Egyptian Journal of Sheep & Goat Sciences, Vol. 6 (1),15-26, (2011)

RESPONSE OF SMALL RUMINANTS TO DIETS CONTAINING REED FORAGE EITHER AS FRESH, SILAGE OR HAY VERSUS BERSEEM HAY.

Ahmed, M. E., O. A. El-Zelaky, K. M. Aiad and E. I. Shehata
Animal Production Research Institute, Agriculture Research Center, Dokki, Egypt

ABSTRACT

This study started by nutritional evaluation (digestion coefficients and feeding value) of reed forage collected from three locations using Rahmani sheep. The best one was used in the second part of the study to compare effect of feeding reed in three forms as fresh, silage or hay on goat's milk production, compositions and quality ending by economic efficiency. Reed collected from Manzalla is relatively the best but with insignificant difference compared to others. Feeding trials lasted for 20 weeks where four groups were assigned to receive the four experimental rations. All groups were fed on restricted amount of concentrate feed mixture, to cover 50% of the requirements recommended by **NRC (1981)** while reed, in the three forms, offered *ad lib*.

Results show that reed silage had the highest digestion estimates, followed by berseem hay then fresh reed and lastly reed hay. Similarly, TDN and DCP were significantly (P<0.05) higher with RS and RF compared to RH and BH (berseem hay as control) rations. TVA's, measured at 4 hrs post feeding in rumen fluid, had no significant differences among the four tested rations. However, microbial protein values were significantly (P<0.05) higher with RS and RF compared to RH and BH rations.

Daily milk was significantly (P<0.05) higher for RS and RF compared to RH and BH rations. The highest milk yield was recorded with RS (1.23, Kg) while the lowest for RH (1.01Kg). Milk fat was superior with the three reed forms than berseem hay. Milk quality parameters were not differed significantly among all groups. The feed intake, kg dry matter, was better with reed silage (1.19 kg) and reed forage (1.22 kg) compared with reed hay (1.37 kg) and berseem hay (1.35 kg) . Reed silage (RS) recorded the highest economic return followed by RF then RH rations while, the lowest was obtained by BH.

It is concluded that reed silage recorded the best feeding values, milk production and quality beside the economic factor.

INTRODUCTION

Farm animals suffer malnutrition in Egypt particularly during summer season where green forages with reasonable protein content are not adequate. Increasing cost of feeding is the main constraint for further increase of animal population in Egypt. Furthermore, several studies **(Tag El-Din, 1990; Shehata *et al*., 2001** and **Ahmed *et al*., 2001)** indicated that wild plants such as Kochia could be used as a good quality forage for ruminants because of its high content of crude protein and nutritive values especially when harvested in earlier growth stage. Moreover, **Soliman *et al*. (1997)** and **EL-Kholany (2004)** reported that the value of CP digestibility and DCP were higher with Sesbania (forage or silage) rations compared with Teosinte or whole corn plants. In the same trend, **Nour *et al*. (1995)** concluded that utilization efficiency, as Kg DM/Kg fat corrected milk (FCM) and TDN/Kg FCM, were better for reed grass in dairy animals diets compared with berseem hay and bean straw. In another study, reed forage had a good palatability and adequate feeding value for goats and could nutritionally and economically replace high quality summer forage like sorghum, resulting in reducing the feeding cost **(Gabr *et al*., 1999)**. Also, **Ahmed *et al*. (2001)** and **Shehata *et al*. (2003** and **2006)** and **Ahmed *et al*.(2009)** reported that using reed grass in small ruminant rations had no adverse effect on the animal performance.

The present study was planned to examine the feeding value of green, hay or silage reed plant and their effects on milk yield and quality of dairy Zaraibi goats beside evaluating their fermentation in the rumen.

MATERIALS AND METHODS

This study was conducted at El-Serw Experimental Research Station belonging to the Animal Production Research Institute, Agricultural Research Center, Ministry of Agriculture, Egypt. The experimental work included two experiments.

Experimental animals and feeding

About 20 tons reed grass was harvested along the Nile river, water canals and lakes at height 50-100 cm. It was directly chopped into 2-3 cm pieces. The silage was immediately made after chopping where moisture content at ensiling time averaged 70%. Reed silage was prepared by adding 3% molasses, on fresh basis, as reported by **Ahmed *et al* (2002)** and **Shehata *et al*. (2003).** The reed hay was made by sun drying. After the evaluation of different sources of reed grasses, the Manzalla lake reed was used only in this experiment with dairy goats.

The first experiment: Digestibility trails (on Rahmani rams)

Two packages of digestibility trials were conducted: the first was to evaluate the three sourcesof reed; Nile reed (NR), Canals reed (CR) and Lakes reed (LR).

Three groups of Rahmani rams, each of 3 animals with an average live body weight of 75.0 Kg and average age 3 years, were used to determine feed intake and digestion coefficients.

The second trial was conducted on 12 rams averaged 62.5 Kg live body weight and 19 months old, which divided into four groups, to evaluate the mentioned four experimental rations. Each trial continued for 28 days the first 21 days as preliminary period, followed by 7 days for feces collection. The animals were fed according to **NRC (1985)** feed allowances .

