USING ALTERNATIVE SOURCES OF ROUGHAGES OR CONCENTRATES FOR BARKI EWES FEEDING.

M. A. Hanafy[1]; A. A. Fahmy[2]; M. S. Farghaly [1] and Afaf A. El Sheref[2]

[1]Animal Production Department, Faculty of Agriculture, Cairo University, Egypt.

[2]Animal and Poultry Nutrition Department, Desert Research Center, El-Matareya, Cairo, Egypt.

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SUMMARY

Sixty Barki ewes aged 2-3 years and weighed 40.6 kg BW at late gestation were selected and randomly distributed into four similar groups (15 in each) to determine the effect of feeding untraditional rations containing *Kochia indica* shrubs and agro-industrial by-products on performance of Barki ewes and their offspring. The first group (R1) fed clover hay plus traditional concentrate feed mixture (TCFM) which consists of 20% undecorticated cotton seed cake, 16% linseed cake, 29% yellow corn grains, 30%wheat bran, 2% molasses, 1% limestone, 1% salt and 1% premix whereas the second group (R2) fed clover hay plus untraditional concentrate feed mixture (UCFM) which consists of 45% radicell, 30% ground date seeds, 20% olive pulp, 2% molasses, 1% limestone, 1% salt and 1% premix. The third group (R3) fed kochia silage plus TCFM while the fourth group (R4) fed kochia silage plus UCFM. Concentrate feed mixture was given to animals to cover 60% of their energy maintenance and production requirements while roughage (clover hay or kochia silage) was offered *ad lib.* A dairy trial lasted for 5 months (two months at late gestation followed by three months at lactation period). At late of lactation period, twelve ewes were chosen to evaluate the experimental rations through a digestibility trial. The selected ewes distributed into four similar groups (3 in each) and fed the same experimental rations. Data showed that dry matter (DM) intake from roughage in kochia silage rations was ($P<0.05$) lower by 50% than that in clover hay rations. Total digestible nutrients (TDN %) was significantly declined by 22 units as affected by UCFM utilization in clover hay rations. The same trend of TDN% was showed in kochia silage rations. In respect of digestible crude protein (DCP %), the utilization of kochia rations for ewes was significantly decreased compared to clover hay rations regardless the concentrate type effect. Total milk yield was significantly affected by the concentrate type and decreased by 9% for ewes fed UCFM compared to those fed TCFM. Ewe's lambs which fed clover hay with TCFM significantly surpassed those fed kochia silage with UCFM in weaning weights and average daily gain by 50% and 61%, respectively. Blood minerals concentration was in the normal range and showed no adverse effect of different dietary treatments on ewe's health. It could be concluded that untraditional rations either consists of kochia silage with TCFM or clover hay with UCFM is might be recommended for lactating ewes feeding without any adverse effects on their body weight, total milk yield, birth and weaning weights of their lambs and blood minerals concentration compared to the traditional rations (clover hay with TCFM).

Keywords: *kochia indica, olive pulp, date seeds, radicell, nutritive value, ewes, milk yield and composition.*

INTRODUCTION

Kochia is an annual bush that belongs to the family *Chenopodiaceae*. This plant is identified as drought resistant and salt tolerant bushes besides being rich in nutritive value (Zahran, 1986; Ashour *et al.*, 1994; Abd El-Hameed, 2003 and El-Shereef, 2007). Kochia is richly branched herb under favorable conditions with relatively high biomass in Sinai Peninsula, Nubaria desert and North Western Coast of Egypt (Abd El-Rahman, 2003). Otherwise, there are an interest of using some agro-industrial by products as radicell which produced in beer industry, olive pulp which produced from oil extraction and date seeds which produced from date packing process (Younan *et al.*, 2005). These agricultural by-products represent the majority occurring in the Egyptian desert. When agro-industrial by products have been used in lambs fattening, the cost of producing one Kg of gain was significantly lower than that fed conventional rations (Khamis *et al.*, 1989 ; Sooud *et al.*, 1989 ; Eid, 1998 ; Fahmy, 1998 ; Khattab *et al.*, 1999 and Youssef *et al.*, 2001).

This study aimed to investigate the effect of using kochia silage and / or agro-industrial by-products as alternative resources of roughage or concentrate the productive performance of ewes and their offspring.

MATERIALS AND METHODS

The present study was conducted at Maryout Research Station, 35 Km South of Alexandria that belong to Desert Research Center, Ministry of Agriculture and Land Reclamation, Egypt.

