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Effect of Using Different Types of Silages Mixtures in Dairy Goat Diets on Milk Production, Feed Conversion, Rumen Fermentation, Nutritional Value and Blood Components.

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ABSTRACT

This work was carried out on lactating goats to investigate the effect of partial replacing concentrate feed mixture (CFM) proteins by some types of silages on milk production, feed conversion and some metabolic parameters as well as economic efficiency. Eighteen dairy Zaraibi goats with average body weight 40.00 kg were divided into 3 groups (6 each). All animals were fed concentrate feed mixture (CFM) to cover 50% of their requirements recommended by NRC (1981). Treatments experimented were 50% CFM + 50% berseem silage as control rations (G1), 50% CFM + 50% mixture silage (50% berseem + 50% fodder beet) (G2), 50% CFM + 50% mixture silage (50% Ses bania +50% fodder beet) (G3) as tested rations. In addition, nine adult Zaraibi males (3 males per each group) were used with three digestion trails to evaluate the feeding values of the experimental. Results indicated that daily total DM intake per head and as g/kg 0.75 tended to silage by decrease with tested rations (G2 and G3) compared with G1, being 1132 and 1102 vs. 1152g/h and 70.93 and 69.64 vs. 72.68 g/kg0.75 respectively. Ruminal pH values were not significantly affected by treatments. While, ammonia-N concentrations tended to be significant lower with G2 and insignificant lower with G3 compared with control (G1). The opposite trend was occurred with microbial protein concentrations among treatments. Also, ruminal TVF,s concentrations were significantly increased by tested rations (G2, G3) compared with that of control one (G1) especially over 3 an 6 sampling fame . Comparison of hematological parameters revealed small fluctuations among groups fed the experimental rations in concentrations of Hb, RBC,s, Hct , MCHC, platelet and albumin. On the other hand, both total protein and globulin were also higher (7.21 and 4.36 g/dl) with G2 than those of the other group but without significance differences among them. Both AST and Alt concentrations were higher with G1 (17.68 and 155.00, respectively) than other groups and the differences were significant in AST activity only and just between G1 and G2. Concerning Ca and ph contents in blood, Scanty differences among the dietary treatments, however it could be observed some significant differences among treatments. Digestion coefficients of most nutrients and feeding values did not affected by the experimental treatments, otherwise CP digestibility and DCP values were significant improved by Sesbania- fodder beet silage rations (G3) than the control (G1) and the other tested rations (G2) milk yield was the highest with G3 followed by (G2), while the lowest yield with G1 and the differences were significant only between G3 and G1. Milk composition as fat, protein, lactose, total solids, solid non fat and ash was unaffected significantly by the tested rations. Accordingly, the feed conversion efficiency was better with G3 (0.82 and 0.123, respectively) and G2 (0.869 and 0.118, respectively) compared with berseem silage alone, G1 (0.93 and 0.134, respectively). Similarly, the economic efficiency was better with G3 compared with the other groups.

Keywords: Lactating goats- mixture silage- Sesbania sesban – fodder beet- berseem – rumen parameters- productive performance.

INTRODUCTION

Nutrition is a major factor affecting the physiological and metabolic status consequently the productive performance of farm animals. In Egypt, there is wide gap between the available feedstuffs and the nutritional requirements of animals population. During summer season, green forage with reasonable protein contents are not adequately available.

According to national policy. The cultivated area with clover would-be tending to decrease for increase lthe cultivated larea with wheat to satisfy human demands. Several studies (Tag El-Din, 1991, Shehata *et al*, 2001 Maged *et al*,2014) indicated that wild plants as Sesbania sesban could be used as a good quality forage for ruminants because of its high content of crude protein and feeding values especially when harvested during earlier growth stage. Moreover, Soliman *et al*. (1997) and El-Kholany (2004) stated that the value of CP digestibility and DCP were higher with Sesbania (forage or silage) rations compared with teosinte or whole corn plants. Recent studies indicated that Sesbania sesban in different forms (forage, silage or seeds) had positive effects on farm animals performance as reported by Ahmed *et al*. (2009), Ibrahim *et al*.(2012) and El-Kholany *et al*(2016).Among important forage croups in Egypt, fodder beet could be recommended as one of the highest producing in loamy soils and reclamation areas and it was found to be a good source of energy for animal feeding (Rammah *et al* 1984). Fodder beet could play an important role for feeding livestock in summer in Egypt, using either in fresh or after in ensilage states for cows (Gabra *et al*, 1992). Therefore, the main objective of this study was to recognized the effect of restriction of concentrate feed mixture (CFM) with some types of silage mixtures berseem with (Sesbania / or fodder beet) given at adlibitum level on milk and its composition, feeding values, feed conversion and economic efficiency of Zaraibi goats. Also, some rumen parameters and blood profile were investigated.

