.17^{ab}	1.48	*
DG (g)	24	168.0^{a}	127.69^{b}	161.29^{ab}	154.47^{ab}	11.93	*
Feed consumption:							
kg DM of CFM	24	112.43	113.52	115.34	112.87	3.31	NS
kg DM of hay or silage	24	36.36^{cb}	39.58^{b}	33.87^{c}	47.32^{a}	1.82	***
Total (DMI) kg	24	148.79^{b}	153.10^{ab}	149.21^{b}	160.19^{a}	3.11	*
TDN (kg)	24	84.99^{a}	73.12^{c}	80.71^{b}	71.94^{c}	1.60	***
DCP (kg)	24	14.02^{a}	8.51^{b}	10.28^{ab}	10.33^{ab}	1.70	**
Feed conversion:							
DM (kg)/kg gain	24	7.14^{b}	9.67^{a}	7.46^{b}	8.36^{a}	0.69	*
TDN (kg)/kg gain	24	4.08^{ab}	4.62^{a}	4.04^{ab}	3.76^{b}	0.38	***
DCP (kg)/kg gain	24	0.67^{a}	0.54^{ab}	0.51^{b}	0.54^{ab}	0.11	***

T1= control (CFM + berseem hay), T2= (CFM+SGMS), T3= (CFM+SSCT) and T4 = (CFM+ SSBL) CFM was used in T1, T2, T3 and T4 as 3 % of live body weight.

[a,b,c] Means denoted within the same row with different superscripts are significantly differ at P<0.05.

* Significant (P<0.05), ** Significant (P<0.01), *** Significant (P<0.001)

Table 5. Economic coasts for growth performance for rams fed on different types of silage

Economical evaluation	T1	T2	T3	T4
Cost of kg DMI of CFM (LE)	2.00	2.00	2.00	2.00
Total feed intake kg	148.79	153.10	149.21	160.19
Cost of total feed intake(LE) (b)	252.13	256.73	256.08	258.86
Price of kg LBW(LE)	22.00	22.00	22.00	22.00
Price of total gain (a)	458.26	337.26	440	421.74
Revenue (LE)	206.13	80.53	183.92	162.88
Economical efficiency (y)	0.81	0.31	0.71	0.62

T1= control (CFM + berseem hay), T2= (CFM+SGMS), T3= (CFM+SSCT) and T4 = (CFM+ SSBL)
CFM was used in T1, T2, T3 and T4 as 3 % of live body weight.
Economic efficiency, y = {(a-b)/b)}, where a = selling coast the obtain gain and b = feeding coast of this gain.

Feed efficiency

Highly significant differences (P<0.001) were found among treatments concerning feed consumption or total dry matter intake. Significant difference was detected in feed conversion as DM between T2 and T4 *vs.* T1 and T3 (Table 4). Results for TDN and DCP kg/kg gain showed significant differences (P<0.001).The more efficient feed conversion ratio as DM was observed in T1, while the lowest feed conversion ratio expressed as kg TDN/kg gain was observed in T4. This means that feed consumption was the effective factor affecting feed conversion when gain was not significantly differed. The lower DCP consumption of animals fed silage containing diet (Table 4) may explain the better feed conversion expressed as kg DCP /kg gain These results agree with those found by (Suliman *et al.*, 2004) on different types of berseem +green bean steams, berseem +SSBL and berseem +SSCT. The greater amounts consumed from TDN, and DCP for the control diet can be explained in the light of proximate analysis, digestibility and nutritive values (Tables 1 and 2).

Economical evaluation

Coast of total feed intake was higher in T4, than other treatments (Table 5), while higher revenue was for T1 and T3 (Table 5). Ration containing hay showed better economic efficiency because of the better daily gain and feed conversion efficiency than lambs fed ration containing silages (Table 5).

Table 6. Least square Means ± standard errors carcass traits and carcass cuts for lambs fed on different types of silage

