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FEEDING MANAGEMENT AND THE PERFORMANCE OF SHEEP IN SOUTHERN SINAI:
3. THE LAMBS PRE- AND POST-WEANING.

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ABSTRACT

The experiment was carried out to study pre- and post-weaning growth and fattening potential of lambs. Lambs used were from an earlier experiment to evaluate effects of feeding management on reproductive efficiency and production rates of ewes. There were four groups of ewes. The control group was fed according to NRC recommended allowances from before breeding till the weaning of offspring at the age of 16 weeks. The three experimental groups were allowed free-choice *ad lib* roughage intake throughout. Each of the three experimental groups was offered a different roughage: *ad lib* berseem hay, one-third hay plus *ad lib* rice straw, or *ad lib* rice straw with added a commercial molasses-urea mixture, Mufeed. From the end of breeding till the end of the early pregnancy stage ewes in the three experimental groups received only the basal roughage. As of the start of the late pregnancy stage and up to the end of lactation and weaning of offspring they were offered *ad lib* ground corn grains and cottonseed meal in separate feeders to allow for free-choice intake.

The growth of lambs was followed for 16 weeks till weaning. For a period of 12 weeks, between weeks 9 and 20 post weaning, ewe-lambs were fed to grow as replacements whereas ram-lambs were fattened. The NRC recommended allowances were used. Daily intake and biweekly weights were recorded.

The ewe feeding management during pregnancy and lactation had a profound effect on lamb performance. During the nursing stage and up to weaning, male and female lambs from the hay-fed ewes were superior in weights and growth rates to the controls, whereas those from the straw-fed ewes were inferior.

The same was true for the growing replacement ewe-lambs and fattening ram-lambs up to the age of 10 months. Ewe-lambs from all groups reached a weight and age suitable for being joined to rams in intensive production systems at the age of about 10 months. However, those from the hay-fed ewes were slightly over fat to attain adult weight at that age. They weighed 44 kg at the age of 10 months. Over fattening of ewe-lambs will negatively affect their fertility.

In comparison to data cited from the literature for Barki and Ossimi sheep, results from the present investigation were exclusively superior. It is believed this was due to the better feeding management of both the dams and their offspring pre- and post-weaning.

Keywords: Sheep, feeding management, growth, fattening.

INTRODUCTION

Nutrition has been known to have a profound influence on productive and economic viability of farm animal enterprises. Specific effects on reproduction and the different production traits are well documented. In the mean time, information regarding the true inherent production potential of the local breeds of sheep and their nutritional needs are meager. Therefore, an experiment was carried in an attempt to quantitatively characterize inherent production and reproduction traits of sheep in southern Sinai (Farid *et al.*, 2006a,b). A free-choice cafeteria feeding system was adopted for the

feeding of the ewe flock in order to insure that nutrition is not a limiting factor. Basal roughages with varying nutritive values were used to study their effect on diet selection and voluntary feed intake, and on ewe production and reproduction. Results indicated wide and significant treatment differences including the effects on lamb performance up to weaning (Farid *et al.*, 2006b).

The production cycle in sheep flocks usually starts with breeding. In many instances it is considered to last until the weaning of offspring. This is not a valid proposition, however. The raising of ewe-lambs as replacements and the fattening of ram-lambs are as important to flock productivity and economic viability as the productivity of the ewes.

In the present experiment growth of lambs from the above mentioned experiment was followed from birth to weaning. After a post-weaning transition period, ewe-lambs were managed to grow as replacements whereas ram-lambs were fattened, both up to the age of about nine months. The American feeding standards (NRC, 1985) were used. Food and nutrient intakes and weight changes were recorded. Inherent growth and fattening potential of lambs were evaluated and the residual effect of dam management and feeding during pregnancy and lactation on lamb performance pre- and post-weaning was assessed. Results are presented herein.

MATERIALS AND METHODS

In the ewe experiment (Farid *et al.*, 2006ab) a total of 85 local ewes were used in four groups. One group served as the control and was fed according to NRC (1985) from before breeding till the weaning of offspring at the age of 16 weeks. Diets consisted of berseem (*Trifolium alexandrinum*) hay, rice straw, yellow corn grains and un-decorticated cottonseed meal, plus additives of salt, TM-salt and calcium carbonate (Table 1). Those were the same ingredients used in the ewes experiment (Farid *et al.*, 2006a). The three experimental groups were allowed free-choice *ad lib* intake throughout. Each group was offered different roughage. These being *ad lib* berseem hay, one-third hay plus *ad lib* rice straw, and *ad lib* rice straw with added a commercial molasses-urea mixture, Mufeed, composed of cane molasses with 4% urea and 2% TM-salt. It was added to straw at the rate of 10% w/w. as fed basis. In addition, a flushing concentrate (4 parts corn grains and 1 part soybean meal) was offered to all four groups at the rate of 200 g/day per ewe from before mating till the end of the breeding season that lasted 40 days.