Rumen fluid samples were taken from the three rams of each group at the end of experiment using stomach tube before feeding (0 time and 4 hrs post-feeding). The samples were filtered through 3 layers of gauze and their pH values were immediately determined. Ammonia nitrogen **(NH_3-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 level was estimated by the method of **Shultz and Shultz (1970)**.

The second experiment: Effect on milk yield (on Zaraibi goats):

This experimental was carried out using 40 Zaraibi dairy goats, aged 24-30 months and weighed 34-35 kg. They were divided into four groups, ten goats each, according to their live body weight, age and milk yield. Feeding trial lasted 20 weeks.

Each group was assigned to receive one of the four experimental rations. All groups received restricted amount of concentrate feed mixture (CFM) that cover 50% of the requirement(as recommended by **NRC (1981)** for lactating goats), then groups fed *ad lib* either on : Reed forage, (RF), Reed silage (RS), Reed hay (RH), or Berseem hay (BH) (Control).

The CFM was offered twice daily at 8 am and 4 pm. Residues were collected and weighed daily. Fresh water was available all the day.

Samples of feeds and feces were analyzed according to **A.O.A.C. (1995).** Fiber fractions were determined according to **Robertson and Van Soest (1981).**

Milk samples:

Daily milk yield was recorded for each doe among all the experimental period where milking was manually. Representative milk samples (about 0.5% of total milk produced) were taken once monthly from each doe at both milking. Samples were collected and analyzed for chemical composition expressed as total solid, fat, protein, ash, as well as pH and acidity which determined as given by

Ling (1963), while lactose content was assessed as described by **Baranett and Abdel-Tawab (1957)**.

Measurements applied for quality of goat's milk

1. Acidity and PH of goat's milk

Fresh whole goat's milk of different treatments was divided into two parts. The first part was incubated at 30°C for 5 hours. The second part was heated at 90°C for 15 sec., cooled to 30°C, then was subdivided into two parts; the first was inoculated with 1% yoghurt starter culture and the second was inoculated with 1% pure culture of mixed strain culture (ABT3) containing Lactococcus acidophilus La-5, Bifidobacterium bidfidum Bb-12 and Streptococcus thermophilus St-20. The second part was incubated at 30°C for 5 hs.

2. Rheological properties of curd

Rennet coagulation time (RCT) was measured by **Davies and White (1958)**. Curd tension was estimated as described by **Chandrasekhara *et al*. (1975)**. The rate of whey syneresis of fresh curd was measured as the volume of drained whey after 10, 30, 60, 90 min. It was calculated as a percentage of the volume of milk according to **Lawernce (1959)**.

Statistical analysis:

Data was subject to statistical analysis by the computer program of **SAS (1996)** using the General linear Model (GLM). The data of digestibility coefficients, blood metabolites and milk yield and its composition were subjected to one-way analysis of variance for exming of effects of treatments (diet1, diet2, diet3, and diet4) according to the following model:

$$Yij = \mu + P_i + E_{ij}$$

Were: Y_{ij} = observed traits, μ= overall mean, P_i = experimental diets 1-4 (1=diet1, 2=diet2, 3=diet3, 4=diet4), e_{ij} = Random error

The data of rumen parameters were subjected analysis of variance for examing of effects of treatments (diet1, diet2, diet3, and diet4) and time of sampling (0, and 4 hours) and their interaction according to the following model:

$$Yijk = \mu + P_i + D_j + PD_{ij} + E_{ijk}$$

Were Y_{ijk} = observed traits, μ =overall mean, P_i =experimental diet 1-4((1=diet1, 2=diet2, 3=diet3, 4=diet4), D_j = time of sampling, D_{ij} =interaction treatment x sampling, E_{ijk} = Random error.

The differences among means were tested using Duncan's Multiple Range Test **(Duncan, 1955).**

RESULTS AND DISCUSSION

Digestibility trials:

1.1.Evaluation of different sources Reed forage:

The chemical composition of reed grasses (NR, CR, LR) and their minerals contents are presented in Table (1). It was noticed that LR, compared to NR, contained more CP (10.73 vs. 10.21%) and NFE (46.73 vs. 44.98%). Meanwhile, LR was less in CF compared with NR (29.51 vs. 31.03%). On the other hand, the values of NDF, ADF and ADL were nearly similar in all strains. P, Mg, Na, K, Fe and Mn were higher in LR than NR and CR, while Ca and Zn were higher in CR than LR. **Shehata *et al*. (1988)** who reported that fresh reed contained 35% DM, 10% CP, 31.4% CF, 45.9% NFE, 3.01% EE and 10.4% ash, on DM base. Moreover, **Gabr *et al*. (1999)** indicated that reed grass contained 12% CP, 31.0% CF, 46.6% NFE,

Similar results were recorded by and 9.2% ash on DM basis, while EE% was lower than that obtained herein (1.2 vs. 2.96 on average). **Ahmed *et al*. (2002)** found that values of Fe, Mn and Zn were 79.8, 115.3 and 55.0 ppm in reed silage.

