Effect of Using *Sesbania sesban* and Its Mixtures with some Summer Fresh Grasses on Lambs Productive Performance in New Reclaimed Soil

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Abstract: The objective of this work was to study cultivation sesbania and its mixtures with sorghum or millet in reclaimed sandy soil, then utilization the green forages in feeding of growing lambs for 16 weeks in two stages (The 1st cut was fed in the 1st stage through the first 8 weeks and 2nd cut was fed in the 2nd stage through the last 8 weeks).Twenty four Ossimi lambs averaged 22.5 kg body weight were divided into four groups (6 in each) to evaluate the following rations: Ration A (control): 100% from requirements of CP according to NRC(1985) from Concentrate Feed Mixture (CFM) + Rice straw *ad lib*., Ration B: 50% from requirements of CP according to NRC from CFM + Sesbania *ad lib*., Ration C: 50% from requirements of CP according to NRC from CFM + Sesbania-Sorghum mixture (1:1) *ad lib*. and Ration D: 50% from requirements of CP according to NRC from CFM + Sesbania-Millet mixture (1:1) *ad lib.* Digestibility trials were conducted to evaluate the experimental rations using 12 rams (3 in each). The rumen parameters were measured and forage yield was determined. Results showed that DM and CF% were lower and CP% was higher in Sesbania than Sorghum, Millet, Sesbania-Sorghum mixture and Sesbania-Millet mixture. The differences among all rations in digestion coefficients of DM, OM, CP, NFE and TDN% of tested rations were not significant. The ruminal parameters explained that the pH of control was significantly higher than other groups at all times in 2nd stage, while the differences among other groups were not significant. The differences of ammonia-N at 2hrs after feeding were not significant among groups, while ammonia-N of control was significantly higher than other groups at 4hrs, and the differences among other groups were not significant at the same time. The differences number of TVFA's among groups were not significant in 1st stage. The differences of protozoa at 4 hrs post feeding were not significant among all groups. The differences of microbial protein were not significant among all groups in the 1st stage. The highest cost value of feed consumption was recorded with control. The daily body gain(DBG) were 156.1, 150.3, 154 and 154.8 gm/h/d for lamb groups which fed rations A, B, C and D respectively and the differences of DBG among four groups were not significant. The best feed conversion and economical efficiency were recorded with ration D. The green forage yield of Sesbania pure, Sesbania-Sorghum mixture and Sesbania-Millet mixture were 10.85, 15.31 and 15.30 ton/feddan, dry yield were 2.22, 3.32 and 3.34 ton/feddan, and crude protein yield were 403, 451 and 478kg/feddan, respectively.

Keywords: *Sesbania, Sorghum,* Millet, Rams, Lambs, Digestion coefficients, Rumen, DBG, Feed conversion, yield.

INTRODUCTION

The animals suffer from shortage of feed especially during summer season in Egypt. Most of animal feeding in this period depends on concentrate feed mixtures and agricultural residues. The expensive price of energy sources as grains or protein sources as Soybean meal and Cotton seed meal tend to increase feed cost of animals. The green forage is cheap food for ruminant feeding. The most green forages in summer season in Egypt are grasses as Sorghum, Sudan grass and Millet. Grasses have higher yield than legumes, but they are considered poor in quality due to low protein content and essential amino acids, therefore sowing legumes in mixtures with grasses improves the quality of forage by increasing protein content and reducing crude fiber content.

Some practical studies were carried out to utilization some mixtures of legumes and grasses in ruminant feeding in summer season such as cowpea with sorghum (Gabra *et al.,* 1991), cowpea with millet (Fathia *et al*, 2008; Abd El-Hamid *et al.,* 2008), Sesbania with Teosinte (Soliman *et al.,* 1997; Soliman and Haggag, 2002), and sesbania with Sudan grass (Fathia *et al.,* 2008; Abd El-Hamid *et al.,* 2008). Generally, some studies were carried out for cultivation Sesbania sesban as a new legume crop in clay soils pure or its mixtures with some grasses in Egypt (Soliman *et al.,* 1997; Haggag *et al.,* 2000; Fathia A. Ibrahim *et al.,* 2008; Abd El-Hamid *et al.,* 2008).

The objective of this work is cultivation of Sesbania Sesban pure and its mixtures with sorghum or millet in reclaimed sandy soil and its utilization instead of a part from concentrate feed mixture in feeding of sheep.

MATERIALS AND METHODS

This study was carried out at Ismailia Research Station (Ismailia governorate) and Animal Nutrition Unit of Ismailia (Animal Production Research Institute), Agricultural Research Center and Research laboratories, Faculty of Agricultural, Suez Canal University, Egypt. Cultivation was practiced in reclaimed sandy soil of Ismailia Research Station farm.