MATERIALS AND METHODS

This study was conducted in El-Serw Experimental Research Station, Animal Production Research Institute, Agricultural Research Center, Ministry Of Agriculture, Egypt. Eighteen lactating Zaraibi does, chosen from El-Serw Station Herd, with an range age of 3-6 years and 40.19± 0.33 kgl live body weight were randomly divided into 3 similar groups (6 of each) for feeding trials using randomized complete block design. Animals were weighed at the beginning then biweekly along experimental period that lasted 14 weeks. Zaraibi goats in all groups were fed restricted amount of concentrate feed mixture (CFM) to cover 50% of total protein requirements which recommended by NRC (19981) for lactating goats in addition a combination of different silages was fed adlib. as follows:

Control ration (G1): CFM + berseem (trifolium alexandarinum) (2nd cut) silage (G1) ad lib.

Tested ration G(2): CFM+ (50% berseem + 50% fodder beet) silage ad lib.

Tested ration (G3) : CFM + (50% Sesbania sesban + 50% fodder beet)silage ad lib.

Animals were fed by groups feeding system in a suitable partition pens. The berseem and fodder beet were cultivated in El-Serw experimental station, while

Sesbania sesban were collected from ridge and canals near the same farm.

Berseem silage was prepared by adding 3% molasses, on fresh basis, while mixture silages prepared without any additives according to Ahmed *et al* (2001 and 2003).

The CFM was consisted of 25% undecortecated cotton meal, 43% yellow corn, 25% wheat bran, 3.5% molasses, 2% limestone,1% common salt and 0.5% minerals mixtures concentrate feed mixture (CFM) consists of 43% yellow corn, 25% undecortecated cotton meal, 25% wheat bran, 3.5 molasses, 2% limestone, 1%commonlsalt. Rations were offered twice daily at 8.0 am and at 3.0 p.m while water was available at all times. The chemical analysis of CFM and different types of silages are presented in Table (1). Samples of feed and feces were analyzed according to the procedures of A.O.A.C (1995). Fiber fractions (NDF, ADF and ADL) of ration ingredients as well as silages were determined according (Robertson and Vanlsoset, 1981).

Cellulose (ADF% - ADL%), and hemicelluloses (NDF% - ADF%) contents were calculated by the difference. Blood samples were collected from the jugularlvein once before feeding (3 animals from each treatment) at the lend of experimental period. Blood samples were centrifuged at 4000 rpm for 20 minutes. Part of the separated serum was directed to enzymes activity determination, while the other part was stored at-20 Co till the biochemical analysis time.

Commercial kits were used for colorimetric biochemical determinations. Different items of the blood picture tested in this experimental were carried out according to the corresponding references illustrated in the following table :

Criteria	References
Hemoglobin (HG)	Linne and Ringsrud (1992)
Red blood cell (RBC's)	Miller and Weller (1971)
GOT and GPT	Retiman and Frankel (1957)
Total protein	Doumas *et al.* (1981)
Albumin	Hill and Wells (1983)

The daily milk yield was recorded for each doe and representative milk samples (about 0.5% of total milk produced) were taken once biweekly from each goat from the morning and evening milking of the same day. Then the samples were compared and analyzed for total solids (T.S), fat, protein, solid non fat (SNF) and ash according to Ling procedures (1963), while milk lactose was calculated by differences.

Rumen fluid samples were taken from 3 animals of experimental group using stomach tube before feeding (0 time) and at 2,4,6 and 8 hrs post-feeding. The samples were filtered through 3 layers of gauze and immediately subjected to the determination of pH value by pH meter, ammonia nitrogen (NH3-N) concentration was measured according to method Conway (1957), total volatile fatty acids (TVF,s) was determined according to the technique described by Warner (1964), whereas microbial protein was determined according to Schultz and Schultz (1970). The economic efficiency was calculated as ratio between output (price of milk yield) and cost of feed consumed according to the local price during the study .

In addition, 3 digestibility trails were conducted using 9 adult Zaraibi bucks to evaluate the digestibility and feeding values of the tested diets. Data were statistically analyzed using SAS (2003) and the significant differences among means were assigned using Duncan multiple rang test methods (Duncan, 1955).