Table (2), show that daily feed intake was higher with LR (951 g/h) compared with CR (917 g/h). The differences between NR, CR and LR in digestion coefficient of all nutrients were not significant

Table (1):Chemical composition of reeds (Nile reed, NR, Canals reed, CR and Lake reed, LR) on dry matter basis

Item	Nile reed (NR)	Canals reed (CR)	Lakes reed (LR)
DM	30.15	29.49	29.97
OM	89.15	88.9	90.00
CF	31.03	30.22	29.15
CP	10.21	10.45	10.73
EE	2.89	2.95	3.03
NFE	45.02	45.28	47.09
Ash	10.85	11.10	10.00
NDF	66.50	65.70	67.03
ADF	40.65	41.53	39.85
ADL	7.46	7.57	7.29
Macro elements,%			
Ca	1.47	1.61	1.53
P	0.28	0.29	0.35
Mg	0.33	0.35	0.41
Na	0.09	0.09	0.10
K	2.47	2.33	2.53
Micro elements, ppm			
Fe	82.0	85.0	91.0
Mn	109	113	121
Zn	55	61	54
Cu	2.0	1.0	1.0

. Meanwhile, the highest values of DM, OM, CF, CP, EE and NFE digestibilities were recorded with LR as shown in Table (2). TDN values did not show significant differences among all reeds sources, while the highest value of TDN was recorded with LR (54.23%) followed by CR (52.04%) and the lowest with NR (51.75%). However, the value of DCP was significantly higher with LR (6.02%) compared to NR (5.48%) as shown in Table (2). The values in this study are nearly similar to those obtained by **Ahmed *et al.* (2002)** on Zaraibi bucks (5.073%).

1.2. Experimental rations:

Chemical composition of tested feedstuffs are shown in Table (3). The results indicate that ash was higher in berseem hay (BH) compared to reed grass (RF), silage (RS) and hay (RH). On the contrary, EE was lower in BH (2.25%) compared to RF, RS and RH (3.03, 3.07 and 3.01%, respectively)

Table (2): Digestibility coefficients and feeding values of reed collected from different sources (Nile reed, Canals reed, Lakes reed) when fed to Rahmani rams.

Item	NR	CR	LR
Daily DM intake g/h	935±10.0	917±8.0	951±13.0
g/kg $w^{0.75}$	36.7±1.0	35±0.8	37±1.1
Digestibility coefficients,%			
DM	50.43±0.82	50.80±0.42	52.03±0.53
OM	54.0±0.43	55.11±0.55	56.15±0.68
CP	53.71±0.71	54.61±0.43	56.07±0.83
CF	45.11±0.80	44.83±0.71	47.15±0.93
EE	61.8±0.37	62.5±0.78	63.55±0.055
NFE	62.81±0.51	63.25±0.43	64.2±071
Feeding value,%			
TDN	51.75±0.33	52.04±0.55	54.23±0.61
DCP	$5.48±0.11^{b}$	$5.71±0.13^{ab}$	$6.02±0.07^{a}$

Means in the same row with different superscripts differ significantly at $P < 0.05$.

Table (3): Chemical composition (%) of concentrate feed mixture, reeds (forage, silage and hay) and berseem hay.

Ingredients	DM %	Composition, % on DM					
		OM	CF	CP	EE	NFE	Ash
Concentrate feed mixture	90.50	93.21	14.80	15.09	3.45	59.87	6.79
Reed forage, RF	29.70	90.00	29.51	10.73	3.03	46.73	10.0
Reed silage , RS	30.05	89.57	28.90	10.94	3.07	46.66	10.43
Reed hay, RH	91.85	89.51	29.65	10.62	3.01	46.23	10.49
Berseem hay, BH	89.37	87.50	28.43	11.10	2.25	45.72	12.50

In the same time, the differences in chemical composition among the tested feedstuffs in CF, CP and NFE concentrations were minor. Similar values were obtained by **Ahmed *et al*. (2009).**

Concerning the farm experimental rations, the digestibility coefficients of most nutrients were higher with RS and RF compared with RH and BH as shown in Table (4). DM, OM, CF and CP digestibilities of RS and RF were significantly (P<0.05) higher than that of RH and BH. In addition, EE digestibility was significantly (P<0.05) decreased with BH compared to the other three tested rations which may be due to the decrease in ether extract content in berseem hay. Moreover, TDN and DCP were significantly (P<0.05) higher with RS and RF compared to RH and BH. The highest values of TDN and DCP were recorded with RS followed by RF then BH, while the lowest value was recorded with RH.

Table(4): Daily feed intake, digestion coefficients and nutritive values of tested diets fed to Rahmani sheep.