The green forages were cultivated during summer season. Pure Sesbania, Sesbania-Sorghum mixture and Sesbania-Millet mixture were cultivated for feeding sheep. The normal recommended agronomic practices of forages in sandy soil as fertilization and irrigation were applied. Two cuts from green forages were taken. The 1st cut was done after about 60 days from planting. The 2nd cut was taken after about 45 days from the 1st Cut. The yield of Sesbania, Sesbania-Sorghum mixture and Sesbania-Millet mixture were estimated.

Four experimental rations were used as the follows:

Ration A (control): 100 % Concentrate Feed Mixture (CFM) as requirements of CP according to NRC (1985) + Rice straw *ad lib*.
Ration B: 50% CFM of requirements of CP according to NRC + Sesbania *ad lib.*
Ration C: 50% CFM of requirements of CP according to NRC + Sesbania-Sorghum mix. (1:1) *ad lib.*
Ration D: 50% CFM of requirements of CP according to NRC + Sesbania-Millet mix. (1: 1) *ad lib*.
Four digestibility trials were conducted to evaluate the experimental rations using 12 rams (3 in each), 2-3 years age and an average weight of 40 kg. Rams were individually housed in metabolic cages, Preliminary period was 15 days and a collection period was 5 days, followed 3 days of ruminal studies.
Composite samples of different forages and feces were dried at 60^{o}C for 24 hrs then milling to pass through a 1 mm screen and stored for chemical analysis. Chemical composition of representative samples of CFM, RS, forages, refusals and feces were determined according to AOAC (1985) procedures.
Rumen fluid samples were taken using a stomach tube at 0 time (before feeding), 2hr and 4hr post feeding. These samples were filtered through three layers of surgical gauze without squeezing. Ruminal pH was immediately estimated by digital pH meter. Rumen ammonia-N was determined according to Conway (1957). Total volatile fatty acids (TVFA's) were measured by the steam distillation method as described by Warner (1964). Total number of protozoa was counted by using Fuchs Rosenthal chamber. Microbial protein was determined by sodium tungestate method according to Shultz and Shultz (1970).
Twenty four growing Ossimi lambs averaged 22.5 kg body weight were divided into four groups (6 in each) and were randomly assigned to evaluate the productive performance of lambs fed the four rations.
The CFM was daily offered in two equal portions at 8 am and 4 pm. The green forages were weighed and offered *ad lib*. Residual were collected and weighed daily. Drinking water was available all time. The growth experiments lasted 16 weeks, which included two stages as 8 weeks in 1st cut (1st stage) and 8 weeks in 2nd cut (2nd stage).The experimental lambs were weighed every two weeks. Feed conversion and economical efficiency were calculated.
All data were subjected to analysis was performed using the General linear Models procedure of the SAS (2002). Mean differences were compared using Duncan ' multiple range test (Duncan, 1955). Data were analyzed using the following mathematical model:

$Yij = \mu + Ti + eij$

Yij = Individual observation.

μ=the overall mean for the trial under consideration.

Ti = the effect of the ith treatment.

eij=Random residual error.

RESULTS AND DISCUSSION

Chemical Composition: The chemical composition of successive cuts of green forages and concentrate feed mixture (CFM) + rice straw (RS) is presented in Table (1). The DM, and CF% were lower in Sesbania than Sorghum, Millet, Sesbania-Sorghum mixture and Sesbania-Millet mixture in 1st and 2nd cuts. The CP content in Sesbania was nearly double CP in Sorghum. While CP content in Sesbania was slightly higher than its mixtures. EE content was higher in Sesbania than Sorghum and millet, while mixtures of Sesbania with Sorghum were slightly higher than Sesbania pure. NFE Content of Sorghum was slightly higher than Sesbania and its mixtures. Ash content of Sesbania was lower than Millet and Millet-Sesbania mixture. Chemical Composition values of Sesbania obtained in this study within the chemical composition data obtained by Abdel-Rahman *et al.* (1995), Singh *et al.* (1980), El-Nahrawy and Soliman (1998), Haggag *et al.* (2000) and Soliman and Haggag (2002). However the chemical composition of mixtures depends on the kind of plants and mix percentages. Similar results were reported by Manaye *et al.* (2009) in Napier grass + Sesbania. Fathia *et al.* (2008) found that DM percent of Sesbania-Sudan grass mixture were 23.31 and 25.13% in 1st and 2nd cuts. The CP content in this study of Sesbania mixtures with Sorghum or Millet take the same trend obtained by Fathia *et al.* (2008) with Sesbania-Sudan grass mixture. Chemical Composition of the tested rations (Table 1) explained that the ration contained CFM + Sesbania had high level of CP and NFE than rations contained CFM+Sesbania-Sorghum mixture or CFM+Sesbania-Millet mixture. The three tested rations had similar values in EE and ash content. Similar trend was reported by Soliman and Haggag (2002). Who found that the mixtures of Sesbania+Teosinte (4:6 ratio) +CFM had CP 15.85, NFE% 50.68 and CF 19.43%. Generally, the calculated chemical composition differs with different in green forage intake. The CP% was lower and NFE% was higher in control ration than rations contained green forage.

