GROWTH PERFORMANCE AND FEED UTILIZATION EFFICIENCY OF RAHMANI LAMBS FED SOME LEGUME AND/OR GRASS SILAGES

Fatheia A. Ibrahim, Soliman, E.S, A. A. Abd El-Hamid and M.E. Ahmed
Anim. Prod. Res. institute, Agri. Res. Centre, Dokki, Giza, Egypt.

ABSTRACT

This work was carried out on growing Rahmani lambs to investigate the effect of using silage made from some legume and/or grasses on growth performance as well as some rumen and blood parameters. Thirty lambs divided into 5 groups (6 animals each) were fed ad libitum on Cowpea (CW), Millet×Napier grass hybrid (MN), Cowpea - Millet× Napier grass hybrid (CW-MN), Sesbania sesban (SS) and Sesbania-Millet× Napier grass hybrid (SS-MN) in five experimental treatments. Concentrate feed mixture (CFM) was offered with experimental groups to cover 1% of body weight. The feeding trial lasted 112 days. Three lambs of each group were involved in digestion trial to evaluate the feeding values of the tested diets.

Results showed that, DM, CP and EE were higher and NFE was lower in SS and CW than MN. The highest OM content was recorded with SS (90.50%) while, CW recorded the lowest value (86.60%). The digestion coefficients of OM, CF and CP of mixture silage (CW-MN) and (SS-MN) were significantly (P<0.05) higher than the other silage groups (CW, MN and SS). The same trend was observed also with DM, EE and NFE digestibility. Thus, the TDN values of both of CW and MN were significantly lower compared with their mixture silage (CW-MN). Similarly, the TDN value of SS-MN mixture silage was significantly (P<0.05) higher than those in SS and MN single silages. The highest value of DCP was recorded with SS (14.95) followed by CW (14.19), SS-MN (12.74) and CW-MN (11.84) and the lowest with MN (7.01) where all differences were significant. The daily feed intake tended to increase with SS-MN group (69.0g/ $kgW^{0.75}$) and CW-MN group (68.56g/$kgW^{0.75}$) compared with the other silage groups. The highest value of water consumption was recorded with SS group whereas, CW-MN group recorded the lowest value. The effect of legume or grass silage and their mixtures on some rumen parameters were significant. Whereas, the effect of silage treatments on most blood parameters were not significant.

As for growth rate, the highest value was recorded with group SS-MN (137g) followed by CW-MN (133g), SS (124g) and CW (120g) and finally MN that recorded the lowest value (115g). The differences among groups were significant. The same positive effect of mixtures silage was observed also with feed utilization efficiency based on DM and TDN. Accordingly, it could be recommended to using mixtures silage such as SS-MN and CW-MN in growing sheep rations owing to their positive effect on growth performance.

Key words: *Sesbania, intercropping, digestibitity, rumen, blood, growth.*

INTRODUCTION

Shortage of feed supply is the main constraint for any further increase in animal production in Egypt. Furthermore, farm animals suffer malnutrition particularly during summer season where green forages with reasonable protein content are not adequate.

Attempts were carried out to introduce new green forages or silages containing higher protein content such as Cowpea (Gabra *et al.*, 1991), Kochia indica (Shehata *et al.*, 2001) and Sesbania sesban (Soliman *et al.*, 1997) singly or as mixtures with grass. The common green forages in summer season are Millet, Napier grass and Sorghum grasses which contains low protein. So, needs to protein sources as legume forages is required to formulate more balanced rations. High yielding and high quality legume-grass mixtures play an important role in forage-animal production system (Mooso and Wedin, 1990 and Fathia *et al.*, 2008).

Moreover, using Sesbania sesban silage and their mixtures with grasses in small ruminant ration had a positive effect on metabolic parameters and productive

performance (El-Kholany, 2004). Similarly, other studies were carried out utilizing some mixtures of legumes and grass in ruminant feeding such Cowpea with Sorghum (Gabra *et al.*, 1991), Kochia indica with Teosinte (Ahmed *et al.*, 2001 and Shehata *et al.*, 2001) and Sesbania sesban with Teosinte (Soliman and Haggag, 2002).