Rations preparation

Six ton of *Kochia indica* plants which naturally grown in Nubaria and Maryout desert were collected during May and June at midbloom stage. Fresh edible parts from stem and leaves were mechanically chopped then mixed with 10% molasses on their fresh basis. Ensiling was done in 6 pits (2.0 ×1.0 ×1.5 meter length, width and height) containing one ton/ pit. The chopped kochia mixture was filled in layers, stacked by trampling and finally covered with plastic sheet and a 30 cm layer of sand was putted to insure anaerobic conditions.

The traditional concentrate feed mixture (TCFM) consisted of 20% undecorticated cotton seed cake, 16% linseed cake, 29% yellow corn grains, 30%wheat bran, 2% molasses, 1% limestone, 1% salt and 1% premix. Meanwhile, the untraditional concentrate feed mixture (UCFM) consisted of 45% radicell, 30% ground date seeds, 20% olive pulp, 2% molasses, 1% limestone, 1% salt and 1% premix. The ingredients of TCFM and UCFM were formulated to be iso nitrogenous.

Dairy feeding trial

Sixty pregnant Barki ewes aged 2-3 years were selected after 3 months of gestation and randomly distributed into four groups (15 in each). The initial live body weights were 41.3±0.36 ; 40.0±0.29 ; 40.2±0.02 and 40.08±0.260 kg BW for the 1st ; 2nd ; 3rd and 4th groups, respectively. Ewes were fed the following experimental rations:

Ration 1 : Clover hay + TCFM

Ration 2: Clover hay + UCFM

Ration 3: Kochia silage + TCFM

Ration 4: Kochia silage + UCFM

Concentrate feed mixtures (TCFM or UCFM) were fed to cover 60% of energy maintenance and production requirements of ewes according to Kearl (1982) while roughages (clover hay or kochia silage) were offered *ad lib.* Ewes were fed with the dietary treatments for 2 months before the lambing date and continued until the end of lactation which lasted for 3 months.

Daily feed offered and refusals were weighed for each group of animals to estimate the actual feed intake. The rations were adjusted every two weeks according to the changes in live body weight. Drinking water was available all the day. After kidding, weight of lambs was recorded at birth then every week up to weaning age (after 3 months of parturition). Milk yield was recorded weekly for all ewes after parturition till the end of the first month then biweekly using hand milking. For measuring daily milk yield, lambs were separated from ewes at 8 am to 8 pm for recording milk yield for 12 hours, and then lambs returned to ewes. In the second day, the same procedure was done, but from 8 pm to 8 am to estimate the total milk yield per 24 hours. Milk samples taken from 4 animals of each group at the first, second and third month during lactation season (12 weeks) for chemical analysis. Blood samples were taken from 4 animals in each group during pregnancy and lactating periods.

Digestibility trial

At the end of lactation period, three Barki ewes were randomly chosen from each group to evaluate the experimental rations through a digestibility trial. The initial live body weights were 39.3; 38.3; 38.7 and 39.0 ±0.271kg for 1st; 2nd; 3rd and 4th groups, respectively. Animals were kept in metabolic cages for 7 days as an adaptation period followed by 7 days as a collection period in shaded pens to avoid water loss during collecting urine and feces.

Daily feed offered and refused were weighed if any to estimate the actual feed intake. Water was available free choice during the experiment. Water intake was calculated by summation total of drinking

water; feed moisture and metabolic water.

Total feces and urine excretion were recorded daily. Representative samples of feces about 5% of the total fresh feces weight, were taken daily and few drops of sulfuric acid were added to avoid N loss. While urine was allowed to drain into bottles containing 5 ml of sulfuric acid and a slight amount of thymol granules was added to prevent N loss and undesired fermentations. At the end of collection period, feces sample of each animal were mixed and ground. The volume of urine was recorded daily and urine samples represent 10% of total urine for each animal were kept. Samples of feed offered and refused; feces and urine were taken and stored for the proximate analysis.

Chemical analysis

Lactic acid in kochia silage were determined by steam distillation method according to Warner (1964). Ammonia N% in silage samples was determined according to Van Soest and Robertson (1982). Dry matter (DM), crude protein (CP), crude fiber (CF), ether extract (EE) and ash of feed ingredients and feces were determined according to AOAC (2000). Urinary nitrogen were determined according to AOAC (2000). Milk protein; total solids and ash were determined according to Ling (1963). Fat in milk was determined by using Gerber tube according to British Standard Institution (1951). Lactose was calculated by difference. Sodium and potassium concentrations in blood serum were determined using flame photometer while calcium was determined by spectrophotometer (Gindler and King, 1972). Phosphorus and magnesium in serum was determined by spectrophotometer according to El-Merzabani *et al.* (1977) and Teitz (1983).