Item	Rations			
	RF	RS	RH	BH
Daily dry matter intake g/h	1420	1437	1305	1315
DM intake g/kg $w^{0.75}$	81.73	82.30	79.10	80.46
Digestibility coefficients, (%)				
DM	60.3±0.35^{a}	62.5±0.5^{a}	55.85±0.6^{b}	57.1±0.42^{b}
OM	63.5±0.41^{a}	64.8±0.47^{a}	58.3±0.71^{b}	60.1±0.53^{b}
CF	53.1±0.53^{a}	55.0±0.47^{a}	49.1±0.49^{b}	50.07±0.67^{b}
CP	68.5±0.67^{a}	69.9±0.58^{a}	63.9±0.45^{b}	65.0±0.7^{b}
EE	70.0±0.73^{a}	70.9±0.53^{a}	68.5±0.43^{a}	65.0±0.27^{b}
NFE	64.8±0.45	65.1±0.81	62.8±0.58	63.4±0.39
Feeding value,(%)				
TDN	66.4±0.35^{a}	67.4±0.047^{a}	62.85±0.45^{b}	63.95±0.57^{b}
DCP	9.25±0.01^{a}	9.45±0.09^{a}	8.6±0.07^{b}	8.8±0.11^{b}

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

Similar results were observed by **Shehata *et al.* (2006)** with Zaraibi bucks. **Gabr *et al*. (1999)** reported that CF and CP digestibilities were significantly (P< 0.05) higher with reed diet compared to sorghum diet (75.11 and 79.03% vs. 69.08 and 69.96%, respectively). The same authors found that DCP was significantly (P< 0.05) higher by 29.3% with substitution of sorghum plants (7.16%) by reed (9.26%) in diet of small ruminants.

Rumen parameters are presented in Table (5). The differences among the four diets were not significant in pH values and ammonia-N concentrations (NH_3-N) before feeding and 4 hrs post feeding. The values of

TVA's concentrations were not differ significantly at 0 time of feeding while at 4 hrs post feeding it was higher ($P < 0.05$) with RS and RF than RH and BH. The highest was noticed with RS while the lowest value was detected with BH. However, microbial protein values were significantly ($P<0.05$) higher with RS and RF compared to RH and BH. Similar trends were given by **Ahmed *et al* (2001 and 2002)** with wild plant (kochia and reed). **Shehata *et al.* (2006)** reported that differences in pH values and NH_3-N were few in reed silage.

Table (5): Ruminal parameters for Rahmani rams fed the experimental rations.

Item	Hrs	RF	RS	RH	BH
pH values	0	7.3±0.11	7.23±0.15	7.31±0.1	7.35±0.09
	4	6.42±0.09	6.31±0.08	6.45±0.132	6.48±0.15
Ammonia-N (mg/100 ml)	0	12.25±0.4	13.01±0.3	12.05±0.5	12.17±0.3
	4	19.35±1.5	20.13±2.1	18.3±1.3	18.7±1.7
Total VFA's (MEq/100 ml)	0	7.75±0.40	8.01±0.20	7.55±0.30	7.41±0.20
	4	$10.83±0.23^{a}$	$11.10±0.15^{a}$	$10.22±0.17^{b}$	$10.13±0.12^{b}$
Microbial protein (g/100 ml)	0	0.410±0.05	0.395±0.03	0.383±0.02	0.370±0.03
	4	$0.635±0.03^{a}$	$0.654±0.02^{a}$	$0.560±0.10^{b}$	$0.553±0.02^{b}$

Means in the same row with different superscripts differ significantly at $P < 0.05$.

Table (6): Milk production of lactating goats fed different experimental diets.

Item	Rations			
	RF	**RS**	**RH**	**BH**
Daily milk yield, kg	1.19^{a}	1.23^{a}	1.01^{b}	1.05^{b}
Fat,%	$3.65±0.1^{a}$	$3.95±0.1^{a}$	$3.7±0.2^{a}$	$3.25±0.1^{b}$
Protein,%	3.05±0.1	3.04±0.0	3.03±0.0	3.0±0.1
Lactose,%	4.65±0.1	4.654±0.0	4.6±0.0	4.55±0.0
Total solid,%	$12.2±0.1^{a}$	$12.4±0.15^{a}$	$12.0±0.1^{ab}$	$11.45±0.1^{b}$
Solid non fat,%	8.5±0.0	8.6±0.1	8.5±0.0	8.3±0.0
Ash,%	0.75±0.0	0.076±0.0	0.7±0.0	0.7±0.0
Somatic (Scc $x10^3$ cells /ml	630±25	570±31	675±22	663±70

Means in the same row with different superscripts differ significantly at $P < 0.05$.

Feeding trial

2.1. Milk production

The daily milk yield of lactating goats are illustrated in Table (6). The obtained results indicate that daily milk yield was significantly ($P<0.05$) higher for RS, RF compared to RH and BH. The highest value (1.23 kg) of milk yield was recorded with RS, while, the lowest value (1.01 kg) was recorded with RH. Similar results were obtained by **Shehata *et al*. (2006) and ZaZa and El-Zelaky (2007). Gabr *et al*. (1999)** found that average daily milk yield of goats fed sorghum was lower (0.6 kg) than those fed reed (0.84 kg) by about 40%.