RESULTS AND DISCUSSION

Chemical composition of the experimental diets:

The chemical composition of the CFM and the tested silages are presented in Table (1). It could be observed that most of nutrients of DM and CF-fractions were slightly higher with Sesbania / fodder beet silage mixture (G3) compared with those of the other silage types while the contents NFE seemed to be in an inverse trend among the silage types. Mostly the lowest values were occurred with berseem silage (G1). However, considerably the contents of CP and CF(the two key elements of feeding rumenants) of all silage typs are significantly favorable for farm animals (sheep, goats and cattle). Usually the addition of starchy crop like fodder beet intolhiguminous crop like berseem atlsilage making could be mesulting a very good balbncel of nutrents especially CP and CF contents of the produced silage.

Similar results on the some types of tested silages were reported by Maged *et al*. (2014). In this respect, Ahmed *et al*. (2013) found that berseem silage contained 29.5% DM, 87.95 OM, 29.67% CF, 14.15% CP, 2.03% EE, 42.10% NFE and 12.05% Ash.

Table 1. Chemical composition of feed ingredients (%) on DM basis

Items	Silages			
	100% Berseem	50% Berseem+ 50% Fodder beet	50% Sesbania sesban + 50% Fodder beet	CFM
DM	29.32	27.30	30.75	91.00
OM	88.00	89.50	88.84	93.90
CF	28.85	22.15	29.11	15.70
CP	14.30	12.75	15.65	14.5
EE	2.19	2.35	2.78	3.15
NFE	44.35	52.25	42.33	60.55
Ash	12.00	10.50	10.16	6.10
NDF	56.20	58.40	61.50	43.50
ADF	38.30	39.20	40.60	19.30
ADL	7.0	6.50	7.40	4.70
Hemicelluloses	17.90	19.20	20.90	24.20
Cellulose	31.30	32.70	33.20	14.60

Silagelquality:

The different silages had a good physical characteristics expressed as natural color and pleasant aroma as well as a good fermentative quality (Table, 2) that expressed as very suitable range of PH (3.95 to 4.33%), and lactic acid (5.80 to 6.5%) and least contents of butyric acid and ammonia-N.

Definitely Ph concentration were in normal range of good silage quality, being 3.95 , 4.20 and 4.35 % for berseem, berseem plus fodder beet and Sesbania plus fodder silages, respectively. The same trend was

observed with acetic concentration, where Sesbania plus fodder beet silage had the lowest concentrationlof acetic acid (2.20%) followed bylberseem plus fodderlbeet (2.30%) andlberseem silage (2.42%). In thislrespect, butyriclacid concentrationlrecorded 0.23, 0.32 and 0.36% forlberseem, berseem plus fodderlbeet and Sesbania pluslfodder beetlsilages, respectively, being theselvalues are considere as one of good indicatorslfor good quality silagelproduced. Ammonia-N concentrationltook the same trend oflbutyric acid concentration. Theselresults are in linelwith the finding oflShehata *et al* (2001) with Kochialsilage and/or teosinte silage, Maged *et al*. (2014) and El-Sayed, F.A. *et al*(2015) withldifferent forages silages.

The daily waterlconsumption with Sesbania-fodder beet silage was markedly higher than with thelothers (G1 and G2) which is mostly due tolthe halophytic effect of Sesbania sesban as reported by Ahmed *et al*. (2001) and Shehata *et al*. (2001) who using Kochia silage in goats rations.

Table 2. Some fermentative quality criteria of different silages tested.

Items	Groups		
	G_1	G_2	G_3
Ph value	3.95	4.20	4.35
Lactic acid,% DM	6.50	6.25	5.80
Acetic acid, % DM	2.42	2.30	2.20
Butyric acid, % DM	0.23	0.32	0.36
Ammonia-N, % DM	0.16	0.20	0.23

Table 3. Feed intake and water consumption by lactating Zaraibi goats fed the experimental rations.

Items	Groups		
	G_1	G_2	G_3
Average BW, kg	39.80	40.20	40.0
Metabolic body size, $w^{0.75}$	15.85	15.96	15.91
CFM	532	522	518
Silage	620	610	590
Total DM intake	1152	1132	1108
DM intake, g/kg w^{075}	72.68	70.93	69.64
Roughage : Concentrate ratio	54 : 46	54 : 46	53 : 47
Daily water consumption			
L/ h / d	3.93	3.95	4.10
Ml / kg BW	99	98	102
Ml /kg $w^{0.75}$	248	247	257
Ml /g DM intake	3.41	3.49	3.70

• Group feeding

Ruminal fermentation parameters:-

Data of some ruminal liquor parameters of Zaraibi goats fed the experimental rations are presented in (Table,4). The maximum pH values were recorded at 0 time sampling with all groups without significant differences among treatments and then decreased to the minimum values at 3 hrs post-feeding and tended to increaselagain at 6 hrs post-feeding with all groups and also the differences among the dietary treatments did not significant over the two sampling times. Similar trends were observed by Zaid *et al* (2009) and Ibrahim *et al*, (2012) with Zaraibi kids and Rahmani lambs, respectively. otherwise, ruminal ammonia-N concentration was greatly increased post-feeding where. The maximum values of ruminallNH3were observed at 3 hrs post-feeding samples then decreased at 6 hrs post-feeding with all dietary treatments.