Digestibility trials:
Feed intake: The values of DM intake (Table 2) as kg/h/d, %LBW and g/kg w$^{0.75}$ were significantly higher in control ration than rations contains CFM and green forages. The lowest values of DM intake were showed by rams fed ration B. The differences between rations C and D were not significant. The values of DM intake (% of LBW) in this study were nearly similar with values recorded by El-Nahrawy and Soliman (1998) and Haggag *et al.* (2000). Soliman *et al.* (1997) found that average DM intake from Sesbania + CFM, Sesbania + Teosinte + CFM were 3.03, 2.70% of LBW of goats.

Digestion coefficients: The differences among all rations in digestion coefficients of DM, OM, CP and NFE% of tested rations were not significant (Table 2). The CF digestibility of rations C and D were significantly higher than ration B or control in the 1st stage, while the differences among all rations in 2nd stage were not significant. The DM and OM digestibility agreed with those obtained by Soliman and Haggag (2002). The CF and NFE digestibility were nearly similar with Rekib and Shukla (1995). On the other hand DM and OM digest ability in this study were lower than that obtained by Soliman *et al.* (1997), El-Nahrawy and Soliman (1998) and Fathia *et al.* (2008).

The CP digestibility in agreement with those obtained by Fathia *et al.* (2008) and Ahmed *et al.* (2009), while the CP digestibility was higher than that obtained by Soliman *et al.* (1997), El-Nahrawy and Soliman (1998) and Soliman and Haggag (2002). The CF digestibility in this study was nearly similar with results obtained by Soliman and Haggag, (2002). Generally, digestion coefficients are affected by different factors as animal species, activities of rumen microbes, feed components and associated effect.

Nutritive values: The differences of TDN among four rations were not significant; the DCP of ration B was significantly higher than other rations (Table2). The highest value of DCP of Sesbania ration may be due to high digestibility of CP. These results agreed with those obtained by Soliman *et al.* (1997) with goats fed Sesbania+CFM. However, the TDN and DCP% of Sesbania-Millet mixture in this study was nearly similar with those obtained by Fathia *et al.* (2008) and Soliman and Haggag (2002). El-Nahrawy and Soliman (1998) found that TDN and DCP% of Sesbania+CFM fed by sheep were 69.90 and 14.30 %, respectively. Generally TDN% is differed with different in chemical composition and nutrient digestibility, and DCP% depends on crude protein in the rations and digestion coefficients of CP.

Table (1): Chemical composition, % of successive cuts of green forage, Concentrate feed mixture, rice straw and calculated rations (on DM basis).

Items	DM%	Chemical composition (% on DM basis)					
		OM	CP	EE	CF	NFE	Ash
Green forage, 1st cut							
Sesnania	19.12	92.08	19.39	2.66	17.45	52.58	7.92
Sorghum	20.66	92.27	8.16	2.11	25.73	56.27	7.73
Millet	21.26	90.58	11.18	2.04	27.38	49.98	9.42
Sesbania-Sorghum mix.	20.46	92.28	14.11	3.38	28.67	46.12	7.72
Sesbania-Millet mix	21.02	90.17	15.87	2.40	28.05	43.85	9.83
Green forage, 2nd cut							
Sesnania	22.21	91.76	16.65	2.99	20.55	51.57	8.24
Sorghum	24.32	92.97	9.24	2.39	26.75	54.59	7.03
Millet	23.56	89.38	8.09	2.01	27.41	51.87	10.62
Sesbania-Sorghum mix.	23.27	92.04	12.94	3.51	28.77	46.82	7.96
Sesbania-Millet mix	22.89	89.80	12.37	2.50	27.63	47.30	10.20
Concentrate feed mixture	94.78	89.98	17.39	3.21	13.35	56.03	10.02
Rice straw	88.87	87.04	4.57	1.40	24.86	56.21	12.96
Calculated rations							
1st stage (1st cut)							
Ration A (Control)	93.14	89.04	13.31	2.63	17.01	56.09	10.96
Ration B	30.4	90.82	18.19	2.99	14.99	54.65	9.18
Ration C	31.35	91.16	15.71	3.30	21.18	50.97	8.84
Ration D	31.95	90.08	16.58	2.78	21.16	49.56	9.92
2nd stage (2nd cut)							
Ration A (Control)	93.04	88.91	12.73	2.55	17.53	56.10	11.09
Ration B	31.19	90.78	17.06	3.11	16.59	54.02	9.22
Ration C	32.34	91.15	14.87	3.38	22.08	50.82	8.85
Ration D	31.96	89.88	14.75	2.84	20.85	51.44	10.12

Table (2): Intake, digestion coefficients and nutritive values% of experimental rations fed by rams.