In a recent study on cultivation and evaluation of some green forage mixtures and its utilization by feeding lactating Zaraibi goats, the results indicated that the mixtures of Sesbania-Sudan grass, Cowpea-Millet and Cowpea-Millet× Napier grass hybrid which available in summer had high feeding quality that offer good alternative to the acute shortage of good quality forages in summer (Fathia *et al.*, 2008). They concluded that feed conversion and economical feed efficiency to produce one kg milk with Zaraibi goats were better with both of Sesbania-sudan grass and Cowpea - Millet× Napier grass hybrid. The aim of this work was to investigate the effect of making silage of Millet× Napier grass hybrid grass mixture and Sesbania or Cowpea legumes and their mixtures on their feeding values and the growth performance of Rahmani lambs when fed on them.

MATERIALS & METHODS

The experimental work of the present study was conducted at El-Serw Experimental Research Station, Animal Production Research Institute, Agriculture Research Center, Egypt .

In a comparative feeding trial, thirty Rahmani lambs aged about 5 months and weighed on average 28.90 ± 0.21 kg were divided randomly into five similar groups and housed in semi-roofed barns 4×3×5 meters. Groups were fed on silage made of;1st group, Cowpea (CW), 2nd group, Millet × Napier grass hybrid (MN), 3rd group, Cowpea-Millet×Napier grass hybrid (CW-MN), 4th group, Sesbania- Millet× Napier grass hybrid (SS) and 5th group, Sesbania- Millet× Napier grass hybrid (SS-MN). In addition all groups were fed 1% of body weight concentrate feed mixture (CFM).The CFM was offered twice daily at 8 am and 4 pm, while silage were fed ad libitum. Drinking water was available all the time.

Lambs were weighed at the beginning of the experiment and then biweekly over the experimental period lasted 112 days. Five digestibility trials were conducted using 12 growing lambs (3 animals in each group) at the end of feeding period to evaluate the nutritive values of the tested diets. Samples of feed and feaces were analyzed according to A.O.A.C. (1995). Rumen fluid samples were taken from lambs during the last month of the feeding trials using stomach tube before feeding (0, 4 and 8 hrs post-feeding. The samples were filtered through three layers of gauze and used to determine pH values. Ammonia nitrogen (NH3-N) concentration was measured according to Conway (1957), total volatile fatty acids (TVFA's) according to the technique described by Warner (1964) and microbial protein was determined according to Schultz and Schultz (1970). Blood samples were taken via the jugular vein in evacuated tubes. Samples were kept at room temperature for 45 min, centrifuged at 4000 r.p.m. for 15 min. The blood serum were separated into clean dried glass vials and stored frozen at -20°C until analysis for total protein according to Armstrong and Carr (1964), Albumin (Daumas *et al.*, 1971), glucose (Trinder, 1969), urea-N (Patton and Crouch, 1977), creatinine (Husdan, 1968) and alkaline phosphatase (Belfied and Goldberg, 1971).

Data were statistically analyzed using SAS (2003). The significant differences among means were assigned according to Duncan (1955).

RESULTS & DISCUSSION

1- Chemical composition:

The chemical composition of feed ingredients are presented in Table 1. It was noticed that the highest dry matter (DM) percentage was recorded with Sesbania SS silage (28.10%) followed by SS-MN silage (26.20%) and CW silage (25.50%), while the lowest value was detected for MN silage (23.70%). The organic matter (OM)

Table (1): Chemical analysis of different experimental silages and CFM.

Item	DM	% on DM basis					
		OM	CF	CP	EE	NFE	Ash
Cowpea , (CW)	25.50	86.60	33.00	19.40	2.70	31.50	13.40
Millet x Napier grass hybrid, (MN)	23.70	87.50	32.20	9.70	1.15	44.45	12.50
Cowpea -Millet× Napier grass hybrid, (CW-MN)	25.00	87.20	32.50	15.00	2.05	37.65	12.80
Sesbania, (SS)	28.10	90.50	31.90	20.10	2.57	36.11	9.50
Sesbania - Millet× Napier grass hybrid, (SS-MN)	26.20	89.00	32.00	16.10	1.90	39.00	11.00
CFM*	91.50	93.50	16.00	15.10	3.60	58.80	6.50