Concerning milk composition (Table, 6), the data indicate interest trend where essential factors affect processing (fat and total solids %) show significant higher values for all reed types diets compared to BH. This may be attributed to the decrease in ether extract (EE) content of BH than RH (2.25 vs. 3.01). Total solids were significantly ($P<0.05$) higher with RS and RF rations compared to control ration,

but differences among RS, RF and RH rations were not significant. These results are in accordance with those of **Gabr *et al.*(1999)** who reported that milk fat yield of goats fed reed diet were significantly higher than sorghum diet. Similar results were obtained by **Nuor *et al*. (1995**) when used reed grass and berseem hay for dairy animals. Somatic cell counts (SCC) in Table (6), shows that differences among the four rations were not significant which agree with that observed by **Shehata *et al*. (2006)**.

2.2.Milk quality

Concerning acidity development and pH changes in goat's milk, the results in Table (7) reveal increase of acid development for raw goat's milk and milk inoculated with yoghurt starter and lactococcus lactis subs. Lactis for all treatment groups. Therefore, this development in acidity proved that goats' milk of different treatments is proper for manufacturing some fermented dairy products such as cheese, yoghurt and cultured milk. These results are in agreement with those of **Enab (1993)** and **Ayad (2003)**. In the same time, natural milk pH and pH of milk inoculated with the used starters were decreased along incubation period. This observation proved the suitability of goats' milk for growth and biochemical activity of starter microorganisms. These are in agreement with those of **Youssef (1989)**.

Table (7): Effect of different rations on RCT , CT , whey syneresis and at loss of whey in goat's milk

Treatment	Groups	RCT min : sec	CT gram	Whey syneresis (after min.) (milli/100ml)				
				10	30	60	90	Fat loss of whey %
Section 1	RF	2 : 40	37.860	25.120	36.960	47.200	55.510	0.55
	RS	2 : 47	34.650	26.800	38.020	46.700	56.402	0.50
	RH	2 : 46	33.910	28.820	38.650	47.000	56.320	0.50
	BH	2 : 39	33.700	28.100	39.210	46.150	55.620	0.50
Section 2	RF	210 : 0	27.420	20.150	27.980	32.810	40.920	0.60
	RS	210 : 0	27.395	19.970	26.300	30.460	37.810	0.55
	RH	210 : 0	27.390	20.100	27.270	32.610	40.310	0.55
	BH	210 : 0	25.410	18.410	25.210	30.120	38.000	0.50

RCT : Rennet Coagulation time & CT : Curd Tension

Concerning some rheological properties of milk the fresh whole goats' milk of different treatment groups were divided into two sections; the first section included the fresh whole raw goats' milk heated to 30°C and rennet was added. The second section included that whole goats' milk of all treatments groups was heated to 72°C then cooled to 30°C and 1% pure cultures of *lactococcus lacits subsp. lactis* was added to it .

Results in table (7) indicate that RCT of the first section ranged from 2 : 39 to 2 : 47 min:sec. This result is consisted with **El-Alamy *et al*. (1992)** and **El- Metwally (2008). El-Senaity *et al*. (2000)** found that the type of milk clearly affected RCT values. This may be due to total solid content of goats' milk. In the present work, there was no significant variation among different treatment groups, in the first section, regarding RCT, while in the second section RCT was 210 minutes for all treatment groups. This may be due to the effect of the starter on acidity development

provided in the formed cured. Concerning curd tension (CT) and whey syneresis, the goats' raw milk (first section) show higher values than when starter was added (second section). These differences may be due to increased

Table (8): Acidity and pH development for goat's milk inoculated with some starters

Treatments	Incubation period (hours)												
		Acidity						pH					
		0	1	2	3	4	5	0	1	2	3	4	5
	Starter %	**Raw milk**											
RF	1%	0.162	0.176	0.200	0.220	0.300	0.430	6.60	6.40	6.36	6.34	6.30	5.52
RS		0.162	0.175	0.210	0.225	0.285	0.425	6.60	6.56	6.34	6.33	6.30	4.73
RH		0.157	0.172	0.200	0.210	0.292	0.420	6.61	6.50	6.35	6.34	6.27	5.76
BH		0.160	0.171	0.200	0.206	0.282	0.404	6.61	6.39	6.35	6.30	6.33	4.73
		Yoghurt milk											
RF	1%	0.163	0.190	0.212	0.406	0.600	0.000	6.59	6.43	6.34	5.82	4.87	0.000
RS		0.157	0.180	0.281	0.490	0.631	0.000	6.62	6.47	6.31	5.81	5.62	0.000
RH		0.156	0.176	0.246	0.450	0.613	0.000	6.62	6.50	6.32	5.83	5.68	0.000
BH		0.162	0.182	0.278	0.450	0.631	0.000	6.60	6.45	6.06	5.82	5.65	0.000
		(ABT3) starter											
RF	1%	0.160	0.182	0.240	0.350	0.512	0.673	6.60	6.450	6.80	6.29	5.75	4.68
RS		0.162	0.175	0.204	0.278	0.620	0.700	6.60	6.560	6.38	6.31	5.65	4.72
RH		0.158	0.184	0.216	0.297	0.449	0.608	6.62	6.470	6.33	6.31	5.85	4.75
BH		0.156	0.166	0.185	0.246	0.363	0.558	6.62	6.550	6.49	6.41	6.29	4.70