Items	Ration A (control)	B Ration	C Ration	Ration D
Dry matter intake, 1st stage (1st cut)				
CFM (Kg/h/d)	1.07	0.52	0.51	0.52
RS (Kg/h/d)	0.61	-	-	-
Forages (Kg/h/d)	-	0.34	0.53	0.58
Total (Kg/h/d)	1.68^{a}	0.86^{c}	1.04^{b}	1.09^{b}
Total DM intake,(% LBW)	4.04^{a}	2.11^{c}	2.64^{b}	2.73^{b}
DM intake,(g / kg W $^{0.75}$)	102.53^{a}	53.21^{c}	65.80^{b}	68.79^{b}
Dry matter intake, 2nd stage (2nd cut)				
CFM (Kg/h/d)	1.12	0.53	0.49	0.51
RS (Kg/h/d)	0.52	-	-	-
Forages (Kg/h/d)	-	0.44	0.64	0.56
Total (Kg/h/d)	1.64^{a}	0.97^{c}	1.13^{b}	1.07^{bc}
Total DM intake, (%LBW)	3.53^{a}	2.31^{c}	2.98^{ab}	2.73^{bc}
DM intake, (kg / kg W $^{0.75}$)	92.10^{a}	58.69^{c}	73.70^{b}	68.33^{b}
Digestion coefficients%, 1st stage(1st cut)				
DM	58.32^{a}	59.34^{a}	58.62^{a}	62.68^{a}
OM	64.86^{a}	66.82^{a}	64.23^{a}	69.96^{a}
CP	72.27^{a}	80.35^{a}	75.68^{a}	78.02^{a}
CF	46.87^{ab}	30.10^{b}	51.91^{a}	59.01^{a}
EE	83.54^{a}	63.15^{b}	75.93^{ab}	74.23^{ab}
NFE	67.94^{a}	72.60^{a}	64.99^{a}	71.70^{a}
Digestion coefficients%, 2nd stage (2nd cut)				
DM	61.14^{a}	60.49^{a}	56.81^{a}	64.76^{a}
OM	66.89^{a}	67.96^{a}	62.42^{a}	69.62^{a}
CP	77.03^{a}	77.61^{a}	73.60^{a}	78.06^{a}
CF	50.43^{a}	49.54^{a}	51.93^{a}	62.82^{a}
EE	88.60^{a}	81.25^{ab}	71.42^{c}	73.32^{bc}
NFE	68.45^{a}	69.82^{a}	63.10^{a}	69.80^{a}
Nutritive values %, 1st stage (1st cut)				
TDN	60.33^{a}	63.05^{a}	61.68^{a}	65.60^{a}
DCP	9.22^{c}	14.62^{a}	11.89^{b}	12.94^{b}
Nutritive values%, 2nd stage(2nd cut)				
TDN	62.47^{a}	64.90^{a}	59.91^{a}	65.20^{a}
DCP	10.26^{c}	13.24^{a}	10.95^{bc}	11.51^{b}

$^{a,\ b\ and\ c}$ means in the same row with different superscripts are significantly different (P<0.05).

Ruminal parameters: Ruminal parameters are presented in Table (3).

Ruminal pH values: The maximum pH values were recorded at 0 hr (before feeding) with all groups then significantly decreased with advanced time (2 and 4 hrs) post feeding in all treatments. Similar trend was observed by Soliman *et al.* (1997), Haggag *et al.* (2000) and Fathia *et al.* (2008). The pH value of group fed ration B was significantly higher than control and insignificantly higher than other groups at 2 hrs in 1st stage, while the pH of group fed ration C was insignificantly higher than that fed ration D and significantly higher than other groups at 4hrs in the same stage. However, the pH of control was significantly higher than other groups at all times in 2nd stage, while the differences among other groups were not significant. However, the obtained pH values after feeding ranged from 5.88 to 6.45. These values are within the normal ranges for normally functions in rumen (5.5 to 7.3) as recorded by Hungate (1966).

Ammonia-N (NH_3-N): The NH_3-N was significantly higher post feeding than before feeding. The same trend was showed by Soliman *et al.* (1997), Haggag *et al.* (2000) and Fathia *et al.* (2008). the differences among all groups at 2 hrs after feeding were not significant. The NH_3-N of control was significantly higher than other groups at 4hrs, while the differences among other groups were not significant at the same time.

Nearly similar values of NH_3-N of Sesbania + Tosinte + CFM were showed by Soliman *et al.* (1997) and with Sesbania-Sudan grass mixture + CFM which showed by Fathia *et al*. (2008). generally, ammonia level depends on CP in the rations and degradability degree of CP in the rumen.

Table (3): Rumen fluid parameters of rams fed on experimental rations fed by rams.

