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Performance of Lambs Fed on Biologically Treated Silages

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Abstract : The aim of this study was to investigate the performance and nutrient digestibility of sheep fed silage of green maize stems (GMSS), silage of sugar cane tops (SCTS), and ½ silage of green maize stems (GMSS)+ ½ silage of sugar cane tops (SCTS) with concentrate feed mixture (CFM) on silage quality, nutrient digestibility, nutritive value, feeding trials , blood serum analysis, carcass characteristics and economic efficiency of growing lambs fed these silages. A feeding trial for 120 days was carried out on twenty four ½ Ossimi x ½ Chios crossbred male lambs of 5 months old and weighing 23.66± 1.69 Kg LBW. Animals were divided into 4 groups (6 lambs each). The experimental groups allotted randomly into four rations, all the experimental groups received 2% CFM of their live body weight and wheat straw as a control (R1), while R2, R3 and R4 included silage of green maize stems GMSS, silage of sugar cane tops (SCTS) and 50% silage of green maize stems (GMSS) +50% silage of sugar can tops (SCTS) *ad-libitum* feed, respectively. Results indicated that nutrient digestibility of all nutrients and feeding value of rations containing silage significant increased ($P<0.05$) were observed in OMD and DMD in ration (2) compared to the control ration, except the value CPD and CFD. The best result rations of TDN and DCP were recorded with ration (4). The average daily gain were significantly increased with rations 3 and 4, the best feed conversion recorded with ration 4 but other test treatments not effect. Dressing percentage was nearly similar among the studied diets and other carcass traits it were best significantly results with ration 4 in sample, Leon, fat weight and eye muscle area. No significant differences were found in blood constituent. Feed conversion and economic efficiency were markedly better with lambs fed 50% (GMSS) +50% (SCTS) feed *ad-libitum* than that of the control group. The lambs meat analysis of CP was increase significantly 22.00 % with ration 3 and 22.17% with ration 4 compared with control (ration 1). It could be concluded that, feeding green corn stem silage, sugar cane top silage and their mixture ad-libitum with low level of concentrate feed mixture for growing lambs, resulted in superior nutrition, better daily gain with ration 3 followed by ration 4. Feed conversion and economic efficiency were improved with ration (4). Good carcass characteristics in ration (4) as compared with other groups. It was could be recommended to used silage green maize Stover and sugar cane top silage in ration to improve lambs performance.

Key words: Green maize stems, Sugar cane tops, Silage, Feeding value, Sheep performance, Nutritive value, Carcass characteristics.

Introduction

Recently corn silage had increased rapidly as green forage for cattle and small ruminants this increase can be related to its relatively high energy content and high quality feed. Silage is the best method for preserving fresh forage with minimal losses. Silage quality and nutritional value are influenced by numerous biological and technological factors, when the proper ensilage techniques are used, silage will have a high nutritive value and hygienic quality[1]. Silages can be used for lamb production together with grain when the pasture quality is low. Live weight gains were low in lambs fed only silage diets and inclusion of grain to the diet led to good responses in production parameters[2]. Silage can be an economical source of nutrients for sheep and goats[3]. The shortage of conventional feed resources is a major constraint for increased productivity of livestock and poultry in developing countries. Sugar cane tops are by-products making up 18-20% of the total biomass of the plant and have been widely studied as a basal diet for fattening and milking cattle[4].

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 supplements. Adding urea to cane tops improves the digestibility of organic matter. Sugar cane tops are also poor in phosphorous[5]. It is an important feed resource for ruminants. Sugar cane tops is poor in protein (5.6%) and total digestible nutrients (46.80%). It is possible to increase the rumen fermentation of cane tops through judicious use of nitrogen - rich supplements, such treatment being an effective method for improvement of nutritive value in roughages[6].The objectives of this study were to determine the effect of feeding silage of green maize stems, sugar cane tops on animal growth performance, feed efficiency and carcass characteristics

Materials and Methods

This present study was carried out at Agriculture Experimental station of Melawi, Animal Production Research Institute, Agriculture Research Center, Egypt.