Statistical analysis

Results of both dairy feeding and digestibility trials were subjected to two way analysis of variance (Factorial) according to SAS (2000).

$$Y_{ijk} = \mu + C_i + P_j + (TP)_{ij} + e_{ijk}$$

Y: every observation of k animal treated with i treatment in j period, μ : overall mean, C: concentrate , effect, P : roughage effect , e : experimental error

Duncan's Multiple Range Test (Duncan,1955) was used to compare the differences among the experimental groups.

RESULTS AND DISCUSSION

Chemical composition of feed ingredients and experimental rations

Chemical composition of feed ingredients, experimental rations are shown in Table (1). Kochia silage had higher contents of ash and nitrogen free extract but lower dry matter, crude protein, crude fiber and ether extract compared with clover hay. Data of fermentative traits (Table 2) indicated a good quality of kochia silage. The results of chemical composition particularly crude fiber and ash content of kochia silage in the present study were similar to those obtained by Shehata *et al.* (2001) and Fahmy (2010).

On the other hand, radicell showed the highest values of CP and moderate amount of CF, NFE and ash while olive pulp had the highest values of CF, EE and ash compared to the other ingredients. These results were similar to those found by Youssef and Fayed (2001) and Abdou (2003).

Dry matter (DM), crude protein (CP) and ether extract (EE) in the traditional concentrate feed mixture (TCFM) were almost similar to those in untraditional concentrate feed mixture (UCFM). Ration 2 (R2) which consisted of clover hay plus untraditional concentrate feed mixture attained the highest content of crude fiber (25.4%) and the lowest contents of ash (8.3%) compared to the other rations. Whereas crude protein and ether extract were nearly similar in all experimental rations.

Feed intake; nutrient digestibility and nutritive values of experimental rations

Dry matter intake, nutrients digestibility, nutritive values and digested nutrients intake are illustrated in Table (3). The untraditional concentrate feed mixture (UCFM) utilization instead of the traditional one (TCFM) in clover hay rations did not significantly affect on the feed consumption of roughages and recorded similar values (10.9 vs. 9.83 g/ kg BW) . The same trend was showed for kochia silage rations (5.15 vs. 4.88 g/ kg BW). Regardless the concentrate type effect, roughage intake in kochia silage ration significantly approximately 50% lower than the intake in clover hay ration. Regardless the roughage type

effect, the utilization of UCFM instead of TCFM did not significantly affect on feed intake. These results are in harmony with the findings of Fahmy (2010) when used kochia silage plus untraditional concentrate feed mixture for lambs fattening.

Table (1): Chemical composition of feed ingredients and experimental rations.

Item	Chemical composition as % on dry matter basis						
	DM	CP	CF	EE	NFE	Ash	OM
Clover hay (Berseem hay)	88.0	13.8	30.4	3.1	38.8	13.9	86.1
Kochia indica silage	45.0	11.8	27.0	2.6	41.6	17.0	83.0
Radicell	93.5	23.8	16.1	1.1	46.9	12.1	87.9
Date seeds	97.6	9.7	11.5	1.2	69.4	8.2	91.8
Olive pulp	88.6	8.5	36.8	4.8	36.1	13.8	86.2
TCFM	90.4	15.7	8.3	2.1	66.4	7.5	92.5
UCFM	89.5	15.32	18.0	1.8	54.18	10.7	89.3
	89.14	14.7	19.7	2.6	52.02	10.87	89.13
Ration1 (R1)	88.55	14.2	25.4	2.5	45.2	8.3	91.7
Ration2 (R2)	72.3	14.4	14.7	2.2	57.8	10.7	89.3
Ration3 (R3)	66.2	13.7	21.3	2.08	49.9	12.9	87.1
Ration4 (R4)							

R1:clover hay+TCFM , R2:clover hay+UCFM , R3:kochia silage+TCFM , R4:kochia silage+UCFM
TCFM = Traditional concentrate feed mixture
UCFM = Untraditional concentrate feed mixture.

Table (2): Fermentation traits of *kochia indica* silage.