*Concentrate feed mixture (CFM) consists of 40% yellow corn, 25% undecorticated cotton seed, 22% wheat bran, 6% rice bran, 3.5% molasses, 2.5 limestone and 1% common salt**.**

of Sesbania silage and their mixture with MN was higher than the other silages. Comparable values respecting CF content among silage types were observed. Otherwise, significant differences among silages regarding CP content were found, with higher values on CW and SS and the lowest associated with MN. The EE content followed similar trend among silages to that of CP. On the contrary, the highest NFE content was recorded with MN (44.45%) while, CW recorded the lowest value (31.50%). The percentage of Ash in SS silage was markedly lower (9.50%) compared with the other silages.

The obtained data of chemical composition was nearly similar with data obtained by Gabra *et al.*, (1991) and Khinizy *et al.*, (1997) who found that Cowpea had higher content of CP and low content of NFE than grasses (Sudan grass, Sorghum, Napier grass and Millet). Soliman *et al.*, (1997) found that Sesbania had high CP and low NFE percent compared with Teosinte grass. Comparing Sesbania silage with Maize silage, El-Kholany (2004) found that Sesbania silage contained considerably more CP (20.01 vs. 11.07%) but NFE content had opposite trend (38.48 vs. 49.88%).

In this respect, Gabra *et al.*, (1991), Ahmed *et al.*, (2001), Shehata *et al.*, (2001) and Soliman and Haggag (2002) found that the chemical composition of legume grass mixtures are intermediate between legumes and grasses.

Generally, there are many factors affecting chemical composition as species and varieties of forages, soil fertilization, subsequent cuts, age of cuts and environmental condition (Gabra *et al.*, 1991, Van Soest, 1996, Haggag *et al.*, 2000 and Fathia *et al.*, 2008).

2- Digestion coefficients and feeding value:

The obtained data in Table 2 indicated that the mixtures silage (CW-MN) and (SS-MN) had significantly ($P<0.05$) better digestion coefficients of OM, CF and CP than all other single silage rations (CW, MN and SS). The highest DM digestibility was recorded with SS-MN (65.83%) followed by CW-MN (64.39%) and SS (62.17%) but the lower values were occurred with MN silage (61.80%) and CW silage (61.87%). Also, the EE digestibility of mixtures silage (CW-MN and SS-MN) were significantly ($P<0.05$) higher than those in MN and SS silage. The same trend was observed with NFE digestibility but, without significant differences among treatments. The improvement in digestion of most nutrients with mixtures silages may be due to the positive associative effect between the two forages as reported by (Soliman *et al.*, 1997, Shehata *et al.*, 2001 and El-Kolany 2004) and the better conduction of the rumen fermentation in case of mixture as shown in Table 4. Gabra *et al.*, (1991) found that digestion coefficients of DM and OM of Cowpea - sorghum mixtures was higher than Sorghum alone. El-Kholany (2004) found that the DM, OM, CF, CP and EE of Sesbania-maize mixture was higher than both of Sesbania and maize silages when singly tested.

Table (2): Digestion coefficients and feeding values of experimental silage rations fed to Rahmani sheep.

Item	CW	MN	CW-MN	SS	SS-MN
DM	61.87±0.84^{b}	61.80±1.03^{b}	64.93±1.31^{ab}	62.17±0.93^{b}	65.83±1.12^{a}
OM	63.47±0.80^{b}	63.00±0.86^{b}	67.03±1.10^{a}	64.00±0.58^{b}	68.97±0.59^{a}
CF	60.90±0.80^{b}	60.90±0.67^{b}	67.93±0.45^{a}	61.20±1.01^{b}	68.07±1.09^{a}
CP	73.13±0.54^{b}	71.30±1.63^{b}	78.93±0.72^{a}	74.40±0.61^{b}	79.10±0.78^{a}
EE	72.00±0.87^{ab}	70.00±1.27^{b}	74.43±1.13^{a}	70.37±0.64^{b}	74.80±0.64^{a}
NFE	63.97±1.19	65.83±1.11	67.90±1.13	64.03±1.54	68.00±1.40
Feeding values:					
TDN	58.89±0.19^{c}	57.72±0.53^{c}	62.93±0.70^{ab}	61.64±0.93^{b}	64.23±0.66^{a}
DCP	14.19±0.10^{b}	7.01±0.16^{e}	11.84±0.11^{d}	14.95±0.12^{a}	12.74±0.13^{c}

a-e: Means in the same raw with different superscripts are significantly different at $P \leq 0.05$.