Differences among treatments respecting ammonia-N concentration was not significant at zero sampling time, while at 3hrs post-feeding sampling time, ammonia-N concentration of G2 was lower significantly ($P<0.05$) than G1 and in significant than G3. Similar trend was observed in case ofl6 hrs post-feeding sample. The marked variation regarding ammonia-N concentrations among treatments are in concordant with the variation of CP content in the different types of silage and the whole rations as well. Also, it could be observed on opposite relationship between ammonia-N concentration values and the microbial protein content values especially over 3, 6 hrs sampling time, over all dietary treatments. Concentration of TVF's at zero sampling time did not significant affected by treatments. While concentrations of TVF's post feeding (3 and 6hrs) were significant higher with the two tested rations (G2 and G3) than that of control one (G1). Similar results were observed by Zaid *et al* (2009) and El-Kholany *et al*, (2013).

Similar findings were found by Haggag *et al* (2002), El-Kholany (2004) who using mixture forageland silagelin Rahmani sheep and Zaraibi goats. El-Emam *et al* (2014) found that ruminal total VFA's concentrationslover 3 and 6 hrs post-feeding significantly lower with berseem silage group thanlthose of triticale silage or berseem/triticale silage.

Ruminal microbial protein was not significantly different among three treatments at zero time and was significantly ($P<0.05$) higher with G2 and G3 than that of berseem silage (G1) over sampling at 3 and 6 hrs post-feeding. This positive effect of mixture silage onlrumina microbial protein was observed also by Shehata *et al* (2001), Ibrahim *et al* (2012) and Ahmed *et al* (2013) in the rumen of bucks, lambs and lactating does, respectively. In perspective, protein is the most important factor in maintaining the rumen ecosystem, stimulating dry matter intake as well as digestibility and leading to high animal performance. So under the malnutrition conditions in developing sub/tropical counters, fodder trees and shrub legumes such as Lucerne (Nguyen *et al* (2017) and like wild Sesbania sesban that used in the present study, were beneficially used as a valuable source of CP under these harsh conditions for monitoring the rumen function.

Table 4. Effect of the experimental rations on some ruminal fermentative parameters of dairy goats.

Items	Hours	Groups		
		G_1	G_2	G_3
pH	0	7.03±0.06	7.05±0.09	6.98±0.03
	3	6.45±0.04	6.49±0.04	6.53±0.06
	6	6.75±0.04	6.73±0.06	6.70±0.04
Ammonia-N (mg/ 100ml)	0	16.90±0.40	17.00±0.30	17.08±0.20
	3	23.10±0.35^{a}	21.90±0.11^{b}	22.11±0.28^{ab}
	6	21.50±0.40^{a}	20.03±0.21^{b}	20.70±0.30^{ab}
Total VFA's (mEq / 100ml)	0	8.85±0.19	9.05±0.08	9.00±0.19
	3	11.71±0.13^{b}	12.92±0.36^{a}	12.69±0.18^{a}
	6	11.03±0.12^{b}	12.05±0.25^{a}	11.90±0.17^{a}
Microbial protein (g/ 100m)	0	0.355±0.02	0.349±0.01	0.341±0.02
	3	0.563±0.017^{b}	0.595±0.01^{a}	0.585±0.01^{a}
	6	0.460±0.017^{b}	0.500±0.01^{a}	0.483±0.01^{a}

a-b Means in the same row with different superscripts differ significantly at P<0.05.

Blood parameters :-

Data of hemato-biochemical parameters are presented in Table (5). Results indicated that most tested blood parameters did not significantly affected by the tested rations. It could be observed that almostly all values of hematological parameters (red blood cells, hemoglobin, Hct, MCV, MCH and MCHC) were slightly higher with tested rations(G2 and G3) than those of control one (G1).