From the end of breeding till the end of the early pregnancy stage, three months from day-15 of breeding, ewes in the three experimental groups received only the basal roughage. As of the start of the late pregnancy stage and up to the end of lactation and weaning of offspring the three experimental groups were offered *ad lib* ground corn grains and cottonseed meal in separate feeders to allow for free-choice intake. Mineral additives were added to both the grain and the meal at the rate of 1.0% limestone and 0.5% each of common and trace-mineralized salt.

Table 1: Nutritive value of feed ingredients, DM basis[1].

	Egyptian Clover Hay	Rice Straw	Straw-Mufeed mix.[2]	Corn Grains	Wheat Bran	Cotton-seed meal
DM, %	89.00	90.00	88.50	89.00	89.00	90.00
ME, Mcal/kg	1.99	1.48	1.91	3.18	2.35	2.84
TDN, %	55.00	41.00	43.90	80.00	65.00	75.00
TP, %	16.00	3.20	4.55	9.2	17.10	25.60
DIP, %	11.52	1.85	3.28	2.76	12.10	19.06
CF, %	28.80	35.10	31.60	2.60	11.30	22.55

1. Data extracted from Kearl *et al.* (1979) and UCD (1997). Feed ingredients are the same as those used in the ewe experiment (Farid *et al.*, 2006ab).
2. Mufeed is a commercial urea-molasses mix containing 4.0% urea and 1.0% trace-mineralized salt, and added to straw at the rate of 10% w/w, as fed basis.

Offspring from that experiment were used for the present study. During the nursing phase from birth till weaning they were kept with their dams and were sharing the feed ingredients offered to the dams in each respective treatment. Apparently their intake became significant as they approached the eighth week of age and beyond (Farid *et al.*, 2006a). Live body weights were recorded weekly after overnight fast.

Weaning was carried out in five weekly batches when the lambs were 16 weeks old (±3 days). During the four weeks after weaning was complete all lambs, males and females, were housed together in one group and fed *ad lib* berseem hay and a concentrate mixture at the rate of 10 g/day/kg live body weight. The concentrate mixture was composed of 63% ground corn grains, 10% wheat bran, 22% soybean meal, 3% cane molasses, 1% limestone and 0.5% of each of salt and TM-salt. This was the transition period.

Following this transition stage, the sexes were separated into two groups and the lamb growing/fattening experiment would have started. However, it had to be postponed for another four weeks because berseem hay was in short supply at the farm. At the age of 6-7 months, 28±2 weeks, ewe- and ram-lambs from the four dam groups were each group-housed in separate shaded pens, one for males and another for females. The ewe-lambs were fed and raised as replacements whereas the ram-lambs were given a fattening diet for a period of 12 weeks. Following the termination of the experiment the animals were turned to the authority of the experimental farm staff but continued on the same diets for a further four week period and intake and live body weights were recorded. This was done to assess the precision of flock management by the farm staff as compared to the presumably more tight management under experimental conditions.

Feeding standards used were those recommended by NRC (1985). Rations were generated using the ARIES software of the University of California, Davis (UCD, 1997). It consisted of berseem hay, rice straw and concentrate mixtures. The composition of the concentrate mixtures is summarized in Table 2. Diets were offered twice daily at 8:00 AM and 4:00

PM and water was made available once daily after the morning feeding. Shrunk live body weights were recorded biweekly. The results were used to investigate the carry over effect of the dam treatments on post-weaning lamb performance as well as to characterize the growth and fattening potential of those lambs. Data was statistically analyzed using the GLM procedures of SAS (1990).

Table 2. Composition (%) of the concentrate mixtures, DM basis.