Rumen fluid parameters	Stages	hrs.post feeding	Experimental rations			
			Ration A (control)	Ration B	Ration C	Ration D
pH	stage 1st	0	7.18^{Aa}	7.46^{Aa}	7.44^{Aa}	7.39^{Aa}
		2	6.37^{Bb}	6.71^{Ba}	6.51^{Bab}	6.48^{Bab}
		4	6.28^{Bb}	6.38^{Cb}	6.68^{Ba}	6.51^{Bab}
	2nd stage	0	7.18^{Aa}	6.83^{Ab}	6.82^{Ab}	6.86^{Aab}
		2	6.45^{Ba}	5.96^{Bb}	5.88^{Bb}	5.95^{Bb}
		4	6.30^{Ba}	6.07^{Bb}	6.11^{Bab}	5.99^{Bb}
Ammonia-N (mg/100 ml rumen fluid)	stage 1st	0	19.04^{Ba}	13.49^{Cb}	13.67^{Bb}	12.46^{Cb}
		2	33.37^{Aa}	29.07^{Aa}	26.37^{Aa}	31.87^{Aa}
		4	34.58^{Aa}	23.43^{Bb}	23.38^{Ab}	25.90^{Bb}
	2nd stage	0	16.94^{Bb}	17.50^{Bb}	23.47^{Ba}	18.99^{C}
		2	31.26^{Aa}	29.87^{Aa}	33.18^{Aa}	32.15^{Ba}
		4	34.39^{Aa}	27.53^{Ab}	29.03^{Ab}	29.71^{Ab}
T VFA's (meq/100ml rumen fluid)	stage 1st	0	4.25^{Ba}	4.20^{Ba}	4.35^{Ba}	4.60^{Ba}
		2	5.92^{Aa}	5.90^{Aa}	5.63^{Aa}	6.40^{Aa}
		4	5.52^{Aa}	6.20^{Aa}	6.17^{Aa}	6.50^{Aa}
	2nd stage	0	4.13^{Ba}	4.63^{Ba}	4.17^{Ba}	4.20^{Ba}
		2	5.73^{Ab}	6.70^{Aab}	7.00^{Aa}	6.33^{Aab}
		4	5.52^{Ab}	6.03^{Aab}	6.12^{Aab}	6.72^{Aa}
Number of protozoa (10^6 /ml rumen fluid)	stage 1st	0	0.61^{Bbc}	0.93^{Aa}	0.55^{Bc}	0.79^{Bab}
		2	1.70^{Aa}	1.29^{Aab}	0.90^{ABb}	1.12^{ABb}
		4	1.91^{Aa}	1.66^{Aa}	1.29^{Aa}	1.43^{Aa}
	2nd stage	0	0.55^{Bb}	0.78^{Ba}	0.64^{Bab}	0.82^{Ba}
		2	2.13^{Aa}	1.55^{Aa}	1.66^{Aa}	1.71^{Aa}
		4	2.22^{Aa}	1.53^{Aa}	1.72^{Aa}	1.55^{Aa}
Microbial protein(g/100ml rumen fluid)	1st stage	4	0.50^{a}	0.61^{a}	0.62^{a}	0.60^{a}
	2nd stage	4	0.55^{a}	0.55^{a}	0.45^{b}	0.50^{ab}

A,B and C means in the same column with different superscripts are significantly different ($P<0.05$).
ab and c means in the same rows with different superscripts are significantly different ($P<0.05$).
The rams in 1st stage which fed green forage were fed 1st cut.
The rams in 2nd stage which fed green forage were fed 2nd cut.

Total volatile fatty acids (TVFA's): The lowest total VFA's was recorded at 0 hr, then significantly increased at 2hrs and 4 hrs post feeding, and the differences of TVFA's at 0 hr among treatments were not significant. The differences among treatments at 2 and 4 hrs post feeding were not significant in 1st stage. The TVFA's of group fed ration C (2nd stage) was significantly higher than control and insignificantly higher than other groups at 2 hrs, while group fed ration D (2nd stage) was significantly higher than control and insignificantly higher than other groups at 4 hrs. The values of TVFA's in this study are lower than that obtained by Soliman *et al.* (1997), Haggag *et al.* (2000) and Fathia *et al.* (2008) in goats.

Total number of protozoa: The minimum number of protozoa were showed at 0 hr with all groups then significantly increased with advanced time at 2 and 4 hrs post feeding. The total number of protozoa of control was insignificantly higher than ration B and significantly higher than other rations (1st stage) at 2 hrs, while the differences at 4 hrs were not significant among all rations. The differences among all rations in 2nd stage were not significant. Generally, the number of protozoa in all rations was very high which might indicate that all rations were good balanced as reported by Hungate (1966). He reported that the number of protozoa was higher with good balanced rations than poor rations.

Microbial protein: The results indicated that similar values of microbial protein of all rations with not significant differences except the ration C (2nd stage) was insignificantly lower than ration D and significantly lower than other rations. Similar results were obtained by Soliman *et al.* (1997) and Fathia *et al.* (2008) by goats.