Ensiling procedures:

Four tons of green maize stems (GMS) and sugar cane tops (SCT) were collected and chopped before ensiling (2–2.5 cm). At ensiling time, 2% yeast (*Saccharum spp.*)[7] and 3% molasses[8] was added to each treatment, 1.5% limestone powder, 1% common salt and 0.5% ground yellow corn (w/w) were added during silage making and fairly distributed among the successive layers of the chopped plants, pressed by tractor and ensiled in a horizontal bunker silo (9 m^3 approximately). The silo was covered with plastic sheet and sand soil and loaded with big stones and car tires.

Silage quality:

Three evaluation silage qualities are shown in Table (2), silage extract was prepared by homogenizing 20 gram fresh material with 100 ml distilled water then blending for 10 minutes[9]. The homogenized sample was filtered through a double layer cheese cloth then solution was re-filtrated through a filter paper until it becomes perfectly clear. The pH value was directly determined using Orion 680 digital pH meter. Lactic acid concentration was evaluated by titration with 0.1 N sodium hydroxide solution using 0.5 ml of phenolphthalein indicator according to method of [10] using the following equation: Lactic acid = ml of Na OH x 0.09/ Sample weight x100. Molar proportion of VFA'S (acetic, propionic and butyric acid) were measured according to[11]using High Performance Liquid Chromatography (HPLC) under this condition, column: Rezex-organic acid, flow rate, 0.4, detector: UV- detector with wave length 200 nm. Ammonia nitrogen (NH3-N) concentration was measured using method of[12].

Feeding trials:

A sum of 24 growing male (½ Ossimi x ½ Chios crossbred lambs), 5 months old and 23.66± 1.69 Kg LBW were distributed into four equal groups (n= six each). All were offered concentrate feed mixture (CFM) as 2% of their LBW as basal diet in addition to wheat straw (WS) for the control ration (R1), green maize stems silage (GMSS) for R2, silage of sugar cane tops (SCTS) for R3 and {50% green maize stems silage (GMSS) +50% silage of sugar cane tops (SCTS) for R4. Silage were offered twice daily *ad-libtum* in two equal portions at 8.00 am and 4.00 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 120 days, while weighing was taken place before feeding every two weeks.

Metabolism trials:

A total of 16 mature male (½ Osimi x ½ Chios crossbred lambs) obtained after the end of the experimental period of feeding trials {40 - 45 kg live body weight (LBW)} were applied in digestion trials four animals for each ration using multiply ANOVA. Animals were kept in individual metabolic cages. Each trial 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, mixed and kept in nylon bags for laboratory analysis.

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[13]. The components of 9, 10 and 11*th* ribs (lean and fat) of the right side of each carcass were mixed after chilling, fat sickness over the eye muscle (*longismuss dorsi*) was measured. Fraction weight at meat, fat and bone of carcass was calculated according to procedure of[14]. The meat was dried at 60°C till constant weight for analysis. Laboratory analysis of feed, feces and carcass samples were carried out according to[15].

Blood serum analysis:

Blood samples were collected from jugular vein and centrifuged at 4000 rpm for 20 minutes. Serum was separated and stored at –20 C° till the analysis. Serum total proteins (TP) were determined according to[16], albumin according to[17], serum globulin (G) was calculated by difference between the TP and Albumin (A) concentration, urea and creatinine according to[18].

Economical evaluation:

Economical evaluation was done for the tested diet assuming that the price of one kg LBW of lambs was 30.00 Egyptian pounds (LE) and the total prices of ingredients used in the CFM, wheat straw, GMSS, SCTS were LE 2850, 800 and 225, respectively. The experiment was terminated when lambs reached LBW of 44-46.50 Kg.

Statistical analysis:

Data were statistically analyzed by using system User's Guide[19]. Separation among means was carried out by using Duncan's multiple range test [20]. The model used was as follows:

$Y_{ij} = \mu + T_i + e_{ij}$, Where: Y_{ij} = Experimental observation, μ = General mean of treatments, T_i = Effect of treatment, e_{ij} = Experimental error

Results and Discussion

Proximate analysis of feeds:

Chemical analysis on dry matter basis indicated that CFM was rich in CP content compared to GMSS and SCTS were low in CF (%) content compared with tested silages. The CFM contained greater percentage of NFE than the tested silages. The WS, SCTS, GMSS and (50%SCTS+50%GMSS) were characterized by their low content of EE and NFE compared with CFM, (Table 1). Forages are characterized by it lower content of NFE and CP, but higher content of CF as a, source of structural carbohydrate than concentrates. Moreover some

NFE were fermented through ensiling ash percent was higher in tested silages compared with CFM and wheat straw, these results agree with[21].