Regarding feeding value, the obtained data in Table 2 indicated significant (P<0.05) higher value of TDN with SS-MN silage (64.23) followed by CW-MN (62.93), SS (61.64) while the lower values with CW (58.89) then MN silage (57.72).The improvement in feeding value as TDN of silage mixtures is likely attributed to the improvement in all nutrients digestibility. The DCP values of legume silages (SS and CW) were significantly (P<0.05) higher than that of single grass, (MN).

Generally, the highest DCP value was recorded with SS silage (14.95%) then CW silage (14.19%) followed by SS-MN silage (12.74%) and CW-MN silage (11.84%), whereas, MN silage recorded the lowest value (7.01%) as shown in Table 2. Similar results were observed by Haggag *et al.*, (2002) and El-Kholany (2004). Gabra *et al.*, (1991) found that DCP of Cowpea -Sorghum mixture was higher than Sorghum alone. Soliman *et al.*, (1997) reported that TDN and DCP of Sesbania-Teosinte mixture plus CFM were higher than Teosinte (P<0.05) plus CFM.

3- Daily feed intake and water consumption:

The average daily feed intake of growing Rahmani lambs is summarized in Table 3. The total DM intake as (g/h/d) or (g/ kg W 0.75) tended to increase with both silage mixtures (1016 g/h/d or 68.56 g/kgW$^{0.75}$) for CW-MN and (1025 g/h/d or 69.00 g/kgW$^{0.75}$) for SS-MN based on the un mixture one. The lowest daily DM intake was recorded with MN silage ration (967g or 66.97g/kgW$^{0.75}$). The same trend was reported by El-Kholany (2004) who found that daily DM intake was significantly (P<0.05) higher with Sesbania-maize silage (896.56g/h or 50.60g/kgW$^{0.75}$) compared with both single Sesbania silage (812.21g/h or 46.71g/kgW$^{0.75}$) and maize silage (819.93 g/h or 47.46 g/kgW$^{0.75}$). Khinizy *et al.*, (1997) reported that the Cowpea intake was higher than Sorghum or Millet grass intake. The same author found that the Millet intake was lower than Napier grass intake. In other study, the DM intake of the three mixture forage (Sesbania-Sudan grass, Cowpea -Millet and Cowpea - Millet×Napier grass hybrid) as g/kgW$^{0.75}$ was nearly similar (76.72, 77.05 and 76.50, respectively) (Fathia *et al.*, 2008). Generally, the ratio of roughage to concentrate tended to increase with both of silage mixtures ration CW-MN and SS-MN (62:38) compared with CW, MN and SS silage rations (60:40) as shown in Table 3.

The daily water consumption was higher for lambs fed Sesbania silage (SS) and their mixtures with Millet×Napier grass hybrid (SS-MN) compared with the other groups (Table 3).

The highest value of daily water consumption, measured as ml/h/d or ml/ kg W$^{0.75}$, was recorded for SS group (3705 ml or 253 ml/kgW$^{0.75}$), followed by SS-MN (3310 ml or 223 ml/kgW$^{0.75}$), CW (3070 ml or 210 ml/kgW$^{0.75}$) then MN (2910 ml or 200 ml/KgW$^{0.75}$), while CW-MN group had recorded the lowest value (2900 ml or 196 ml/kgW$^{0.75}$). The same trend was observed with water consumption when expressed as a present

of dry matter intake and it ranged between 2.85 to 3.77 ml/g DM intake. The values of water consumption in this study are nearly similar to those obtained by Ahmed *et al.*, 2009 on growing Rahmani lambs (ranged from 1.90 to 3.16 ml/g DM intake) and Soliman *et al.*, (2010) on growing Zaraibi goats (ranged from 2.22 to 3.30 ml/g DM intake). Generally, the daily water consumption was higher with Sasbania silage compared with the other

Table (3): Daily dry matter intake and water consumption of Rahmani lambs fed the experimental silage ration during growth period.