Table (9): Feed economic efficiency for lactating goats fed different experimental diets

Item	**Rations**			
	RF	**RS**	**RH**	**BH**
N. of does	10	10	10	10
Body weight, kg	35.0	34.5	35.0	35.5
Daily milk yield, kg	1.19	1.23	1.01	1.05
Daily DM intake, g/h:				
CFM, g/h	650	645	633	644
Roughage, g/h	801	813	751	770
Total DM intake, g/h	1451	1458	1384	1414
DM intake, g/kg $w^{0.75}$	100.8	102.5	96.2	97.2
Roughage :concentrate ratio	55:45	56:44	54:56	54:56
Feed conversion :				
Kg DM/ Kg milk	1.22	1.19	1.37	1.35
Economic efficiency:				
Cost of consumed feed (L.E/h)	1.06	1.08	1.03	1.30
Price of milk (L.E/h)	4.284	4.428	3.636	3.780
Feed cost /Kg milk, L.E	0.891	0.878	1.0020	1.238
Economic efficiency,%	4.04	4.10	3.53	2.92

protein content of goats' milk as affected by acidity of milk and curd **(Dimov and Mineva 1963)**. The percentage of fat loss in the whey was approximately similar in the treatment of the two sections. This result is in agreement with those obtained by **(Emara, 1990; El-**

Alamy *et al*., 1992; Enab, 1993 and **Mehana *et al*., 1998).**

2.3. Feed and economical efficiency

Feed and economical efficiency are presented in Table (9). The DM intake tended to increase with RS (1458 g/h and 102.5 g/kg $w^{0.75}$) compared with RH (1384 g/h and 96.2 g/kg $w.^{075}$) whereas, animals in RH and BH consumed approximately similar quantities of DM intake as shown in Table (10). The feed efficiency based on DM was better with reed silage ration (1.19 kg) and reed forage ration (1.22 kg) compared to reed hay ration (1.37 kg) and berseem hay ration (1.35 kg). Similar results was observed by **Shehata *et al.* (2006)**. The obtained values of feed conversion are comparable with those given by **Abdelhamid *et al.* (1999)** and **Ahmed (2001)** for Zaraibi goats during early and mid-lactation periods, respectively.

Cost of consumed feeds, price of milk and economical efficiency are presented in Table (9). The economic efficiency recorded the highest value with reed silage RS (4.10) followed by reed forage, RF (4.04) then reed hay, RH (3.53) while, the lowest value was detected with berseem hay, BH (2.92). Thus, reed silage had recorded the highest economic return as reported by **Shehata *et al.* (2006)** and **Ahmed *et al.* (2009)** with goat's and sheep, respectively.

CONCLUSION

It is concluded that reed silage ration recorded the highest digestibility and feeding value with Rahmai sheep and the highest milk production with good economic return effect with lactating Zaraibi goat without any adverse effect on milk quality.

REFERENCES

Abdelhamid, A. M, Shehata, E. I and Ahmed M. E, (1999). Physio-nutritional studies on pregnant and lactating goats fed on rations differing in roughage /concentrate ratio at different feeding levels and/or not supplemented with bentonite 3-Effects on productivity, reproductively and digestive and metabolic disturbances. J. Agric. Sci. , Mansoura Univ., 24:4637.

Ahmed, M. E.; Shehata, E.I.; Soliman, A.A.M.; Fathia A. Ibrahim and Hagag, M. El-H. (2002). Nutritional evaluation of reed (Arundo domax,L.) – maize (Zea mays, L.) mixed silage by goats. Proc. 1st Ann. Sci. Conf. Anim. Fish Prod., P: 85-94, Mansoura, Sep, 2002.

Ahmed, M.E.; Abdelhamid, A.M. Abou Amou, F.F. Soliman, E.S. El-Kholy N.M and Shehata, E.I. (2001). Response of milk production of Zaraibi goat to feeding silage containing different levels of Teosinte and Kochia. Egypt .J. Nutrition and Feeds 4 (Special Issue): 141

Ahmed, M.E.; E. I Shehata; Abou Ammou F. F.; Khalifa, E. I. and El- Zalaky O. A.(2009). Productive and reproductive performance of Rahmani sheep fed rations containing reed forage (Arundo domax, L) either fresh, hay or silage. Egyptian J. Of Sheep & Goat Sciences, Vol. 4 (1), 2009, 45.

A. O. A. C. (1995). Official Methods of Analysis. (16th) Edt. Association Analytical Chemists, Washington, D.C., USA.

Ayad, K.M.K. (2003): Studies on some dairy products. Ph.D. Thesis Faculty of Agriculture, Mansoura University, Egypt.