Table (1): The chemical composition of the feed ingredients and rations.

Item	DM	% on DM basis					
		OM	**CP**	**CF**	**EE**	**NFE**	**Ash**
Chemical composition of the ingredients :							
CFM*	91.66	93.14	14.34	11.65	2.90	64.25	6.86
Wheat straw(WS)	92.23	90.80	2.5	41.8	1.61	44.89	9.2
Green maize stems silage (GMSS)	37.55	87.50	8.80	35.21	1.84	41.65	12.50
Sugar cane tops silage (SCTS)	35.28	85.96	7.45	34.68	1.29	42.54	14.04
50% (SCTS) +50% (GMSS)	36.42	86.73	8.13	34.95	1.57	42.08	13.27
Molasses	77	86	6	-	0.8	-	14
Yeast	94	93	48	3	1	-	7
Calculated chemical composition of experimental rations:							
Ration (R1)	91.31	92.57	11.47	18.94	2.59	58.56	7.42
Ration (R2)	81.13	82.87	13.31	16.74	2.70	62.10	8.12
Ration (R3)	77.88	91.37	12.66	16.27	2.51	58.93	8.61
Ration (R4)	78.03	92.71	13.98	16.18	2.18	62.61	7.29

* The ingredients of concentrate feed mixture (CFM) were yellow corn 35%, cottonseed meal 32%, wheat bran 27%, molasses 3%, limestone 2% and sodium chloride 1%. Ration(R1)|: CFM+ wheat straw, Ration(R2)|: CFM+ Green maize stems silage, Ration(R3)|: CFM+ Sugar cane tops silage, Ration(R4)|: CFM+ 50% sugar cane tops silage +50% green maize stems silage.

Table (2): Chemical quality of the aqueous extracts of experimental silages.

Silage quality						
	pH	**NH_3-N (of N%)**	**Lactic acid**	**Acetic acid**	**Propionic acid**	**Butyric acid**
Experimental silage:		(%)	(%)	(%)	(%)	(%)
Green maize stems silage(GMSS)	4.1	8.27	63.52	16.66	8.13	3.95
Sugar cane tops silage (SCTS)	4.3	8.31	60.65	18.11	9.17	4.50

Silage quality:

The results of silage quality in Table (2) showed that the smell of the silages was good and did not have a strong objectionable odor. The pH value was detected in SCTS was 4.3 and GMSS was 4.1. These results agreed with[22], who mentioned that the silage with Ph value of 4.2 or less could be good silage similar results reported by[23] indicated that good quality silage made from corn Stover has pH value of 4.1. In the current work the ammonia nitrogen values of SCTS and GMSS were 8.27 and 8.31%, respectively of total nitrogen in silage these results agreement with[24]. The result of these study revealed that the lactic acid was recorded higher in GMSS (63.52%) than SCTS (60.65%) but acetic acid, propionic acid and butyric acid were recorded lowest value (16.66%, 8.13% and 3.95%, respectively) in GMSS compared with SCTS (18.11, 9.17 and 4.50%, respectively).

Nutrients digestibility:

Digestibility coefficients of the different treatments are presented in Table (3). Highly significant differences were observed in DM and OM in ration 2 compared with other treatments. . The digestibility values for CP and CF were detected significantly increased in all tested ration compared with control. No significant difference was detected between R2 and R3 in EE digestibility but in R4 was significantly increased and NFE digestibilities significantly increase except R3 [25]. [21]found no significant difference in OM, CF and EE when lambs fed berseem + SSBL or bean green waste + berseem or SCTS + berseem by 3:1 berseem to by product 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 R3 which contained sugar cane tops silage have the highest values for all nutrients digestibility except DMD and OMD. These results are in agreement with those found by[26,27,28,29].

Table (3): The effect of experimental rations on nutrients digestibility and nutritive value by lambs.