Item	CW	MN	CW-MN	SS	SS-MN
Daily dry matter intake:					
From CFM, g/h/d	389	383	390	389	393
From Silage, g/h/d	594	584	626	595	632
Total DM intake, g/h/d	983	967	1016	984	1025
DM intake, g/ kg $w^{0.75}$	67.28	66.97	68.56	67.31	69.00
R/C ratio	60:40	60:40	62:38	60:40	62:38
TDN intake, g/h/d	579	558	639	607	658
Water consumption:					
ml/h/d	3070	2910	2900	3705	3310
ml/ kg $w^{0.75}$	210	200	196	253	223
ml/g DM intake	3.12	3.01	2.85	3.77	3.23

groups which is mostly due to the halophytic effect of Sasbania as reported by Shehata *et al.*, (2001) and El-Kholany (2004) with Kochia and Sasbania silage, respectively .

4- Rumen parameters:

Rumen parameters are presented in Table 4. The differences in ruminal pH values among the five groups were not significant at 0 and 4hrs post feeding. Whereas, at 8 hrs post feeding, the value of SS was significantly less ($P<0.05$) than single and SS-MN silage groups. However, the obtained pH values at all hours are within the normal ranges (5.5 to 7.3) as recorded by Hungate (1966). The differences in ammonia-N concentration and total VFA's value among the five rations before feeding (0 time) were not significant. Ammonia-N of Sasbania group (SS) was significantly ($P<0.05$) higher than MN and CW-MN groups and insignificantly higher than CW and SS-MN groups at 4hrs post feeding as shown in Table 4. The high content of ruminal

Table (4): Rumen liquor parameters of Rahmani sheep fed the experimental silage rations.

Item		CW	MN	CW-MN	SS	SS-MN
pH values	0	7.03±0.12	6.97±0.12	7.03±0.17	7.07±0.13	7.00±0.06
	4	6.40±0.06	6.43±0.07	6.47±0.09	6.37±0.09	6.43±0.07
	8	$6.77±0.03^{ab}$	$6.67±0.03^{ab}$	$6.80±0.06^{a}$	$6.60±0.06^{b}$	$6.82±0.07^{a}$
NH_3-N, (mg/100ml)	0	13.47±0.41	12.87±0.68	13.20±0.46	14.13±0.41	13.67±0.27
	4	$22.20±0.40^{ab}$	$19.20±0.64^{c}$	$20.40±0.46^{bc}$	$22.53±0.52^{a}$	$21.00±0.81^{abc}$
	8	20.07±18.20	17.53±0.35	18.47±0.27	20.67±0.37	18.67±0.47
TVFA's, (meq/100ml)	0	7.77±0.27	8.23±0.27	8.00±0.23	7.83±0.33	7.93±0.28
	4	$10.30±0.21^{c}$	$11.40±0.21^{a}$	$11.07±0.19^{ab}$	$10.50±0.25^{bc}$	$11.20±0.23^{ab}$
	8	$10.03±0.26^{b}$	$11.20±0.21^{a}$	$10.93±0.22^{a}$	$10.20±0.23^{b}$	$11.00±0.17^{a}$
Microbial protein, (g/100ml)	0	0.40±0.02	0.38±0.02	0.41±0.03	0.39±0.05	0.42±0.01
	4	$0.67±0.02^{ab}$	$0.62±0.03^{b}$	$0.71±0.02^{a}$	$0.69±0.03^{ab}$	$0.73±0.01^{a}$
	8	$0.59±0.02^{ab}$	$0.55±0.02^{b}$	$0.64±0.02^{a}$	$0.61±0.04^{ab}$	$0.65±0.01^{a}$

a-c: Means in the same raw with different superscripts are significantly different at $P \leq 0.05$.