Item	*Kochia indica* silage.
pH value	4.4
Lactic acid, %DM	5.2
Ammonia nitrogen, %DM	0.18

Digestibility coefficients of crude fiber (CF), ether extract (EE) and nitrogen free extract (NFE) significantly varied among the experimental rations. The incorporation of UCFM in clover hay ration resulted in a decrease ($P<0.05$) in CF, EE and NFE digestibility coefficients compared with those in the control ration which consisted of clover hay plus TCFM. Regardless the concentrate type (TCFM or UCFM) effect, digestibility coefficients of all nutrients in clover hay rations was higher than those in kochia silage rations. These results are similar to those obtained by Ahmed *et al.* (2001) that all nutrients digestibility was significantly decreased for goat fed kochia silage instead of Teosinte silage rations. While the utilization of the untraditional concentrate feed mixture (UCFM) instead of the traditional one (TCFM) resulted in a significantly decrease in digestibility coefficients of CF and EE regardless the roughage type effect.

Total digestible nutrients (TDN %) was significantly declined by 22 units as affected by UCFM utilization in clover hay rations. The same trend was detected in kochia silage rations. The untraditional concentrate feed mixture utilization for ewes feeding significantly decreased TDN% by 20 units compared to TCFM regardless the roughage type effect. No significant effects of roughage type on TDN% regardless the concentrate type effect was detected.

Digestible crude protein concentration (DCP %) of ration consisted of kochia silage plus UCFM significantly decreased by 3.1 units compared to that of ration consisted of clover hay plus TCFM. As an overall mean effect, kochia rations significantly decreased DCP% compared to clover hay rations

Table (3) : Feed intake, nutrients digestibility coefficients, nutritive values and digested nutrients intake of ewes during the digestibility trial.

Item	Experimental rations				An overall mean effect				±SE
	Clover hay		Kochia silage						
	TCFM	UCFM	TCFM	UCFM	Clover hay	Kochia silage	TCFM	UCFM	
No. of animals	3	3	3	3	6	6	6	6	0.00
Body weight of ewes, kg/h	39.3	38.3	39.0	38.7	38.8	38.85	39.0	38.6	0.271
Dry matter intake, g/ kg BW									
Roughage	9.83^{a}	10.9^{a}	4.88^{b}	5.15^{b}	10.34^{a}	5.02^{b}	7.36	8.025	0.842
Concentrate	9.05	9.00	9.29	9.26	9.03	9.28	9.17	9.13	0.438
Total	18.88^{ab}	19.9^{a}	14.17^{b}	14.41^{b}	19.37^{a}	14.3^{b}	16.53	17.16	0.854
Digestibility coefficients,%									
DM	66.1	61.7	52.4	47.9	63.9	50.2	59.25	54.8	3.48
CP	71.7	63.1	66	57.6	67.4	60.3	68.85	58.85	2.89
CF	64.6^{a}	35.9^{b}	60.7^{a}	39.2^{b}	50.3	49.9	62.65^{a}	37.55^{b}	4.11
EE	83.3^{a}	55.8^{b}	68.4^{ab}	64.5^{b}	69.6	66.5	75.85^{a}	60.15^{b}	3.67
NFE	80^{a}	59.7^{b}	64.2^{b}	50.2^{b}	69.9^{a}	57.2^{b}	72.1	54.95	3.70
Nutritive values, %									
TDN	70.9^{a}	48.3^{c}	61^{b}	43.9^{c}	59.47	52.5	65.95^{a}	45.9^{b}	3.57
DCP	10.6^{a}	8.92^{ab}	9.47^{ab}	7.49^{b}	9.78^{a}	8.48^{b}	10.04	8.23	0.458
Digested nutrients intake, g / kg BW $^{0.75}$									
g TDN / kg BW $^{0.75}$	30.5^{a}	24.2^{ab}	15.7^{c}	19.3^{bc}	27.3^{a}	17.5^{b}	23.1	21.7	1.88
g DCP /kg BW $^{0.75}$	4.99^{a}	4.04^{ab}	2.67^{c}	3.35^{bc}	4.52^{a}	3.01^{b}	3.83	3.70	0.295

a, b and c means having different superscripts within the same row are significantly differed (P<0.05

Table (4): Nitrogen and water balances of ewes during the digestibility trial.