Item	Ration (1)	Ration (2)	Ration (3)	Ration (4)	±SE
No. of animal	4	4	4	4	
Nutrients digestibility (%):					
DM	61.74^{b}	64.79^{a}	60.17^{b}	61.65^{b}	1.18*
OM	64.65^{b}	68.33^{a}	65.14^{b}	66.08^{b}	1.20*
CP	60.95^{b}	63.74^{a}	62.12^{a}	64.10^{a}	1.72*
CF	53.52^{b}	57.38^{a}	57.37^{a}	59.78^{a}	1.83*
EE	75.31^{b}	75.57^{b}	74.99^{b}	81.40^{a}	1.84*
NFE	68.78^{c}	73.42^{a}	71.19^{b}	73.86^{a}	1.75*
Nutritive value (%): TDN*	61.79^{d}	65.67^{b}	63.39^{c}	68.85^{a}	1.55*
DCP**	7.00^{b}	8.48^{a}	7.86^{b}	8.96^{a}	0.26*

a ,b,c and d Means with different superscripts within each row for each parameter are significantly different ($P \leq 0.05$).* TDN (Total digestible nutrients);**DCP (Digestible crude protein).

Nutritive value:

Concerning of feeding values of the experimental diets, data in Table (3) indicated that increasing feed intake of concentrate feed mixture with different types of corn stem silage and sugar cane silage was accompanied with increasing values of TDN and DCP which mainly attributed to the increase in digestibility of CP and other nutrients. Highly significant differences were detected among studied diets concerning TDN, and DCP, respectively. The highest values were recorded by R4 followed by R2, which the lowest increase significantly TDN value was recorded in R3 compared with control. However, the highest values of DCP were recorded by R4 (Table 3). No significant difference between R1 (control) and R3 was detected in DCP. The results obtained in this study as TDN and DCP were in accordance with those found by[21,30]. The nutritive values of tested rations can be explained in view of proximate analysis, portions of silage consumption to CFM and digestibility coefficients Table (2 and 3). The whole maize silage Showed significant difference ($P<0.05$ and $P<0.01$) between CFM and whole maize silage in favor of silage[29]. Such differences might be due to the silage combinations and experimental conditions. These results agree with the findings of[28,31,32,26,33].

Feeding trial:

Average daily gain:

Performance of the growing lambs are in (Table 4) indicated that the total daily dry matter intake (Kg/h/d) was not significantly for lambs fed diet containing Green maize stem silage (GMSS) ration (2), sugar Cane tops silage (SCTS) ration (3) compared with control Ration (1) but a mixture of SCTS+GMSS ration (4) were highly significantly ($p<0.05$) dry matter intake than those all treatments.

Table (4): Performance of lambs fed the experimental rations.

Items	Diets				± SE
	Ration (1)	Ration (2)	Ration (3)	Ration (4)	
					-
Initial body weight (kg).	21.67	22.17	20.80	22.15	0.88^{NS}
Final body weight (kg).	40.43	41.89	41.60	43.31	1.15^{NS}
Total gain (kg).	18.76	19.72	20.80	21.16	0.75*
Daily gain (g).	156^{c}	164^{b}	173^{a}	176^{a}	3.02*
Feed consumption: <u>Dry matter intake:</u>					
Concentrate (g/head/day)	812	767	787	826	-
Wheat straw (g/head/day)	259	-	-	-	-
Silage (g/head/day)	-	259	255	277	-
Total Daily DM intake (Kg /h/d)	1.071^{b}	1.026^{b}	1.042^{b}	1.103^{a}	0.072*
TDNI (Kg/head/day)*	0.662^{c}	0.674^{b}	0.661^{c}	0.759^{a}	0.19*
CPI (g/head/day)**	134^{c}	137^{b}	130^{d}	154^{a}	8.11*
DCPI (g/head/day)***	81.67^{c}	87.00^{b}	80.48^{c}	98.83^{a}	4.68*
Feed conversion (kg DM/kg gain)	6.86^{a}	6.26^{b}	6.02^{b}	6.26^{b}	1.22*
Feed cost/kg gain	16.160^{a}	14.025^{b}	13.294^{b}	13.727^{b}	0.43*
Daily revenue	2.159^{b}	2.676^{a}	2.890^{a}	2.864^{a}	0.12*
Economic efficiency	0.856^{b}	1.192^{a}	1.256^{a}	1.185^{a}	0.11*

No. of animals 6 each groups and duration day 120. a, b, c and d Means with different superscripts on the same row are different at (P<0.05). *Total digestible nutrients intake, **crude protein intake, ***Digestible crude protein intake. Economic efficiency Y = [(A-B/B)], where A= selling cost of obtain gain, and B=feeding cost of this gain.