ammonia-N concentration in SS group may be due to the high content of CP in Sasbania silage as reported by El-Kolany (2004) and high protein degradability of Sasbania protein as reported by Khalili and Varvikko (1992). The Total VFA's values of MN group was significantly (P<0.05) higher than CW and SS groups at 4 and 8hrs post feeding. Similar results were observed by Soliman *et al.*, (1997). El- Kholany (2004) who observed that the total FVA's of Sasbania silage group was significantly lower than maize-Sasbania silage group and insignificantly lower than maize silage at 4hrs post feeding. Finally, Fathia *et al.*, (2008) found that the total VFA's of Sasbania-Sudan grass group was significantly lower (10.60 meq) than Cowpea-Millet and Cowpea-Millet×Napier grass hybrid group (11.70 and 11.83meq, respectively), while the differences between the two later were not significant at 4hrs post feeding. Ruminal microbial protein content was not significantly differed among the five silage groups at zero time while there were significantly (P<0.05) higher count with silage mixture groups than that of CW and MN at 4 and 8hrs post feeding. Similar results were shown by Gabr *et al.*, (1999), Ahmed *et al.*, (2001) and Fathia *et al.*, (2007). Soliman *et al.*, (1997) observed that ruminal microbial protein at 4hrs post feeding was significantly higher with Sasbania-Teosinte (0.79g/100ml) compared with Sasbania or Teosinte alone (0.63 and 0.49g/100ml, respectively).

5- Blood serum parameters:

Data of some blood parameters in growing Rahmani lambs, as affected by feeding treatments, are present in Table 5. The data indicate that no significant differences among the five silage groups for blood hemoglobin, hematocrite (pcv), mean cell hemoglobin concentration (MCHC%), serum total protein, albumin, globulin, creatinine, glucose and alkaline phosphatase (ALP), while serum urea-N of CW and SS groups were significantly (P<0.05) higher than MN group. The higher values of serum urea-N of CW and SS may be due to higher level of ammonia-N in the rumen. Similar results were observed by EL-Kholany (2004). The obtained values are within the normal range reported by Jain (1986) and Kaneko (1989) for healthy goats and in line with the findings of Ahmed *et al.*, (2001) and Fathia *et al.* (2008) of healthy goats.

6- Growth performance

Performance data of growing lambs in relation to different rations are presented in Table 6. The initial live body weights of all lambs in the five groups were approximately equal. During the growing period (16 weeks), final body weight (FBW) was higher with animals fed silage mixture rations (CW-MN and SS-MN) compared with the other three groups. Also, total body gain (TBG) and daily body gain (DBG) were followed similar trends

Table (5): Some blood serm profile of Rahmani sheep fed the experimental silage rations.

Item	CW	MN	CW-MN	SS	SS-MN
Hemoglobin (Hb), g/dl	12.23±0.37	12.00±0.25	12.53±0.32	12.00±0.35	12.73±0.32
Hematocrite (PCV), %	35.40±0.38	36.03±0.58	35.00±0.87	35.50±0.50	34.87±0.47
Mean cell hemoglobin concentration (MCHC%), %	34.67±0.88	33.33±0.88	35.67±0.88	34.00±1.53	36.33±0.67
Total protein, g/dl	7.07±0.13	6.83±0.15	7.00±0.12	7.17±0.03	7.03±0.12
Albumin (A), g/dl	3.23±0.09	3.07±0.09	3.13±0.20	3.33±0.18	3.10±0.15
Globulin (G), g/dl	3.83±0.15	3.77±0.13	3.87±0.09	3.83±0.20	3.93±0.03
A/G	0.85±0.05	0.82±0.04	0.81±0.07	0.88±0.09	0.79±0.05
Urea-N, mg/dl	17.47 ± 0.79^{a}	14.93 ± 0.35^{b}	16.03 ± 0.43^{ab}	17.50 ± 1.00^{a}	15.43 ± 0.70^{ab}
Creatinine, mg/dl	0.90±18.20	0.75±0.03	0.80±0.06	0.87±0.08	0.85±0.08
Glucose, mg/dl	75.33±2.91	80.00±2.89	76.67±2.85	74.67±2.40	77.00±2.08
Alkalin phosphatase(ALP), IU/l	118±4.41	125±4.62	115±6.08	121±7.37	117±4.36

a-b: Means in the same raw with different superscripts are significantly different at $P \leq 0.05$.