Baranett, A.S and Abdel-Tawab, G. (1957). A rapid method for determination of lactose in milk and cheese . J. Sci. Food Agric., 8: 437.

Chandrasekhara M. R, R. K. Bhagawan, M. Swaminathan and V. Subrahmanyan (1957). The use of mammalian milk and processed milk foods in the feeding of infants. Indian J. Child. Health. D, 70L.

Conway, F.(1957).Microdifussion Analysis and Volumetric Errors .Rev.Ed. Lockwood . London.

Davies, D. T. and J. C. D. White (1958). The relation between the chemical composition of milk and the stability of the caseinate complex: II. Coagulation by ethanol. Journal of Dairy Research, 25: 256.

Dimov, N. and Mineva, P.(1963). Effect of some factors on the syneresis of fresh cured and losses of solids in the whey in the processing of cows', ewes' and buffaloes 'milk. Dairy Sci Abst., 255.

Duncan, D.B. (1955). Multiple Range and Multiple F-test Biometrics, 11:1-42.

El-Alamy, H.A.; M.H. El – Senaity and A.M. Kholif (1992). Manufacture of white soft cheese from goat milk supplemented with skim milk powder.J. Agric. Sci Mansoura Univ. ,17(12): 3875 – 3880.

El-Kholany,M.M (2004). Evaluation of some new green fodder for Farm animals. Ph.D. Thesis Fac. Of Agric, Mansoura Univ.

El-Metwally, R.I.M. (2008). Manufacture of Mozzarella Cheese by Using Different Types of Milk. Msc.thesis. Faculty of Agriculture. Mansoura University, Egypt.

El-Senaity, M.H.; Awad, A.A.A. and Youssef, Y.B. (2000). Factors affecting rennet coagulation time and synersis of different types of milk. J. Agric. Sci., Mansoura Univ., 25(1): 287-295.

Emara, H.M.M. (1990). Studies on Soft Goats' Cheese. Ph.D .Thesis , Faculty of Agriculture. Mansoura University, Egypt .

Enab, A.K.M. (1993). studies on the use of Goat's Milk in chesse Production. M.S. thesis . Faculty of Agriculture Mansoura University, Egypt.

Gabr, A. A., Mehrez A.Z, Soliman, E.S.M and El-Kholany, M E. (1999). Response of lactating goats to diets containing reeds grass (Arundo domax, L.) versus sorghum plants. Egypt. J. Nutrition and Feeds, 2 (Special Issue): 297.

Lawernce, A.J(1959). Syneresis of rennet curd. J. Dairy Technol., 14:166.

Ling, E.R.(1963). A Textbook of Dairy Chemistary, vol.2., Parctical 3rd Ed., Chapmen and Hall, Ltd London, UK..

Mehana, M.Y; A.A., El-Shazly, ;M.M., Nasr, and K.M. Ayad, (1998). Studies on Domiati cheese, 1-Yield, gross chemical composition and physical properties of curd of goats' milk as affected by feeding rations. J. Agric. Sci. Mansoura Univ., 23(11): 4949 - 4957.

Nour, A.M.; Tag El-Din, A.E. Nour, A.A. and El-Nagar, A. (1995). Utilization of reeds, bean straw and berseem straw in feeding lactating Friesian cows. Alex. J.Agric. Res.40:83.

NRC, National Research Council (1981). Nutrient Requirements of Domestic Animals. Nutrient Requirements of Goats. National Academy Press. Washington D.C., USA.

NRC, National Research Council, (1985). Nutrient Requirements of Domestic Animals. Nutrient Requirements of Sheep. National Academy Press. Washington D.C., USA.

Robertson, J.B. and Van Soest, P.J (1981). The detergent system of analysis and its application to human foods. In: W.P.T. James and O. Theander (Editors), The Analysis of Dietary Fiber in Food. Marcell Dekker, New York; pp.123.

SAS (1996). SAS. User's Guide: Statistical Analysis System Institute, INC.,Cary, N.C. USA.

Shehata, E. T., Ahmed, M. E., Abo Ammou, F.F., Soliman, A.A.M and El-Haggag, M. (2003). Effect of paratial replacement of maize (Zea mays L.) with reed (Arundo domax,L) in silage fed to growing Rahmani lambs. Egyptain L. Nutrition and Feeds . 6(Special Issue):969.

Shehata, E. T., Ahmed, M. E., Abo Ammou, F.F., Soliman, A.A.M., Aiad, K. M. and Abdel-Gawad, A.M. (2006). Comparison of feeding reed as hay or silage with feeding berseem hay or maize silage to dairy Zaraibi goats. Egyptian Journal of Sheep, Goat and Desert Animals Sciences, (1): 233.

Shehata, E.I.; Ahmed, M.E. Abdelhamid; A.M; Abou Amou, F and Haggag, M.El. H. (2001). Comparative nutritive values of silage rations containing different levels of Teosinte and Kochia. Egypt. J. Nutrition and Feeds, 4 (Special Issue): 129.

Shehata, M.N; Tag El-Din, A. E.; El-Shazly, K and Borhami, B.E. (1988). Utilization of reeds in the feeding of ruminants. Alex. J. of Agric. Res.