Also, slightly differences among experimental rations respecting the total leukocytes count and its

differential cells(Neutrophils, lymphocytes, Monocytes, Eosinophils and platelet count), were observed. Similarly, minor differences among treatments were observed in respect of total protein, albumin and globulin concentrations. Beneficially, the hematological data was used as an indication of the health status of the goats. Fed the experimental diets. The similarly of blood total protein, albumin and globulin concentrations among treatments might be greatly due to the similarity of CP contents and its intake such treatments (Table1). Inconsistent, Figueiras *et al*.(2016) revealed that the excess of protein in diets of cattle led to increased the elimination of nitrogenous compounds via urine. Regarding creatinine concentration, no significant difference among treatments were observed. Creatinine levels were within the normal range and they were comparable with the finding of Elitok (2012). Both AST and ALT concentration were higher with G1 (17.68 and 155, respectively) than other groups and the differences were significant in AST concentration only. Higher liver enzymes were associated with lower nutrient intake Oni *et al*., 2006) which indicated that goats fed the experimental diets had adequate amounts of nutrients to sustain their maintenance and milk production. Concerning Ca and ph contents in blood, despite diminishing differences among treatments, Ca content with G3 rations was lesser significantly than that of G2 and insignificantly than that of G1 ration. While ph content was higher significantly with both tested rations than that of control one.

Generally, the obtained values are within the normal physiological ranges reported by Jain (1986) and Keneko (1989) for healthy goats and in the line with findings of Gabrl*et al* (1999), El-Kholany (2004) and Ibrahim *et al*. (2008 and 2012) who used mixture of silage (or forage) in small ruminant rations.

Table 5. Effect of experimental treatments on some hematological and serum biochemical parameters of lactating goats.

Items	Groups		
	G_1	G_2	G_3
Hematological parameters:-			
RBC's x10^6/ml	13.45±0.54	13.63±0.96	14.02±1.15
Hemoglobin, g/dl	10.36±0.65	10.81±0.11	11.42±0.77
Hct %	29.50±0.93	30.26±0.33	31.33±1.45
MCV, fl	21.13±1.40	21.55±1.43	21.88±1.57
MCH, pg	7.66±0.39	7.97±0.54	8.39±1.28
MCHC, g/dl	36.60±2.46	36.87±0.36	37.81±3.47
Total leukocyte count, x 10^3/ml	10.51±3.10	12.35±1.00	13.30±2.02
Neutrophils, %	42.00±1.15	42.69±0.90	42.35±0.34
Lymphocytes, %	54.36±0.87	53.34±1.51	54.69±0.88
Monocytes,%	2.01±0.57	2.70±.35	1.67±0.67
Eosinophils, %	1.56±0.33	1.36±0.33	1.36±0.33
Platelet count, x 103/ml	360±11.70	383±8.85	395±18.11
Serum biochemical :-			
Total protein, g/dl	7.01±0.13	7.21±0.15	7.09±0.19
Albumin, g/dl	2.75±0.30	2.85±0.13	2.98±0.12
Globulin, g/dl	4.26±0.34	4.36±0.27	4.11±020
Creatinine, mg/dl	0.95±0.06	0.84±0.06	1.04±0.09
AST, m/l	17.68±0.68^a	14.75±0.87^b	15.70±0.32^{ab}
ALT, m/l	155±10.33	147±18.78	149±4.95
Calcium, mg/ dl	10.55±0.13^{ab}	10.63±0.08^a	10.30±0.06^b
Phosphorus (inorganic), mg/dl	8.10±0.03^b	8.31±0.03^a	8.25±0.03^a

a-b Means in the same row with different superscripts differ significantly at P<0.05.

Digestion coefficients and feeding value:-

The effects of tested rations on digestion coefficients of most nutrients were not significant when compared with control one as shown in (Table 6). Only CP digestibility was higher in G3 (72.24%) then that oflG2 (70.75 %) and G1 (71.05 %). This result was related to the crude protein content as reported earlier in (Table 1). Otherwise, very slightly differences among treatments in respect of TDN value were observed. Similar results were observed by Shehata *et al*.(2001) with substitution Teosinte forage by Kochialin silage form and offered with concentrate mixture to Zaraibilbucks. The highest values of DCP were observed with G3 (10.57 %) then followed by G2 (9.60%)and the lowest value was associated with control one (G1) as (9.45%). Similar results were observed by Shehata *et al* (2001) and Ibrahim *et al* (2012) with goats and sheep fed rations containing Kochia and Sesbania silages, respectively. El-Kholany (2004) found that digestion coefficients (DM, OM, CF, CP and EE) and feeding value (TDN and DCP) of maize- Sesbania mixture was higher than both of maize and Sesbania silages when singly tested. The adequacy of CP content of all experimental rations in the present experimental could be concederable led to an achievement for optimum microbial digestion of feed consumed and hence the digestibility of most nutrients seemed to be fully satisfied as shown in Table 6.