Ingredients	Before (4 wks)	Growth/fattening period: 0-4 wks	5-8 wks	9-12 wks	After (4 wks)
Growing ewe-lambs concentrates:					
Corn grains	42.00	42.00	38.00	35.00	35.00
Wheat bran	0.00	0.00	36.00	43.00	43.00
Cottonseed meal	54.00	54.00	20.00	18.00	18.00
Limestone	2.00	2.00	2.40	1.60	1.60
Salt	1.00	1.00	2.40	1.60	1.60
TM-VIT mix.	1.00	1.00	1.20	0.80	0.80
Fattening ram-lambs concentrates:					
Corn grains	24.87	24.87	25.95	34.35	36.50
Wheat bran	43.33	43.33	46.34	41.28	40.00
Cottonseed meal	27.89	27.89	23.16	20.66	20.00
Limestone	1.58	1.58	1.83	1.54	1.50
Salt	1.58	1.58	1.83	1.54	1.50
TM-VIT mix.	0.75	0.75	0.92	0.63	0.50

RESULTS

Pre-weaning Growth

Least square means of birth and weaning weights and growth rates are summarized in Table 3. Growth curves were drawn from arithmetic means (Figure 1). At birth, male and female lambs from the control dams were heavier than those from the hay group dams but observed differences were not significant ($P>0.05$). As the nutritional quality of the roughage offered to the dams decreased, the birth weight of their offspring decreased. The weaning weights showed a different trend. Male and female lambs from the hay-fed dams became heavier ($P<0.05$) than their control mates, and the latter were similar to lambs from ewes fed straw in the other two groups. Weaning weights of lambs from the hay-fed dams were 27.83 kg for ewe-lambs and 27.75 kg for ram-lambs. Corresponding weights of lambs from the control ewes were 21.88 kg and 21.72 kg for females and males, respectively; females were few grams heavier than males. It has been shown earlier (Farid *et al.*, 2006b) that the hay-fed ewes surpassed the others, including the NRC controls, in body condition at lambing and weaning, and in milk production.

Growth rates were calculated during four 4-week periods between birth and weaning, least-square means are summarized in Table 3. In general, growth was particularly fast between 5 and 8 weeks especially in the control and hay group ewe-lambs. This trend was not observed in the ewe-lambs originating from the straw-fed ewes.

Table 3: Pre-weaning growth rates of ewe- and ram-lambs.[1]

Lamb group	Dam feeding groups:			
	NRC control	Hay group	Hay-Straw	Straw-Mufeed
Ewe-lambs				
Birth weight, kg	(8) 3.83±0.193^{a}	(5) 3.63±0.244^{a}	(11) 3.22±0.164^{ab}	(6) 2.96±0.222^{b}
Weaning weight, kg	(8) 21.88±1.336^{b}	(3) 27.83±2.181^{a}	(9) 22.78±1.259^{ab}	(5) 22.90±1.690^{ab}
Growth rates, kg/day:				
0- 4 wks	(8) 0.15±0.016^{b}	(4) 0.22±0.026^{a}	(9) 0.16±0.015^{ab}	(5) 0.17±0.020^{ab}
5- 8 wks	(8) 0.22±0.017^{ab}	(3) 0.26±0.028^{a}	(9) 0.17±0.016^{b}	(5) 0.17±0.022^{b}
9-12 wks	(8) 0.15±0.016^{a}	(3) 0.18±0.026^{a}	(9) 0.16±0.015^{a}	(5) 0.19±0.020^{a}
13-16 wks	(8) 0.13±0.016^{b}	(3) 0.22±0.026^{a}	(9) 0.20±0.015^{a}	(5) 0.19±0.020^{ab}
Total period	(8) 0.16±0.011^{b}	(3) 0.22±0.018^{a}	(9) 0.17±0.010^{ab}	(5) 0.18±0.014^{ab}
Ram-lambs				
Birth weight, kg	(10) 3.87±0.193^{a}	(12) 3.76±0.176^{a}	(3) 3.23±0.345^{a}	(3) 3.45±0.354^{a}
Weaning weight, kg	(9) 21.72±0.154^{a}	(12) 27.75±1.866^{a}	(3) 19.50±3.732^{a}	(1) 26.50±6.463^{a}
Growth rates, kg/day:				
0- 4 wks	(10) 0.11±0.022^{ab}	(12) 0.20±0.020^{a}	(3) 0.15±0.040^{ab}	(2) 0.07±0.049^{b}
5- 8 wks	(10) 0.21±0.021^{a}	(12) 0.22±0.020^{a}	(3) 0.14±0.039^{ab}	(2) 0.10±0.048^{b}
9-12 wks	(10) 0.17±0.024^{a}	(12) 0.20±0.022^{a}	(3) 0.11±0.044^{a}	(2) 0.22±0.054^{a}
13-16 wks	(9) 0.15±0.019^{a}	(12) 0.24±0.017^{a}	(3) 0.17±0.034^{a}	(1) 0.25±0.058^{a}
Total period	(9) 0.16±0.019^{a}	(12) 0.22±0.016^{a}	(3) 0.14±0.032^{a}	(1) 0.20±0.056^{a}

1. Least-square means ± SEM, numbers in parenthesis are numbers of animals.

a-b Means in a row not sharing a superscript were significantly (P<0.05) different according to Duncan's multiple range test.