Item	Experimental rations				An overall mean effect				±SE
	Clover hay		Kochia silage		Clover hay	Kochia silage	TCFM	UCFM	
	TCFM	UCFM	TCFM	UCFM					
A) Nitrogen balance									
Nitrogen intake (mg/kg BW)	443^{a}	418^{ab}	324^{bc}	316^{c}	430.5^{a}	320^{b}	383.5	367	20.9
Total nitrogen excretion (mg/ kg BW)	339^{ab}	359^{a}	271^{b}	293^{ab}	349^{a}	282^{b}	305	326	14.8
Total nitrogen excretion % of intake	76.5^{c}	85.9^{ab}	83.4^{bc}	92.8^{a}	81.2^{b}	88.1^{a}	79.95^{a}	89.35^{b}	2.04
Nitrogen balance (mg/ kg BW $^{0.75}$)	104^{a}	59^{b}	53^{b}	23^{c}	81.5^{a}	38^{b}	78.5^{a}	41^{b}	9.53
B) Water balance									
Total water intake (ml/ kg BW)	141^{a}	123^{ab}	123^{ab}	112^{b}	132^{a}	117.5^{b}	132^{a}	127.5^{b}	4.3
Total water excretion (ml/ kg BW)	41.8	44.3	46.9	45.5	43.05	46.2	44.35	44.9	2.27
Total water excretion % of intake	29.6	35.9	38.1	40.6	32.75	39.35	23.85	38.25	2.02
Water balance (ml/ kg BW $^{0.82}$)	99.2^{a}	78.7^{b}	76.1^{b}	66.5^{b}	88.95^{a}	71.3^{b}	87.65^{a}	72.6^{b}	4.44

a, b and c means having different superscripts within the same row are significantly differed (P<0.05).

regardless the concentrate type effect. On the other hand, no significant effect on DCP% was detected due to the concentrate type (TCFM or UCFM).

Total digestible nutrients (TDN) intake expressed as g/kg $BW^{0.75}$ was ($P<0.05$) decreased by 36.7% in kochia silage with TCFM compared to clover hay plus TCFM. The roughage type significantly effected on TDN intake whereas the concentrate type did not affect as an overall mean.

Digestible crude protein (DCP) intake followed the same trend of TDN intake. Data of TDN and DCP intake in the present study are in agreement with the finding of Fahmy (2010) when used kochia silage with the untraditional concentrate feed mixture for fattening lambs. Also the improving of all nutrients digestibility, TDN and DCP intakes as g / kg $BW^{0.75}$ for clover hay plus TCFM compared to kochia silage plus UCFM was agreement with those obtained by Hanafy *et al.* (2007) when studied the effect of kochia hay in feeding dairy goat.

Nitrogen and water balances

Nitrogen and water utilization are summarized in Table (4). Nitrogen intake expressed as mg N/kg BW was significantly differed among the experimental rations. Nitrogen intake of animals fed clover hay with TCFM showed higher values (36.7% and 40.2%) compared to kochia silage rations plus TCFM or UCFM. Clover hay rations regardless the concentrate type effect showed 34.5% higher nitrogen intake compared to kochia silage ration. Nitrogen balance of ewes fed clover hay plus TCFM or UCFM followed the pattern of nitrogen intake. Kochia silage inclusion instead of clover hay resulted a significantly depressing in nitrogen retention by 53.4%. Also, regardless the roughage type effect, the UCFM inclusion in ewes rations resulted a decreasing in nitrogen balance by 47.8% compared to those fed the traditional one. Data of nitrogen balance in this work are in harmony with those obtained by Fahmy and Ibrahim (2005) Youssef *et al.* (2009) and Fahmy (2010) when sheep fed kochia shrubs compared to those fed clover hays plus traditional concentrate feed mixture.

Total water intake (Table 4) for ewes fed clover hay plus TCFM significantly higher than those fed kochia silage plus UCFM. Total water intake was significantly decreased as a result of kochia silage inclusion in rations, regardless the concentrate type effect. The same trend was showed for the UCFM inclusion regardless the roughage type effect without significant differences. The total water excretion of ewes did not significantly differ among the experimental rations. Meanwhile water balance of animals fed the experimental rations ($P<0.05$) varied and showed the higher value for animals fed clover hay plus TCFM followed by those fed clover hay plus UCFM, Kochia silage plus TCFM or UCFM in descending order. Therefore, ewes fed clover hay plus TCFM were more adapted for thermoregulation in the desert than other groups. As an overall effect of roughage type, the inclusion of kochia silage in ewes ration caused significantly depressing in water balance versus those fed clover hay.