- *Based on free market prices of feed ingredients 20014, the cost of experimental rations was estimated as the total prices of ingredients used in the concentrate feed mixture, wheat straw and fresh silage, being, 2850, 800 and 225 L.E., respectively and the price of one kg body weight on selling, 30 L.E.*

Significant (P<0.05) differences were found among the experimental groups in total body weight gain Table (4). The final body weight (FBW) values were slightly higher for those fed silages plus CFM compared with control diet; subsequently the average daily gain came out greater in lambs fed silages than the control diet. The best ration was recorded with ration 4 compared with other rations. These phenomena may be due to the higher digestibility, feeding value and intake of TDN and DCP in some treatments silage than control, and efficient utilization of rumen fermentation products, volatile fatty acids, NH3 and microbial protein[34]. Lambs received the least CFM + silage *ad-lib* recorded the highest (P<0.05) average daily gain (ADG). Average daily gains of R2, R3 and R4 were 164, 173 and 176 g/day *vs.* (156) g/day for ration control, respectively.

Feed efficiency:

Table (4) shows that total weight gain and average daily gain were significantly (P<0.01) higher for lambs fed mixed silage (R4) (21.16kg and 176 g/h/d) than those fed control (18.76 Kg and 165g/h/d). Feed intake for lambs fed mixed silage (R4) recorded (1.103 kg/h/d) higher significant (P<0.01) than another rations (R1, R2 and R3) were recorded (1.071, 1.026 and 1.042 kg/h/d), respectively. The best significantly higher TDNI and CPI were recorded with R4 (0.759 kg/h/d and 154 |kg/h/d), respectively followed by R2 which recorded 0.674 kg/h/d and 137 g/h/d but R3 not significantly effect in TDNI. Feeding mixed corn silage and sugar cane tops silage (R4and R2) were improved feed conversion (6.26 kg feed/kg gain) (P<0.01) compared with control (6.86). The present results indicated that feed cost to produce one Kg gain was less for lambs fed mixed corn silage recorded (13.73EL) compared with control (16.16 EL). These results agreed with those found by[21,27,35], reported that the ensiling of (SCTS) at the time of harvesting and the addition of molasses make the tops palatable for the animals. There are few reports where sugarcane tops have been fed alone to ruminants. Information available shows that SCTS is highly palatable forage with good voluntary consumption indices[36].

Economic efficiency:

Rations containing silage showed best economic efficiency which had better daily gain and feed efficiency than lambs fed ration containing CFM + wheat straw (control), due to high cost of feed (Table 4). Accordingly, feeding mixed corn silage (R4) improved economic efficiency from 0.856 to 1.185. These results due to mainly the low cost of silage, availability of nutrient utilization, efficiency of feeds, high cost of CFM and wheat straw. These results in accordance with those findings of[21] that the percent of improvements above the control diet in economical return were 40.78, 35.69 & 29.19 %. The same trend was observed by[29] found the best economic efficiency for lambs fed on whole maize silage vs. control, the figures were 2.495 vs. 1.39. Also [37]showed the better economic efficiency for lambs fed on ureated corn feed silage than that of control.

Blood constituents:

Blood constituents of lambs feeding green maize stem silage ration (R2), sugar cane tops silage ration (R3) and mixed (R4) are shown in Table (5), observed not significantly affect were found among the experimental rations. It was noticed in serum total protein, albumin, globulin, creatinine and urea-N. In this respect, [38,39]on goat and [29]on sheep, mentioned that, all estimated values for measured parameters of blood serum constituents were within the normal levels for animals fed the different levels of silage rations. blood total protein, albumin, globulin and Blood urea Nitrogen were increased in two groups that fed silage [33].

Table (5): Effect of the experimental rations on some blood serum parameters of lambs.

Item	Experimental rations				± SE
	Ration (1)	Ration (2)	Ration (3)	Ration (4)	
T. Protein (g/dI)	7.46^{a}	7.47^{a}	7.59^{a}	7.67^{a}	1. 28 NS
Albumin (g/dI)	3.68^{a}	3.71^{a}	3.74^{a}	3.77^{a}	2. 43 NS
Globulin (g/dI)	3.78^{a}	3.76^{a}	3.87^{a}	3.86^{a}	1. 46 NS
Creatinine (g/dI)	1.20^{a}	1.22^{a}	1.25^{a}	1.30^{a}	1. 37 NS
Urea-N (g/dI)	13.28^{a}	13.31^{a}	13.36^{a}	3.51^{a}	1. 39 NS

± a, Means with different superscripts on the same row are different at (P<0.05).