Milk yield and its composition:-

Data presented in Table (7) showed the effect of tested rations on average milk yield and its composition. The obtained results indicated that daily milk yield of

Zaraibi goats was significantly higher with G3 Than that of G1 while milk yield of berseem-fodder beet silagelration (G2) was insignificant higher than that of berseem silage ration (G1), being 1.230, 1.315 and 1.355 kg for G1, G2 and G3, respectively.

Table 6. Digestion coefficients and feeding value of experimental rations fed to Zaraibi bucks.

Items	Groups		
	G_1	G_2	G_3
Digestibility, (%)			
DM	67.05±0.69	66.80±0.59	67.92±0.73
OM	70.61±0.46	69.83±1.06	68.55±0.43
CF	63.20±0.49	62.65±0.56	63.08±0.24
CP	71.05±0.55^{b}	70.75±0.33^{b}	72.24±0.48^{a}
EE	81.00±0.66	79.83±0.42	80.20±0.58
NFE	70.85±0.75	69.20±0.70	68.85±0.61
Feeding values, (%)			
TDn	66.10±0.34	65.85±0.50	65.50±0.44
DCP	9.45±0.05^{b}	9.60±0.07^{b}	10.57±0.06^{a}

a-b Means in the same row with different superscripts differ significantly at P<0.05.

Table 7. Effect of feeding experimental rations on milk production, its composition and yield of fat and protein of Zaraibi goats.

Items	Groups		
	G_1	G_2	G_3
Daily milk yield, kg/h/d	1.230±0.07^{b}	1.315±0.05^{ab}	1.355±0.02^{a}
Milk composition, %			
Fat, %	4.0±0.06	4.03±0.05	4.05±0.07
Protein, %	3.02±0.04	3.03±0.05	3.07±0.03
Lactose, %	4.61±0.04	4.63±0.05	4.64±0.05
Total solids, %	12.33±0.02	12.42±0.03	12.49±0.09
Solids nonfat(SNF),%	8.33±0.06	8.39±0.08	8.44±0.07
Ash, %	0.70±0.01	0.73±0.02	0.73±0.02
Fat yield, g/h/d	492^{b}	529^{b}	548^{a}
Protein yield, g/h/d	371^{b}	398^{ab}	416^{a}

a-b Means in the same row with different superscripts differ significantly at P<0.05.

The superiority of productive performance for lactating goats with mixtures silages, especially G3, may be due to the positive associative effect between the two forages and the better condition of rumen fermentation as reported by Soliman *et al* (1997), Ahmed *et al* (2001 and 2013) and Ibrahim *et al*. (2012) Often the interaction between the components of the diet (mixture of silage in the present study) in both disestion and metabolism could be guarantee optimal rumen function and in turn significantly increasing the efficiency of milk production. El-Kholany (2004) found that milk yield was significantly-higher by lactating goats fed silage mixture (50% maize- 50% Sesbania) than those fed maize or Sesbania silage alone.

As regarded to milk composition , the data indicated that the differences among the experimental treatments on milk composition as fat, protein, total solids, SNF and Ash seemed to be unsignificant between them. The present results respecting milk composition are nearly similar with those obtained by Ahmed *et al* (2001) and Ibrahim *et al* (2008) on Zaraibi goats with little differences due to the individual differences among goats and feeding system.

Generally, yields of fat and protein were significantly higher with mixture silage-rations (G2 and G3) compared with those of berseem silage-ration (G1) as shown in Table (7). These results were related to the average milk yield as reported earlier study conductes by Ahmed *et al* (2001).

Daily feed intake , feed conversion and economic efficiency:-

Data of feed intake, feed conversion rate and economic efficiency of the dairy Zaraibi goats are summarized in Table (8). Results indicated that feed conversion calculated as DM and CP / milk yield was better for the two tested rations (G2 and G3) compared with those of control one (G1). Similar results were observed by El-Kholany (2004) and Ahmed *et al*(2013) using mixture of silage for dairy Zaraibi goats. Data in Table (8) indicated that the highest total feed cost(L.E /h/ d) was recorded for G1 (2.09) compared with other groups (1.97 and 1.77 for G2 and G3, respectively) . The corresponding values of price of milk yield were (4.305, 4.603 and 4.743 L.E/h for G1, G2 and G3, respectively). Therefore, the highest total feed cost/ kg milk (L.E) was observed for G1(1.70) and the lowest values were for G2 and G3 (2.5 and 1.31, respectively), due to the highest daily milk yield as well as the lowest price of feed consumption in the tested groups (silage mixture).

Accordingly, the economic efficiency was improved for the two tested rations G2 and G3 by 13.5% and 30%, respectively compared with G1. This positive effect of Sesbania or beet-fodder on economic efficiency was observed also by Ahmed *et al*. (2001 and 2009) and Ibrahim *et al*. (2008) with lactating Zaraibi goats.