Productive performance of ewes

Productive performance of ewes as affected by different rations are illustrated in Table (5). Initial live body weight of ewes fed the experimental rations was nearly similar (41.3, 40.0, 40.2 and 40.08 kg). Whereas the final body weight was slightly varied. The highest value (43.0 Kg) was recorded for animals fed clover hay plus TCFM whereas the lowest value (36.2 Kg) was recorded for their mates fed kochia silage plus UCFM. Generally, body weight of ewes during the experimental period did not affect by type of roughage (clover hay and kochia silage) or concentrate (TCFM and UCFM).

Milk yield and composition

Total milk yield was ranged from 154.6 g/h/d for ewes fed kochia silage plus UCFM to 175.1 g/h/d for ewes fed clover hay plus TCFM (Table 5) without significant differences. Regardless roughage type, total milk yield significantly decreased by nearly 9% for ewes fed UCFM compared to those fed TCFM. No significant differences were detected due to type of roughage. Similar findings were observed by Younan *et al.* (2005) for lactating goats fed agro-industrial by-products (27% date seeds + 27% olive pulp + 19% grape pulp and 27% radicell) with clover hay compared to their mates fed concentrate feed mixture with clover hay.

Milk fat percentage ranged from 5.25% for ewes fed clover hay + TCFM to 5.76% for those fed kochia silage + UCFM. This result agreed with Kassab *et al.* (2009) for lactating ewes fed either treated or untreated canola meal which was replaced 25% of concentrate feed mixture + rice straw. Regardless the type of roughage effect, the untraditional concentrate feed mixture in ewes rations significantly increased milk fat % and milk ash by 8.1% and 5.7%, respectively. Increasing milk fat% may be due to the lower milk yield for ewes fed UCFM rations compared to their mates fed TCFM. Otherwise, clover hay or kochia silage plus UCFM contained higher crude fiber which has positive effect in milk fat yield.

Table (5) : Productive performance of ewes and their offspring as affected by type of rations during the feeding trial.

Item	Experimental rations				An overall mean effect				±SE
	Clover hay		Kochia silage		Clover hay	Kochia silage	TCFM	UCFM	
	TCFM	UCFM	TCFM	UCFM					
A) Ewes									
Body weight of ewes, kg/h									
Initial body weight (After 3 months of pregnancy)	41.3	40.0	40.2	40.08	40.6	40.2	40.8	40.04	0.685
Final body weight (after 3 months of lactating)	43.0	41.3	41.4	36.2	42.1	38.8	42.2	38.8	1.088
Total milk yield, (g/h/d)	175.1	157.6	165.7	154.6	166.4	160.15	170^{a}	156.1^{b}	7.092
Milk composition%									
Total solid	16.41	16.32	16.40	16.36	16.37	16.38	16.41	16.34	0.21
Fat	5.25	5.72	5.36	5.76	5.49	5.56	5.31^{b}	5.74^{a}	0.022
Protein	4.52	4.76	4.56	4.1	4.64	4.33	4.41	4.43	0.30
Ash	0.82^{c}	0.87^{bc}	0.93^{ab}	0.98^{a}	0.85^{b}	0.96^{a}	0.88^{b}	0.93^{a}	0.745
Lactose (calculated)	5.82	4.97	5.55	5.52	5.40	5.54	5.69	5.25	0.847
B) Kids									
Birth weight, kg.	3.62	3.74	3.51	3.17	3.68	3.34	3.57	3.46	0.068
Weaning weight, kg.	16.74^{a}	16.74^{a}	16.39^{a}	8.25^{b}	16.74^{a}	12.32^{b}	16.57^{a}	12.49^{b}	0.472
Average daily gain, g.	145.7^{a}	144.4^{a}	143.1^{a}	56.44^{b}	145.05^{a}	99.77^{b}	144.4^{a}	100.42^{b}	5.92

a, b and c means having different superscripts within the same row are significantly differed (P<0.05).

Table (6) : Minerals concentrations in serum (mg / dl) of ewes fed the experimental rations during late pregnancy and mid-lactation periods in the feeding trial.