Shultz, T.A. and E.Shultz (1970). Estimation of rumen microbial nitrogen by three analyiical methods, J. Dairy Sci., 53: 781.

Soliman, E, S Khinizy, A.E. M. Mohamed K. Bahira and El-Haggag, M. (1997). Studies on using Sasbania and Teosinte forages in feeding of growing Zaraibi goats .Egypt .J.App. Sci. 12(5) 63.

Tag El Din, A. E. (1990). Evaluation of reeds in complete diets for ruminants. Indian J. Anim. Sci., 60 (9): 1106.

Warner, A.C.I.(1964).Production of volatile fatty acids in the rumen. Methods of measurements. Nutr. Abst. Rev., 34:339.

Youssef, A.S (1989). Studies on goats, milk: Utilization in soft and hard cheese making. Ph.D. Thesis Fac. of Agric, Al-Azhar Univ.

Zaza, G. H. M. and El-Zalaky, O. A. (2007). Using reed (Arundo domax, L) as a non-traditional feed source and its effect on productive performance of lactating goats. Egyptian J. Nutrition and Feeds, 10 (2): 171.

REED FORAGE EITHER AS FRESH, SILAGE OR HAY VERSUS BERSEEM HAY.

الملخص العربي

استجابة المجترات الصغيرة للعلائق التي تحتوي نبات الغاب سواء قدم طازجا أو سيلاج أو دريس مقارنة بدريس البرسيم

محمد إبراهيم أحمد – أسامة عزمي الزلاقي – كامل محمد عياد- عصام الدين شحاته

***معهد بحوث الإنتاج الحيواني – مركز البحوث الزراعية – الدقي –مصر**

الهدف من هذا العمل البحثي هو تقييم نبات الغاب من مصادر مختلفة (شاطئ النيل – القنوات- بحيرة المنزلة) بواسطة الأغنام الرحمانى وتلى ذلك إختيار أفضلهم وهو غاب بحيرة المنزلة لإختبار أثر استخدامه فى أشكاله المختلفة (أخضر – سيلاج – دريس) في علائق ماعز اللبن. تم تغذية حيوانات التجربة طبقا لمقررات NRC لسنة 1981 حيث قدم 50% منها من العلف المصنع بينما الباقى قدم من الغاب بأشكاله الثلاث حتى الشبع. وذلك لدراسة محصول اللبن وتركيبه وجودته وكذلك التقييم الاقتصادي .

أوضحت النتائج أن معاملات الهضم لنبات الغاب كانت متقاربة بين المصادر المختلفة للغاب (سواء شاطئ النيل – القنوات- بحيرة المنزلة) وإن كانت القيمة الأعلى في المركبات الكلية المهضومة لصالح غاب بحيرة المنزلة ولكن بدون فروق معنوية.

أظهرت النتائج أيضا أن عليقة سيلاج الغاب هي الأفضل في معظم معاملات الهضم تلاها عليقة الغاب الأخضر ثم عليقة دريس البرسيم وأخيرا عليقة دريس الغاب ، في حين حدث تفوق معنوي لكل من المركبات الكلية المهضومة والبروتين المهضوم مع الغاب الأخضر والسيلاج مقارنة بدريس البرسيم والغاب .

فيما يخص إنتاج اللبن فقد كانت مجموعتيى الغاب الأخضر والسيلاج أعلا معنويا من مجموعتى الدريس للغاب أو البرسيم. كان اعلى إنتاج لمجموعة سيلاج الغاب (1.23كجم) وأقلهم دريس الغاب (1.01 كجم).

أما مكونات اللبن فقد حدث انخفاض معنوي في محتوي دهن اللبن مع الغذاء المحتوى على دريس برسيم مقارنة بعلائق الغاب الثلاث، بينما كان هناك تذبذب بسيط في مكونات اللبن الأخرى.و لم يكن هناك أية اختلافات معنوية فيما يتعلق بجودة اللبن.

فيما يتعلق بقياسات كفاءة التحويل الغذائي فقد كانت هناك أفضلية لصالح عليقة سيلاج الغاب (1.19) ثم عليقة الغاب الأخضر (1.22 ثم عليقة دريس البرسيم 1.35) وأخيرا عليقة دريس الغاب (1.37)، أم فيما يخص اقتصاديات استخدام هذه العلائق المختبرة فقد كانت الكفاءة الاقتصادية الأفضل لصالح عليقة سيلاج الغاب ثم الغاب الأخضر و تلي ذلك عليقة دريس الغاب وأخيراً سجلت عليقة دريس البرسيم (عليقة المقارنة) أقل قيمة.

وبناءا علي ما تقدم يمكن القول أن عليقة سيلاج الغاب هي الأفضل حيث حققت أعلي قيمة غذائية مع الأغنام، وأفضل إنتاج لبن ذى مردود اقتصادي جيد مع الماعز الزرايبي الحلاب دون حدوث تأثير عكسي علي جودة اللبن المنتج.