Growth performance of growing lambs:

Feed intake of lambs: The estimated concentrate feed mixture intake of control lambs were nearly duplicated the CFM intake of other treatments according NRC (1985). The average forages intake of rations B, C and D were nearly similar (Table4). The total DM intake of control was higher than other groups, while the DM intake of other groups was nearly similar. These results in harmony with those obtained by Reedm *et al.* (1990), Soliman *et al.* (1997), Abd El-Hamid *et al (*2008), Ahmed *et al.* (2009) in Sesbania forage and Fathia *et al.* (2012) in Sesbania silage. The TDN intake of lambs fed control ration was relatively higher than that fed other rations, and the values of TDN intake of other rations were nearly similar. The DCP intake by lambs fed ration B was relatively higher than other rations, may be due to the high percent DCP of Sesbania. Fathia *et al.* (2012) found that TDN intake of lambs from CFM + Sesbania silage and CFM + silage of Sesbania-Millet x Napier hybrid was 607 and 658 gm/h/d.

Body weight gain: Live body weights of initial experiment of four groups were nearly equal. Final body weights of experiment in all treatments were nearly similar and the differences among four groups were not significant. Daily body gain (DBG) were 156.1, 150.3, 154 and 154.8 gm/h/d for lamb groups which fed control, ration B, ration C and ration D, respectively, and the differences of DBG among four groups were not significant as shown in Table (4).

Similar values were obtained by Abd El-Hamid *et al* (2008) and Ahmed *et al.* (2009) of lambs fed CFM + Sesbania-Sudan grass mixture and was higher than Fathia *et al.* (2012) with lambs fed on CFM + silage containing Sesbania or Sesbania- Millet x Napier hybrid.

Feed conversion: The best feed conversion as Kg DM/Kg gain were recorded with ration D and the bad feed conversion recorded with control as shown in Table4. Feed conversion in this study was nearly similar with that obtained by Soliman *et al.* (1997) in ration containing Sesbania + Teosinte + CFM, Abd El-Hamid *et al* (2008) in Sesbania-Sudan grass mixture + CFM and Fathia *et al.* (2012) in silage Sesbania- Millet x Napier hybrid + CFM and Sesbania silage + CFM.

Feed cost and economical efficiency: The highest cost value of feed consumption (LE/h/d) was recorded with control and the lowest cost of feed consumption was recorded with rations C and D as shown in Table (4). The feed cost/kg weight gain take the same trend of cost feed consumption. The best economical efficiency was showed in ration D, and the bad economical efficiency was recorded with control.

Yield and cost of green forages: The obtained results in Table (5) indicated that the green forage yield (1st cut + 2nd cut) of Sesbania pure (10.85 ton/feddan) was lower than Sesbania-Sorghum mixture (15.31 ton/feddan) and Sesbania-Millet mixture (15.30 ton/feddan). The same trend was observed with dry matter yield (2.22, 3.32 and 3.34 ton/feddan, respectively). The same trend was obtained in yield of CP, TDN and DCP. The yield obtained in this study was higher than the Sesbania yield obtained by Soliman *et al*. (1997), and was lower than Sesbania yield obtained by El-Nahrawy and Soliman (1998) and Haggag *et al.* (2000). However, the yield of green forage is affected by different factors as cultivation regions of plants, kinds, varieties, number of cuts, soil fertility and agricultural processes (as irrigation, fertilization…etc.). The total cost/ton of Sesbania was higher than Sesbania-Sorghum mixture or Sesbania-Millet mixture as shown in Table (5).

CONCLUSION

It could be concluded that the rations contained 50% CFM + Sesbania- Sorghum mixture or Sesbania-Millet mixture were better than control and group fed 50% CFM + Sesbania pure and the best ration which contained 50% CFM + Sesbania-Millet mixture. Therefore, this mixture could cultivated in new reclaimed sandy soil in summer season then utilization in feeding of growing lambs and consequently reduce the high price of feed.

Table (4): Intake, body gain, feed conversion and economical efficiency of lambs fed experimental rations.