Item	Experimental rations				An overall mean effect				±SE
	Clover hay		Kochia silage		Clover hay	Kochia silage	TCFM	UCFM	
	TCFM	UCFM	TCFM	UCFM					
Late pregnancy period									
Na	143.7	143.7	148.3	147.7	144^{b}	148^{a}	146	145.7	0.998
K	4.52	4.42	4.78	5.17	4.47^{b}	4.97^{a}	4.65	4.79	0.127
P	5.31	4.8	4.98	4.79	5.06	4.88	5.14^{a}	4.79^{b}	0.083
Ca	11.3	11.3	9.4	9.74	11.3^{a}	9.57^{b}	10.3	10.5	0.315
Mg	1.10	1.07	1.06	1.03	1.09^{a}	1.04^{b}	1.08	1.05	0.013
Mid lactation period									
Na	140	142	143	143	141	143	141	142.5	0.793
K	4.2^{b}	4.04^{b}	4.35^{b}	4.97^{a}	4.12^{b}	4.66^{a}	4.27	4.5	0.129
P	4.68	4.31	4.74	4.21	4.49	4.47	4.71	4.26	0.109
Ca	10.6^{a}	10.5^{a}	8.72^{b}	9.34^{b}	10.5^{a}	9.03^{b}	9.64	9.92	0.265
Mg	1.07	1.01	1.02	0.96	1.04	0.99	1.04^{a}	0.99^{b}	0.015

a, b and c means having different superscripts within the same row are significantly differed (P<0.05).

This result can be illustrated on the basic stated that fat yield negatively correlated with milk yield (Hanafy *et al.*, 2007 ; Younan *et al.*, 2005 and Abd El-Gawad, 2002).

Regarding milk protein % for all experimental animal groups, results indicated that neither roughage nor concentrate type has affect on milk protein%. However, milk ash % was significantly differed; the highest value (0.98%) was recorded for ewes fed kochia silage + UCFM while the lowest value (0.82%) was recorded for those fed clover hay + TCFM. The overall mean effect showed that the inclusion of either kochia silage or UCFM increased ($P<0.05$) ash %. This result was in harmony with those obtained by Ahmed *et al.* (2001) that milk ash % for goat increased by increasing the level of kochia silage in the ration. Milk lactose percentage did not affect by type of either roughage or concentrate.

Birth and weaning weight of kids

Data cleared that birth weights of lambs recorded comparable values without significant differences, it ranged from 3.17 kg for those fed kochia silage + UCFM to 3.74 kg for those fed clover hay + UCFM. Abu Zanat and Tabbaa (2006) found that dietary treatments which contain TCFM with either barley straw or Atriplex browse had no significant effect on birth weight of Awassi lambs.

Weaning weights and average daily gain of lambs were significantly ($P<0.05$) affected by type of ration. Lambs in the fourth group which fed kochia hay + UCFM detected the lowest values of weaning weights (8.25 kg) and average daily gain (56.44 g) compared to the other groups.

Concerning the overall mean, kochia silage or UCFM in rations had negatively effects on the weaning weights of the experimental lambs groups. The average daily gain of kids followed the same trend of the weaning weight. This result may be due to that their mothers recorded the lowest total milk yield as a result of ration type effect.

Blood parameters

The concentrations of serum sodium (Na), potassium (K), phosphorus (P), calcium (Ca) and magnesium (Mg) in both late pregnancy and lactation periods are given in Table (6). Serum Na, K and P concentrations of ewes fed the four experimental rations were in the normal range during late pregnancy and lactation periods (Puls, 1988).

During late pregnancy period, serum Na, K, P, Ca and Mg levels did not affect by types of ration. While serum Na and K concentrations for ewes fed kochia silage significantly higher compared to their mates fed clover hay, regardless the concentrate type effect. The same of serum Na and K levels was observed during lactation period. El Shaer (2010) reported that the electrolytes Na and K are known to be found in high concentrations in halophytes. The obtained results are in harmony with those obtained by Ahmed *et al.* (2001) for lactating goats fed kochia silage. Serum Mg concentration significantly increased for ewes fed clover hay compared to those fed kochia silage (late pregnancy). Whereas serum Ca concentration in both pregnancy and lactation periods was negatively affected by type of roughage. This result are in agreement with those finding by Hanafy *et al.* (2007) for goat fed kochia hay plus TCFM as a result of the presence of oxalate in kochia which decrease calcium availability. Generally, serum minerals concentration of the present study were within the normal levels for ewes in all physiological stages (Antunovic *et al.*, 2002 , Yildiz *et al.*, 2004 and Sobiech *et al.*, 2008).

Finally, results indicated that utilization of untraditional ration either consists of *Kochia indica* silage with TCFM or clover hay with UCFM could be used in feeding of lactating ewes without any adverse effects on their body weight, total milk yield, birth and weaning of their kids and animal health.