Table (6): Growth performance of Rahmani lambs fed the experimental silage rations.

Item	CW	MN	CW-MN	SS	SS-MN
No. of lambs	6	6	6	6	6
Feeding period, weeks	16	16	16	16	16
Initial weight, (kg)	29.00±0.53	28.70±0.45	29.00±0.38	28.80±0.64	28.90±0.44
Final weight, (kg)	42.45±0.33^{cb}	41.62±0.22^{c}	43.87±0.43^{ab}	42.70±0.14^{bc}	44.22±0.23^{a}
Total gain, (kg)	13.45±0.24^{c}	12.92±0.48^{c}	14.87±0.54^{ab}	13.90±0.59^{bc}	15.30±0.27^{a}
Daily body gain (g)	120±2.17^{c}	115±4.29^{c}	133±4.78^{ab}	124±5.25^{bc}	137±2.40^{a}
Average dry matter intake:					
DM intake, g/h/d	983	967	1016	984	1025
TDN intake, g/h/d	579	558	639	607	658
Average daily body gain, g	120	115	133	124	137
Feed utilization efficiency:					
kg DM/kg gain	8.19	8.41	7.64	7.94	7.48
kg TDN/kg gain	4.82	4.85	4.80	4.89	4.80

a-c: Means in the same raw with different superscripts are significantly different at ($P \leq 0.05$).

to that of (FBW) with substantial superiority values with silage mixture related to the raw ones The positive effect of silage mixtures (or forage) on small ruminant performance was observed also by Soliman *et al.*, (1997), Gabr *et al.*, (1999), Ahmed *et al.*, (2001) and El-Kholany (2004). In this connection, Soliman *et al.*, (1997) observed that using Sasbania-Teosinte mixture with CFM in goat rations had clear positive effect on final body weight and total body gain compared with both of single Sasbania or Teosinte with CFM and the improvement in daily body gain was reached to more than 32.00% with forage mixture (Sasbania-Teosinte) plus CFM compared to Sasbania or Teosinte alone plus the same percent of CFM. In the same line, feed utilization efficiency based on DM and TDN was better with mixed silages (CW-MN and SS-MN) compared with the other groups as shown in Table 6. Similar results were observed by Ahmed *et al.*, (2001) and El-Kholany (2004) with small ruminants fed mixed silage (or forages). Soliman *et al.*, (1997) reported that feed efficiency based on DM and TDN was greatly better with CFM+Sasbania-Teosinte mixture (8.77 and 6.04, respectively) compared with CFM+Sasbania alone (11.81 and 7.73) and CFM+Teosinte alone (16.24 and 10.43).

CONCLUSION

It could be concluded that using silage mixtures (Cowpea-Millet×Napier grass hybrid and Sasbania-Millet×Napier grass hybrid) in feeding sheep had positive affect not only on improving digestion coefficients and feeding value, but also on improving the rumen environment reflected on better efficiency of feed utilization and growth performance.

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GROWTH PERFORMANCE AND FEED UTILIZATION EFFICIENCY OF RAHMANI LAMBS FED SOME LEGUME AND/OR GRASS SILAGES

الملخص العربى

الأداء الإنتاجى وكفاءة استخدام الغذاء للحملان الرحمانى المغذاة على سيلاج بعض مواد العلف البقولية والنجيلية ومخاليطها.

فتحية عبد العظيم ابراهيم -السيد سليمان محمد سليمان –ايمن عبد الحى عبد الحميد- محمد ابراهيم احمد
معهد بحوث الإنتاج الحيوانى- مركز البحوث الزراعية.