Table 8. Feed and economic efficiency for lactating Zaraibi goats fed different experimental rations.

Items	Groups		
	G_1	G_2	G_3
BW, kg	39.8	40.2	40.0
Metabolic body size, $w^{0.75}$	15.84	15.96	15.91
Daily DM intake (g/h)			
CFM	532	530	527
Silage	615	605	585
Total DM intake	1147	1135	1112
DM intake, % of BW	2.88	2.82	2.78
DM intake, g/kg $w^{0.75}$	72.41	71.1	69.89
Roughage : concentrate, (R/C) ratio	54:46	53:47	53:47
CP intake g/h/d	165	155	168
Milk yield, g/h/d	1230	1315	1355
Feed conversion			
Kg DM/ kg milk	0.93	0.86	0.82
Kg cp / kg milk	0.134	0.118	0.123
Economic efficiency			
Cost of feed consumed, L.E / h/d	2.09	1.97	1.77
Price of milk, L.E	4.305	4.603	4.743
Feed cost / kg milk, L.E	1.70	1.50	1.31
Economic efficiency, %	2.06	2.34	2.68

The prevailing prices, per ton, at time of the study are, CFM 2500 L.E, BS cost 300 L.E., BS/FB cost 235 L.E and 1 ton Sesbania sesban / fodder beet silage cost175 L.E while , 1 kg milk 3.5 L.E.

CONCLUSION

Based on the results of this study, it could be concluded that Sesbania-fodder beet silage can be successfully fed at ad lib. Level to with certain level of concentrate lactating goats without any adverse effect on milk production , ruminal functun, blood

constituents, feed utilization efficiency and feeding values of the rations .

Further studies are needed to evaluate the Sesbania-fodder in different forms (hay- fresh- silage) at different levels as well as with other sources of energy and feed additive with different farm animals

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تأثير استخدام أنواع مختلفة من مخاليط السيلاج في علائق الماعز الزرايبي الحلاب علي كل من إنتاج اللبن، كفاءة تحويل العلف ، تخمرات الكرش،القيمة الغذائية ومكونات الدم.