Items	Ration A (control)	B Ration	C Ration	Ration D
No. of animals	6	6	6	6
Initial weight (Kg)	22.19[a]±1.01	22.50[a]±1.20	22.92[a]±1.39	22.83[a]±1.13
Final weight (Kg)	39.67[a]±2.04	39.33[a]±1.71	40.17[a]±1.72	40.17[a]±1.25
Dry matter intake, 1st stage (0-8 weeks)				
CFM (Kg/h/d)	0.907	0.460	0.461	0.459
RS (Kg/h/d)	0.328	-	-	-
Forages (Kg/h/d)	-	0.532	0.584	0.585
Total (Kg/h/d)	1.234	0.992	1.045	1.044
Total DM intake,(% LBW)	4.73	3.79	3.92	3.91
DM intake,(g / kg $W^{0.75}$)	107	86	89	89
Dry matter intake, 2nd stage (8-16 weeks)				
CFM (Kg/h/d)	1.162	0.479	0.480	0.479
RS (Kg/h/d)	0.467	-	-	-
Forages (Kg/h/d)	-	0.794	0.813	0.804
Total (Kg/h/d)	1.629	1.273	1.293	1.283
Total DM intake, (%LBW)	4.79	3.68	3.67	3.63
DM intake, (kg / kg $W^{0.75}$)	116	89	89	88
Feed units intakes, 1st stage (0-8 weeks)				
TDN intake, Kg/h/d	0.74	0.63	0.64	0.68
DCP intake, g/h/d	113	145	124	135
Feed units intakes, 2nd stage (8-16 weeks)				
TDN intake, Kg/h/d	1.04	0.83	0.77	0.84
DCP, intake g/h/d	171	169	142	148
Average body gain				
Total body gain, Kg/h/d(1st stage)	7.73	7.33	7.42	7.75
Daily body gain, gm/h/d(1st stage)	138.0	130.9	132.5	138.4
Total body gain, Kg/h/d(2nd stage)	9.75	9.50	9.83	9.59
Daily body gain, gm/h/d(2nd stage)	174.1	169.6	175.5	171.3
Total body gain, kg/h/d	17.48	16.83	17.25	17.34
Average daily body gain, gm/h/d	156.1	150.3	154.0	154.8
Average feed conversion (0-16 weeks)				
Kg DM/Kg gain	9.3	7.54	7.63	7.52
Feed cost and economical efficiency (0-16 weeks)				
Total feed cost (LE/h/d)	2.86	1.75	1.60	1.60
Price weight gain LE/h/d)	5.46	5.26	5.39	5.42
Economical efficiency	1.91	3.01	3.35	3.39

The lambs in 1st stage which fed green forage were fed 1st cut.
The lambs in 2nd stage which fed green forage were fed 2nd cut.

Table (5): Yield and cost of Sesbania pure, Sesbania-sorghum mixture and Sesbania-Millet mixture which cultivated in reclaimed sandy soil.

Items	Sesbania pure			Sesbania-Sorghum mix.			Sesbania - Millet mix.		
	1st cut	2nd cut	Total	1st cut	2nd cut	Total	1st cut	2nd cut	Total
Yield (ton/feddan)									
Green forage yield	6.20	4.65	10.85	8.75	6.56	15.31	8.74	6.56	15.30
Dry yield	1.19	1.03	2.22	1.79	1.53	3.32	1.84	1.50	3.34
CP yield	0.231	0.172	0.403	0.253	0.198	0.451	0.292	0.186	0.478
TDN yield	0.750	0.669	1.419	1.104	0.917	2.021	1.207	0.978	2.185
DCP yield	0.174	0.136	0.310	0.213	0.168	0.381	0.238	0.173	0.411
Total cost, LE/ton									
green forages	-	-	160	-	-	114	-	-	114
Dry matter	-	-	784	-	-	524	-	-	521
Crude protein	-	-	4318	-	-	3858	-	-	3640
TDN	-	-	1226	-	-	861	-	-	796
DCP	-	-	5613	-	-	4567	-	-	4233

Total cost/feddan were 1740 LE in summer season included rent value, seeds and other cultivated practices

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تأثير إستخدام نبات السيسبان ومخاليطة مع بعض النجيليات على الأداء الإنتاجي للحملان في الأراضي الجديدة المستصلحة