Parameters	No.	T1	T2	T3	T4	± SE	Sig
Fasting body weight(kg)	12	42.33[b]	44.33[ab]	45.67[a]	41.67[b]	0.88	**
Carcass length (cm)	12	50.33[c]	56.00[b]	64.00[a]	65.33[a]	1.62	***
Carcass circumference (cm)	12	72.67	79.50	71.67	65.00	5.17	NS
Width of carcass at lion (cm)	12	21.00	21.67	21.33	20.67	0.65	NS
carcass weight (kg)(CW)	12	22.83	23.00	23.40	20.80	0.99	NS
Empty dressing (%)	12	65.12	61.34	60.28	60.16	1.67	NS
Fast dressing (%)	12	53.63	52.12	51.07	49.90	1.10	NS
Tail fat (kg)	12	0.65	0.55	0.65	0.47	0.08	NS
Bowel fat (kg)	12	0.15[b]	0.22[b]	0.30[a]	0.15[b]	0.02	***
Kidney fat (kg)	12	0.12[b]	0.15[ab]	0.25[a]	0.13[ab]	0.04	*
Total fat (kg)	12	0.92[ab]	0.92[ab]	1.20[a]	0.75[b]	0.09	**
Fore quarter (kg)	12	5.42	5.27	5.45	4.73	0.26	NS
Hind quarter (kg)	12	4.97	5.48	5.13	4.83	0.22	NS
Fore quarter (%)	12	52.00[a]	48.97[b]	51.44[a]	49.47[b]	0.27	***
Hind quarter (%)	12	47.83[b]	51.03[a]	48.56[b]	50.53[a]	0.23	***
Shoulder weight. (kg)	12	2.06	1.98	1.97	1.80	0.12	NS
Sets cut (kg)	12	1.50	1.75	1.47	1.53	0.09	NS
Ends cut (kg)	12	1.33[b]	1.08[c]	1.53[a]	1.00[c]	0.06	***
Chine weight (kg)	12	1.63	1.82	1.50	1.43	0.13	NS
Leg weight (kg)	12	3.30	3.67	3.63	3.40	0.19	NS
Chine (%)	12	32.70	33.15	29.54	29.50	2.38	NS
Leg (%)	12	67.30	66.85	70.46	70.47	2.37	NS
Length rump (cm)	12	48.33	48.67	51.00	49.33	1.04	NS
Circumference of rump (cm)	12	41.67[b]	48.00[a]	45.00[ab]	49.00[a]	1.20	***
Area of *Longismus dorsi* (cm^2)	12	22.53[a]	15.44[b]	24.25[a]	14.56[b]	2.01	**
Fat thickness around *Longismus dorsi* (mm)	12	0.62[a]	0.71[a]	0.44[b]	0.73[a]	0.04	***

CW= carcass weight (kg), EDr= Empty dressing (%) ,FDr= Fast dressing (%), Sets = chest &neck , ends = fore pairs ribs cut, chine = lion weight, leg = rump weight. Where: T1= control (CFM + berseem hay), T2= (CFM+SGMS), T3= (CFM+SSCT) and T4 = (CFM+ SSBL), CFM was used in T1, T2, T3 and T4 as 3 % of live body weight.

Carcass characteristics

Highly significant (P<0.01& P<0.001) differences were found among lambs in fasting body weight (FBW) kg and carcass length (cm), while no significant difference was observed in carcass weight and dressing percentage calculated based on fasted (FDr) or empty weights (EDr %) (Table 6).

Fore and hind quarters as well as tail fat weights were not affected by treatments. No significant difference (P<0.001) was also found among treatments in leg and chine weights (Table 6). Carcass lambs of T3 and T1 recorded the highest weight of ends compared with those fed T2 and T4. The highest weights of shoulder were recorded in T1 while the lowest value was for T4. Measurements of rump circumference area of *Longismus dorsi* and fat thickness around *Longismus dorsi* differed significantly among the studied groups. Lambs fed T4 and T2 recorded the highest value for rump circumference and fat thickness. The highest area of *Longismus dorsi* $(cm)^2$ was recorded in T3 and T1 (Table 6).

Physical analysis of 9, 10 and 11th ribs cut (lean, fat and bone) indicated significant differences ($P<0.05$) in favor of T1 than the other treatment.

Chemical composition of *Longismus dorsi* muscle indicated highly significant differences ($P<0.01$ & $P<0.05$) in protein and EE (Table 8).

The dietary protein and carbohydrates are the two main components, to be effective on animal performance (Taie *et al.*, 1996). They positively affect rumen fermentation subsequently the nutrient utilization (Mahmoud *et al.*, 1999). In this view we can explain carcass characteristics of fat tail lambs. Animals fed T1 that was greater than other treatments in CP and NFE% showed better final body weight, total gain and fasting body weight. Also eye muscle area was affected by the two main factors. Fat are the main element that reflect the nutritional status of the animal (Taie *et al.*, 1996 and Suliman and Marzouk, 2006).The fat content of *longismus dorsi* was greater for animals fed T1 than other treatments. The second factor is the genetic structural especially growth cycle waves, first come from the head of animal toward lion area and the second wave come from down raised up to lion area (rump).