أجريت هذه الدراسة على حملان الأغنام الرحمانى النامية لإختبار تأثير استخدام سيلاج بعض مواد العلف النجيلية أو البقولية ومخاليطها على الأداء الإنتاجى وكفاءة تحويل الغذاء وبعض قياسات سائل الكرش والدم، وقد تم إستخدام ٣٠ حولى رحمانى نامى، حيث قسمت الى خمس مجاميع عشوائيا (٦ بكل مجموعة) حيث غذيت على سيلاج لوبيا العلف (مج١)، سيلاج الدخنابير (مج٢)، سيلاج مخلوط لوبيا العلف والدخنابير (مج٣)، سيلاج السيسبان (مج٤)، سيلاج مخلوط من السيسبان والدخنابير (مج٥) فى خمس مجاميع متتاليه، وقد غذيت الحيوانات على العلف المركز بنسبة ١% من وزن الجسم أما السيلاج فقدم فى كل المعاملات للشبع. استمرت التجربة لمدة ١١٢ يوم ، كما اجريت تجارب هضم على ثلاث حوالى فى نهاية تجربة التغذية لتقييم العلائق المختلفة.

اوضحت النتائج المتحصل عليها أن نسبة المادة الجافة والبروتين الخام ومستخلص الاثير كانت مرتفعة فى السيسبان ولوبيا العلف مقارنة بالدخنابير ولكن الكربوهيدرات الذائبة كانت اعلى فى الدخنابير عن كلا من السيسبان، لوبيا العلف، أما بالنسبة للمادة العضوية فقد سجلت أعلى قيمة مع سيلاج السيسبان (٩٠,٥%) فى حين كانت أقل قيمة (٨٦,٦٠%) مع لوبيا العلف. ارتفعت معنويا معاملات هضم المادة العضوية والالياف الخام والبروتين الخام مع مجموعتى سيلاج المخاليط مقارنة بالمجموعات الاخرى، وكذلك سجلت معاملات هضم المادة الجافة ومستخلص الاثير والكربوهيدرات الذائبة قيما أفضل مع مج٣، مج٥ مقارنة مع مج١، مج٢، مج٤. اما فيما يتعلق بالقيمة الغذائية فقد سجلت المركبات المهضومة الكلية تفوقا معنويا مع مخاليط السيلاج مقارنة بكل من السيلاج البقولى او النجيلى بمفرده بمعنى ان المركبات المهضومة الكلية كانت افضل معنويا مع مج٣ مقارنة مع مج ١، مج٢ وايضا أفضل معنويا مع مج٥ مقارنة مع مج ٢، مج٤.لكن البروتين المهضوم كان افضل مع مج٤ (١٤,٩٥) ثم مج١ (١٤,١٩) ثم مج٥ (١٢,٧٤) ثم مج٣ (١١,٨٤) فى حين كانت اقل قيمة مع مج٢ (٧,٠١). زاد استهلاك الغذاء اليومى من سيلاج المخاليط متمثلا فى مج ٥(٦٩,٠٠جم/كجم حيز جسم تمثيلى، مج٣ (٦٨,٥٦جم/كجم حيز جسم تمثيلى)، فى حين زاد استهلاك المياه مع سيلاج السيسبان (مج٤) وفى المقابل سجلت (مج٣) أقل قيمة.كما تأثرت معنويا قياسات سائل الكرش بسيلاج مواد العلف البقولية والنجيلية ومخاليطها، فى حين لم تتأثر معنويا معظم قياسات الدم بين كل المجموعات المختبرة.

فيما يتعلق بمعدل النمو اليومى فقد سجلت أعلى قيمة فى المخاليط متمثلة فى مج٥ (١٣٧جم) ثم مج٣ (١٣٣جم) ثم تلى ذلك سيلاج السيسبان (١٢٤جم) ولوبيا العلف (١٢٠جم) فى حين سجلت أقل قيمة مع سيلاج الدخنابير (١١٥جم) والاختلافات كانت معنوية. أيضا لوحظ نفس التأثير الايجابى لمجموعتى سيلاج المخاليط (مج٣، مج٥) على كفاءة التحويل الغذائى (محسوبة على اساس المادة الجافة والمركبات الكلية المهضومة) مقارنة بالمجموعات الاخرى (مج١، مج٢، مج٤).

وبناء على ذلك توصى الدراسة بأن سيلاج المخاليط هو الأفضل فى تغذية الاغنام النامية لتأثيراته الايجابية على الهضم وبيئة الكرش وبالتالى تحسين كفاءة التحويل الغذائى والاداء الانتاجى فى الاغنام الرحمانى.