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تم تنفيذ هذا العمل على الماعز الزرايبي الحلابة لتتعرف علي تأثير الاستبدال الجزئي لبروتين مخلوط العلف المركز بواسطة بعض أنواع السيلاج على إنتاج الحليب وكفاءة تحويل الغذاء وبعض القياسات الهضمية وكذلك الكفاءة الاقتصادية. تم تقسيم ١٨ ماعز زرايبي حلاب بمتوسط وزن الجسم ٤٠.٠٠ كجم إلى ٣ مجموعات (٦ بكل منها). تم تغذية جميع الحيوانات على خليط العلف المركز لتغطية ٥٠٪ من توصيات ال NRC (١٩٨١). العلائق التجريبية كانت كا الأتي :المجموعة الأولي : ٥٠ ٪ مخلوط علف مركز+ ٥٠٪ سيلاج البرسيم (مج١)المجموعة الثانية : ٥٠ ٪ مخلوط علف مركز + ٥٠٪ مخلوط سيلاج (٥٠ % برسيم + ٥٠% بنجر العلف) (مج ٢)المجموعة الثالثة : ٥٠ ٪ مخلوط علف مركز + ٥٠٪ سيلاج خليط (٥٠٪ سيسبان +٥٠٪ بنجر العلف (مج ٣) . تم تغذية الحيوانات بالإضافة إلى ذلك تم استخدام تسعة ذكور الزرايبي تامة النمو (٣ ذكور لكل مجموعة ويتم تغذيتها علي واحدة من العلائق الثلاث التجريبية) لاستخدامها في تجارب الهضم لتقييم القيمة الغذائية للعلائق المختبرة.اوضحت النتائج مجموع المأكول اليومي من المادة الجافة كجرام/ حيز جسم تمثيلي يميل الي الانخفاض مع العلائق المختبرة (مج٢ و مج٣) بالمقارنة مع مج١ وكانت ١١٣٢ و ١١٠٢ مقابل ١١٥٢ جم/راس و ٧٠.٩٣ و ٦٩.٦٤ مقابل ٧٢.٦٨ جرام / كجم حيز جسم تمثيلي على التوالي.لم تتأثر قيم الرقم الهيدروجيني للمعاملات بينما قيمة الامونيا نيتروجين وكذلك مع مج٣ بالمقرنة بالكنترول وبالعكس حدث مع البروتين الميكروبي بين المعاملات كانت معنوية قليلا . وكذلك تأثر تركيز الأحماض الدهنية الكلية الطيارة بشكل كبير بالعلائق المختبرة وسجلت أعلى القيم مع (مج٢، مج ٣) مقارنة مع(مج ١) خصوصا في الساعتين الثالثة والسادسة. وكشفت المقارنة بين قياسات الدم أن هناك تقلبات صغيرة في تركيزات كلا من : الهيموجلوبين وتركيز كرات الدم الحمراء والهيماتوكريت معدل تركيز الهيموجلوبين داخل الخلية والصفائح الدموية والالبيومين الفروق بين المجموعات المغذاة علي العلائق المختبرة. من ناحية أخرى، كان كل من البروتين الكلي الجلوبيولين أعلى أيضا (٧.٢١ و ٤.٣٦ جرام / ديسي لتر) مع(مج٢) عن المجموعات الأخرى ولكن من دون فروق معنوية. وكانت تركيزات إنزيمات الكبد AST, ALT أعلى مع (مج١) (١٧.٦٨و ١٥٥.٠٠، على التوالي) عن المجموعات الأخرى، وكانت الاختلافات معنوية في تركيزAST فقط. اما فيما يتعلق بمحتوى الكالسيوم والفسفور في الدم، على الرغم من الاختلافات المتناقضة بين المعاملات، كان محتوى الكالسيوم مع معاملة (مج٣) أقل بكثير من محتوى (مج١, مج٢)، في حين كان محتوى الفسفور أعلى بشكل ملحوظ مع كل من المعاملات المختبرة عن الكنترول. أشارت البيانات التي تم الحصول عليها إلى أن معاملات الهضم لجميع العناصر الغذائية و البروتين الخام المهضوم انخفضت مع مجموعة المقارنة (مج١) بالمقارنة مع المعاملتين المختبرتين وكانت الاختلافات معنوية في البروتين الخام المهضوم فقط. أما بالنسبة لإنتاج الحليب، فقد بينت النتائج أن أعلى محصول لبن تم تسجيله مع (مج٣) ثم يليه (مج٢) ، في حين كان أدنى عائد مع (مج١) والاختلافات كانت معنوية.ا ظهرت اختلافات قليلة في المعاملات المغذاة علي العلائق التجريبية ، ولم تتأثر معاملات الهضم والقيمة التغذية بالعلائق التجريبية، إلا أن قابلية الهضم كبروتين خام وقيم وبروتين مهضوم تحسنت معنويا مع معاملة خليط السيسبان مع بنجر العلف مج٣ مقارنة بالكنترول مج١ لم يتأثر تكوين اللبن من الدهن والبروتين واللاكتوز والمواد الصلبة الكلية، والمواد الصلبة الغير دهنية والرماد بشكل ملحوظ مع العلائق التجريبية. ا ظهرت اختلافات قليلة في المعاملات المغذاة العلائق التجريبية ، ولم تتأثر معاملات الهضم والقيمة التغذية بالعلائق التجريبية، إلا أن قابلية الهضم كبروتين خام وقيم وبروتين مهضوم تحسنت معنويا مع معاملة خليط السيسبان مع بنجر العلف مج٣ مقارنة بالكنترول مج١ لم يتأثر تكوين اللبن من الدهن والبروتين واللاكتوز والمواد الصلبة الكلية، والمواد الصلبة الغير دهنية والرماد بشكل ملحوظ مع العلائق التجريبية. وبناء على ذلك، كانت كفاءة تحويل العلف أفضل مع مج٣ ومج٢مقارنة مع معاملة سيلاج البرسيم وحده مج ١(الكنترول. وبالمثل كانت الكفاءة الاقتصادية أفضل مع مج٣ مقارنة بالمجموعات الاخري من النتائج السابقة، يوصى باستخدام مخلوط سيلاج السيسبان مع علف بنجر العلف في علائق الماعز بجانب مخلوط سيلاج البرسيم مع بنجر العلف ، حيث أن هذا الأخير أصبح نادرا ومكلفا. و يمكن تغذية بنجاح لمخلوط سيلاج كلا من السيسبان وبنجر العلف للماعز الزرايبي الحلاب وبدون أي تأثير عكسي علي انتاج اللبن و قياسات تخمرات الكرش و ومكونات الدم وكفاءة تحويل الغذاء و القيمة الغذائية للعلائق .وهناك حاجة إلى مزيد من الدراسات لتقييم السيسبان كعلف في أشكال مختلفة (الدريس , السيلاج ,الطازج) بمستويات مختلفة وكذلك مع مصادر أخرى من الإضافات الغذائية للطاقة مع حيوانات المزرعة المختلفة