Table 7. Least square means ±Standard error of 9, 10 and 11 ribs cut weight for lambs fed on different types of silage

ITEMS	No.	T1	T2	T3	T4	± SE	Sig
Total WT of sample (gm).	**12**	526.7^{a}	450.0^{ab}	483.3^{ab}	400.0^{b}	35.9	*
Lean meat wt. (gm)	**12**	341.7^{a}	291.7^{ab}	310.3^{ab}	250.0^{b}	22.3	*
Fat wt. (gm)	**12**	105.0	90.0	99.7	87.0	8.5	NS
Bone wt. (gm)	**12**	81.7^{a}	68.3^{ab}	73.3^{ab}	63.3^{b}	5.1	*

SE = Standard error. T1= control (CFM + berseem hay), T2= (CFM+SGMS), T3= (CFM+SSCT) and T4 = (CFM+ SSBL)
CFM was used in T1, T2, T3 and T4 as 3 % of live body weight.
[a,b,c] Means denoted within the same row with different superscripts are significantly differ at $P<0.05$.
* Significant ($P<0.05$).

Table 8. Means ± Standard errors of the chemical composition of *Longismus dorsi* for rams fed on different types of silage

ITEMS	No.	T1	T2	T3	T4	± SE	Sig
Moisture %	12	63.17^{b}	67.30^{b}	62.63^{b}	72.04^{a}	2.22	*
CP %	12	20.64^{a}	20.51^{a}	21.27^{a}	14.22^{b}	3.02	**
EE %	12	14.86^{a}	10.92^{b}	14.76^{a}	12.40^{a}	2.04	*
Ash %	12	1.33	1.29	1.35	1.34	0.14	NS

CP = Crudeprotein, EE = Ether extract.
T1= control (CFM + berseem hay), T2= (CFM+SGMS), T3= (CFM+SSCT) and T4 = (CFM+ SSBL)
CFM was used in T1, T2, T3 and T4 as 3 % of live body weight.
[a,b,c] Means denoted within the same row with different superscripts are significantly differ at $P<0.05$.
* Significant ($P<.05$), ** significant ($P<0.01$).

CONCLUSION

Lambs fed the control diet showed better results expressed as digestibility, feeding value, N-balance, growth performance and economical efficiency. More work is required to improve the digestibility and feeding value of silage containing diets.

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الأداء الإنتاجي للحملان النامية المغذاة علي سيلاج القمم النامية لقصب السكر(زعازيع القصب) وسيلاج أوراق بنجر السكر وسيلاج عيدان الذرة الخضراء

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أجري هذا البحث لدراسة أداء النمو و معاملات الهضم للحملان المغذاة علي سيلاج عيدان الذرة الخضراء ، سيلاج قمم قصب السكر وسيلاج أوراق بنجر السكر مع العلف المركز. وقد استخدم في تجربة الهضم عدد 16 كبش تام النمو بوزن حي من 40-45 كجم . وقد أستخدم في تجربة النمو عدد 24 حولي صعيدي في مرحلة النمو وقد تم توزيعها في أربعة مجموعات عشوائية طبقا لوزن الجسم غذيت علي أربعة معاملات غذائية كالتالي:-

المعاملة الأولي- (علف مركز + دريس برسيم)، المعاملة الثانية (علف مركز+ سيلاج عيدان الذرة الخضراء) ، المعاملة الثالثة (علف مركز + سيلاج قمم قصب السكر) والمعاملة الرابعة (علف مركز + سيلاج أوراق بنجر السكر), وقد استخدم العلف المركز بنسبة 3% من الوزن الحي وغذي السيلاج حتي الشبع . وقد كانت العلائق المحتوية علي السيلاج أقل في معاملات هضم المادة الجافة ، المادة العضوية ، البروتين الخام ، الألياف الخام ، والدهن والكربوهيدرات الذائبة مقارنة بالكنترول (المعاملة الاولي) وكانت الاختلافات معنوية عند مستوي (0.01 و 0.001) . كما الاختلافاتفي المركبات الغذائية الكلية المهضومة (TDN) والبروتين الخام المهضوم(DCP) بين العلائق المختبرة عند مستوى معنوية (0.01 و 0.001). وأظهرت نتائج ميزان الازوت و الازوت الممتص وميزان الازوت علي الازوت الممتص وميزان الازوت علي الازوت الكلي المستهلك اختلافات معنوية عند مستوي (0.001) لصالح المعاملة الأولي (الكنترول). كما أن متوسط معدل النمو اليومي و الكفاءة التحويلية و نسبة التصافي وبعض صفات الذبيحة الأخرى متشابهة تقريبا بين العلائق المختبرة ، وكانت نسبة البروتين أعلي ونسبة الدهن أقل في لحوم ذبائح الحملان المغذاة علي عليقة الكنترول مقارنة بباقي المعاملات.