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استخدام مصادر بديلة من الأعلاف الخشنة أو المركزة فى تغذية النعاج البرقى

محمد أحمد حنفي [1] و عبد الفتاح عفيفي فهمي[2] و محمد سيد فر غلى[1] و عفاف عبد الرحمن الشريف[2]

[1]قسم الإنتاج الحيواني-كلية الزراعة- جامعة القاهرة-مصر

[2]قسم تغذية الحيوان و الدواجن-مركز بحوث الصحراء-المطرية- القاهرة-مصر

تم اختيار 60 نعجة برقى عمر من 2-3 سنوات بمتوسط وزن 40.6 كجم خلال فترة الحمل المتأخر ووزعت عشوائيا على اربع مجموعات متماثلة (15 / مجموعة) لدراسة تأثير التغذية على علائق غير تقليدية مكونة من شجيرات الكوخيا ومخلفات التصنيع الزراعي على الأداء الانتاجى للنعاج البرقى ومواليدها.

غذيت المجموعة الأولى على دريس البرسيم ومخلوط العلف المركز التقليدى (20% كسب قطن غير مقشور ، 16% كسب كتان ، 29% ذرة صفراء، 30% نخالة قمح ، 2% مولاس ، 1% حجر جيرى ، 1% ملح طعام ، 1% مخلوط معدنى وفيتامينات) بينما غذيت المجموعة الثانية على دريس البرسيم و مخلوط العلف المركز غير التقليدي (45% تفل البيرة ، 30% نوى البلح ، 20% تفل الزيتون ، 2% مولاس ، 1% حجر جيرى ، 1% ملح طعام ، 1% مخلوط معدنى وفيتامينات). وغذيت المجموعة الثالثة على سيلاج الكوخيا ومخلوط العلف المركز التقليدي بينما غذيت المجموعة الرابعة على سيلاج الكوخيا ومخلوط العلف المركز غير التقليدي. أعطيت الأعلاف المركزة لتغطية 60% من الاحتياجات الحافظة والإنتاجية من الطاقة بينما قدمت الأعلاف الخشنة (دريس البرسيم أو سيلاج الكوخيا) للشبع. واستمرت تجربة إنتاج اللبن (شهرين فى فترة الحمل المتأخر ثم ثلاثة أشهر فى فترة الحليب). فى نهاية فترة الحليب تم اختيار 12 نعجة برقى لتقييم العلائق المختبرة من خلال تجارب الهضم. ووزعت النعاج المختارة في أربع مجموعات (3 / المجموعة) وغذيت على نفس العلائق المختبرة.

أظهرت النتائج انخفاض كمية المادة الجافة المأكولة من العلف الخشن فى علائق سيلاج الكوخيا معنويا بمعدل 50% عن المأكول فى علائق دريس البرسيم كما انخفض تركيز المركبات المهضومة الكلية انخفاضا معنويا بـ 25 وحدة فى علائق دريس البرسيم كنتيجة لاستخدام مخلوط العلف المركز غير التقليدي. و كذلك سجلت نفس النتيجة للمركبات المهضومة الكلية % فى علائق سيلاج الكوخيا. كما انخفضت النسبة المئوية للبروتين الخام المهضوم معنويا عند استخدام علائق الكوخيا فى تغذية النعاج مقارنة بعلائق دريس البرسيم بصرف النظر عن تأثير نوع العلف المركز. بينما كان لنوع العلف المركز تأثيرا معنويا على إنتاج اللبن الكلى حيث انخفض بحوالي 9% للنعاج المغذاه على مخلوط العلف المركز غير التقليدى مقارنة بمثيلاتها المغذاه على مخلوط العلف المركز التقليدى. كما تفوقت مواليد النعاج المغذاه على دريس البرسيم مع مخلوط العلف المركز التقليدي على مثيلاتها المغذاه على سيلاج الكوخيا مع مخلوط العلف المركز غير التقليدي فى أوزان الفطام و معدلات النمو اليومى بمقدار 50% و 61% على التوالى. وكانت تركيزات العناصر المعدنية بالدم فى المستوى الطبيعى ولم يكن للمعاملات الغذائية المختلفة أي أثر سلبي على صحة النعاج.

وبناءا على ذلك يمكن التوصية باستخدام العلائق غير التقليدية سواء المكونة من سيلاج الكوخيا مع مخلوط العلف المركز التقليدى أو دريس البرسيم مع مخلوط العلف المركز غير التقليدي فى تغذية النعاج الحلابة دون اى تأثيرات سلبية على أوزان الجسم وانتاج اللبن الكلى وأوزان الميلاد والفطام للمواليد وصحة الحيوان مقارنة بالعليقة التقليدية (دريس برسيم + مخلوط العلف المركز التقليدى).