Carcass characteristics:

The slaughter data are presented in Table (6). Highly significant (P<0.05) differences were found among lambs in fasting body weight (FBW) kg, carcass weight and dressing percentage compared with control. The highest significantly (P<0.05) weights of shoulder were recorded in ration mixed silages (R4) recorded 426.67 g while the lowest significantly (P<0.05) value was for ration R1 (control) recorded 401.67g. There are different significantly value of lean weight in rations silage, the best value was recorded with R4. The fat weight not different between ration, except R2 was significant decreased. The bone weight was significant decrease in lambs received R4 and R2 compared with control ration R1. The big eye muscle area recorded with ration mixed silages. Measurements of fat thickness differed significantly (P<0.05) among the studied rations lambs. Lambs fed R4 and R3 recorded the highest low values for fat thickness. In this view we can explain the body weight gain, lambs production, carcass characteristics of lambs tail fat , may be affected by the dietary rough, concentrate feed mixture which affect gastrointestinal tract to be heavier than the other organs[40]. Also, eye muscle area which may be affected by two main factors, dietary concentration and its composition from protein, fat and CF, but the second factor, the genetic structural especially growth cycle waves , first come from the head of animal toward at lean area and the second wave come from down raised up to lean area (rump). The explanation of these results in light of CP, EE, CF and NFE content of rations in different types of silages and digestibility of fiber subsequent nutritive value, despite of CFM characterized by higher amount of nutrients and its digestibility and nutritive value, but silage characterized by high degradable amounts of nutrients and digestibility, high energy (VFA's) of silages, therefore reflect a higher fermentation, it is clear that the carcass cuts and carcass constituents. Higher digestibility of CF and EE showed that the increase (P<0.05) as CF increased in the ration of sheep and goats[34].

Table (6): Effect of the experimental rations on Carcass traits of lambs.

Item	Experimental rations				± SE
	Ration (1)	Ration (2)	Ration (3)	Ration (4)	
Fasting LBW, kg	44.07 [b]	46.52 [a]	45.93 [a]	46.45 [a]	2.15*
Carcass wt, kg	22.25 [b]	24.67 [a]	23.62 [a]	24.45 [a]	1.02*
Dressing,%	50.48 [c]	53.03 [a]	51.43 [b]	52.64 [a]	2.35*
Sample weight, g	401.67 [d]	416.67 [b]	410.65 [c]	426.67 [a]	5.18*
Lean weight, g	258.09 [d]	278.09 [b]	266.89 [c]	289.43 [a]	3.17*
Fat weight, g	70.86 [a]	68.05 [b]	71.28 [a]	70.58 [a]	3.10*
Bone weight, g	72.72 [a]	70.53 [b]	72.48 [a]	70.66 [b]	3.05*
Fat thickness, cm	0.60 [a]	0.55 [b]	0.50 [c]	0.53 [c]	0.02*
Eye muscle area, cm	14.64 [c]	16.86 [b]	16.40 [b]	17.96 [a]	1.03*

- a, b, c and d Means with different superscripts on the same row are different at (P<0.05).

Table (7): Effect of the experimental rations on chemical analysis of lamb meat.

Item	Experimental rations				± SE
	Ration (1)	Ration (2)	Ration (3)	Ration (4)	
Moister%	63.20 [a]	61.97 [b]	62.45 [a]	62.39 [a]	2.12*
CP%	21.73 [b]	21.63 [b]	22.00 [a]	22.17 [a]	1.14*
EE%	14.16 [a]	15.20 [a]	14.75 [a]	15.33 [a]	0.86 NS
Ash%	1.30 [a]	1.10 [b]	1.40 [a]	1.12 [b]	0.02*

± a, b and d Means with different superscripts on the same row are different at (P<0.05).

It could be concluded that, feeding green corn stem silage, sugar cane top silage and their mixture *ad-libitum* with low level of concentrate feed mixture for growing lambs, resulted in superior nutrition, better daily gain with R3 followed by R 4. Feed conversion and economic efficiency were improved with R 4. Good carcass characteristics in R 4 as compared with other groups. It was could be recommended to use silage green maize Stem and sugar cane top silage in rations feed to improve lambs performance.

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