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أجريت هذه الدراسة بهدف تقييم زراعة بعض الأعلاف الصيفية الخضراء وهى السيسبان والمخاليط من السيسبان والسورجم والسيسبان والدخن في تربة رملية مستصلحة .وقد زرعت هذه الأعلاف الخضراء في ثلاث معاملات حقلية:
المعاملة الأولى :زرعت بذور السيسبان بمفردها
المعاملة الثانية :زرعت بذور السيسبان مع بذور السورجم كمخلوط بنسبة (1:1)
المعاملة الثالثة :زرعت بذور السيسبان مع بذور الدخن كمخلوط بنسبة (1:1)
وذلك لاستخدامها في تغذية الأغنام في الحالة الطازجة .كما تم تقدير إنتاجية الفدان من السيسبان ومخاليطه.
وقد استخدمت أربعة علائق تجريبية على النحو التالي:
العليقة أ (كنترول) 100% : علف مركز وفقا لمتطلبات البروتين الخام ل NRC 1985+قش أرز للشبع.
العليقة ب 50% :علف مركز من متطلبات البروتين الخام ل NRC 1985+السيسبان للشبع.
العليقة ج 50% :علف مركز من متطلبات البروتين الخام ل NRC 1985+مخلوط السيسبان والسورجمبنسبة (1:1)للشبع.
العليقة د 50%:علف مركز من متطلبات البروتين الخام ل NRC 1985+مخلوط السيسبان والدخن بنسبة (1:1)للشبع.
وقد أجريت 4 تجارب هضم لتقييم العلائق التجريبية باستخدام 12 كبش (3) في كل مجموعة بمتوسط وزن 40كجم وتم أخذ العينات للتحليل الكيميائي كما تم أخذ عينات من سائل الكرش لتقدير مقاييس نواتج تخمرات الكرش .وتم إجراء تجارب نمو على نفس العلائق التجريبية الأربعة حيث تم استخدام 24 حمل نامي بمتوسط وزن 22,5كجم في 4 مجاميع 6) في كل مجموعة.(وذلك لتقدير المأكول وتقدير العائد اليومي من وزن الجسم ومعدل التحويل الغذائي والكفاءة الاقتصادية للعلائق التجريبية .وقد استغرقت تجربة النمو 16 أسبوع على مرحلتين كل مرحلة 8 أسابيع، وقد استخدمت الحشة الأولى من الأعلاف الخضراء في المرحلة الأولى واستخدمت الحشة الثانية في المرحلة الثانية .وأشارت النتائج التي تم الحصول عليها إلى الآتي:
كانت نسبة المادة الجافة في السيسبان 19,12% في الحشة الأولى و 22,21% في الحشة الثانية وفى مخلوط السيسبان والسورجم كانت 20,46% في الحشة الأولى 23,27% في الحشة الثانية وفى مخلوط السيسبان والدخن 21,02% في الحشة الأولى و 22,89% في الحشة الثانية، وكانت نسبة البروتين الخام في السيسبان 19,3% في الحشة الأولى و 16,65% في الحشة الثانية وفى مخلوط السيسبان والسورجم كانت 14,11% في الحشة الأولى و 12,94% في الحشة الثانية وفى مخلوط السيسبان والدخن كانت 15,87% في الحشة الأولى و 12,37% في الحشة الثانية.
كانت الفروق في معاملات هضم المادة الجافة والمادة العضوية والبروتين الخام والمستخلص الخالي من الازوت وكذلك المركبات الكلية المهضومة غير معنوية .بينما كانت النسبة المئوية للبروتين الخام المهضوم في العليقة ب أعلى معنويا من العلائق التجريبية الأخرى. أظهرت دراسات الكرش أن pH في المرحلة الثانية كان مرتفعا معنويا في الكنترول عن باقي العلائق عند جميع الأوقات وكانت امونيا الكرش عند 4 ساعات مرتفعة معنويا في الكنترول عن باقي العلائق والتي لم يكن بينها فروق معنوية عند نفس الميعاد. وكانت الفروق في مجموع الأحماض الدهنية الطيارة بين المعاملات في المرحلة الأولى غير معنوية ,وفى المرحلة الثانية كانت مجموع الأحماض الدهنية الطيارة في العليقة ج مرتفعا معنويا عن الكنترول عند الساعة الثانية بينما كان في العليقة د مرتفعا معنويا عن الكنترول عند الساعة الرابعة .كما كانت الاختلافات في العدد الإجمالي للبروتوزوا غير معنوية عند 4ساعات كما كانت الاختلافات في البروتين الميكروبي غير معنوية في المرحلة الأولى.
وأظهرت النتائج أن الأوزان النهائية للمعاملات الأربعة كانت متقاربة وليس بينها اختلافات معنوية .وكانت الزيادة في معدل النمو اليومي في وزن الجسم متقاربة وليس بينها اختلافات معنوية وكان معدل النمو اليومي في عليقة الكونترول 156,1جم والعليقة ب 150,3جم والعليقة ج 154جم والعليقة د 154,8جم للرأس في اليوم .وكان معدل التحويل الغذائي أفضل في الحملان المغذاة على العليقة د عن باقي العلائق .وقد سجلت أعلى تكلفة للغذاء لعليقة الكنترول وسجلت أقل تكلفة للغذاء لكل من العليقة ج و د .وكانت الكفاءة الاقتصادية في العلائق ج و د أفضل من ب ومن الكنترول وكانت العليقة د أفضل نسبيا من العليقة ج.
أظهرت النتائج الحقلية أن إنتاجية العلف الأخضر للحشتين من السيسبان بمفرده 10,85ومخلوط السيسبان والسورجم 15,31 والسيسبان والدخن 15,30طن/فدان على التوالي وفى المادة الجافة كانت 2,22 و 3,32 و 3,34طن/فدان على التوالي .وكانت تكلفة إنتاج الطن من المادة الجافة 784و 524و 521جنيه على التوالي.
ومن النتائج التي تم الحصول عليها يمكن أن نستخلص أن العلائق التي تتكون من 50% من العلف المركز+مخلوط السيسبان والسورجم أو مخلوط السيسبان والدخن كانت أفضل من عليقة الكنترول المحتوية على 100%علف مركز أو تلك المحتوية على 50%من العلف المركز + السيسبان بمفرده وكان مخلوط السيسبان والدخن أفضل نسبيا من مخلوط السيسبان والسورجم لذلك يفضل زراعته في الأراضي الرملية المستصلحة في فصل الصيف واستخدامه في تغذية حملان الأغنام وذلك لتوفير الأعلاف المركزة المرتفعة الثمن.