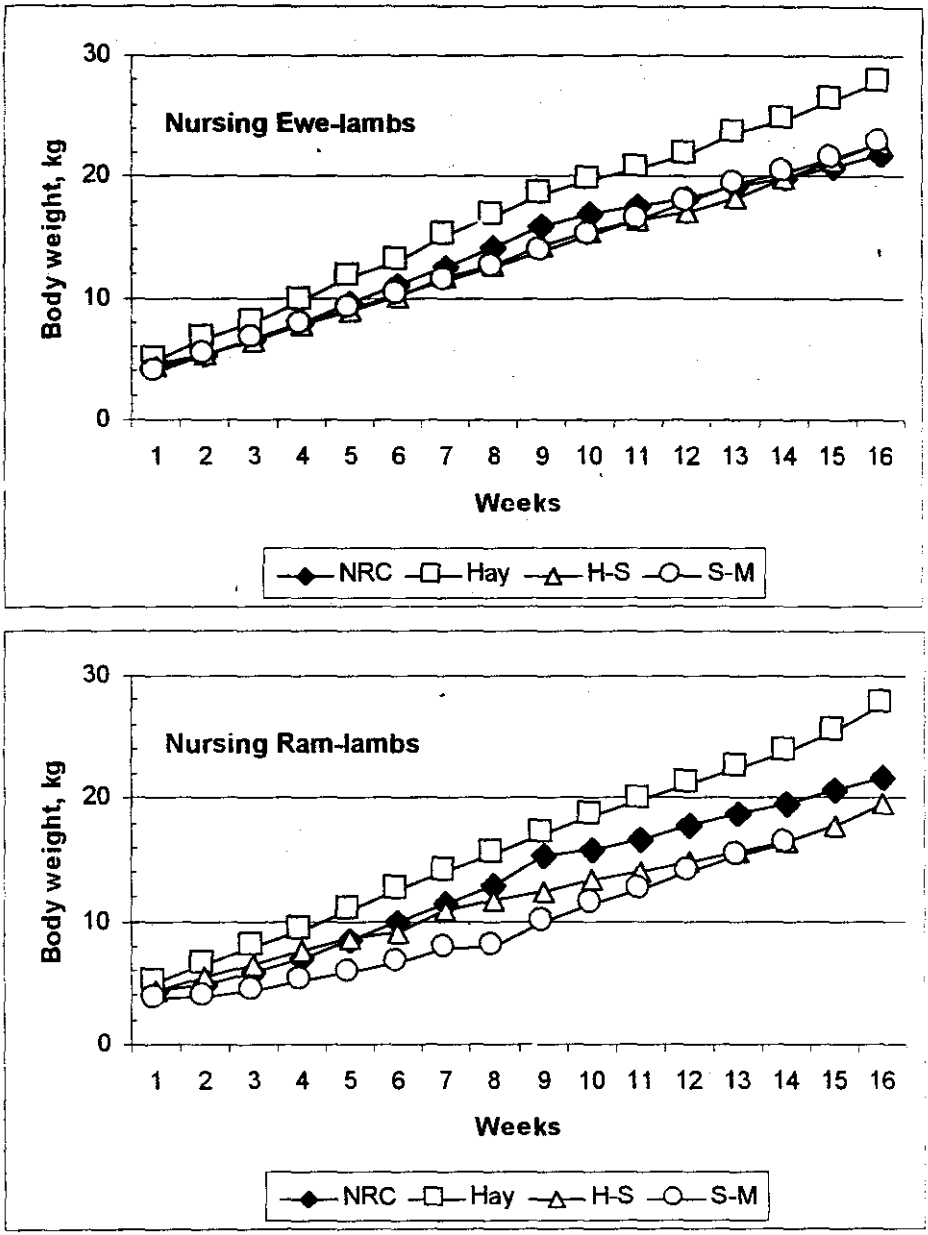

Figure 1. Growth curves of nursing ewe-lambs (top) and ram-lambs (bottom).

Overall, lambs from the hay-fed ewes grew at the rate of 0.22 kg/day whereas those from the control group grew at only 0.16 kg/day ($P<0.05$). Males and females were not different.

The growth curves shown in Figure 1 indicate a relatively stable increase in live body weight throughout the 16-week period supporting the contention (Farid *et al.*, 2006b) that as milk production decreased and weights increased the lambs shared the diets offered to the dams especially the concentrates (and possibly hay) and in particular beyond the age of eight weeks.

Growing Replacement Ewe-lambs

Post-weaning growth curves of the ewe-lambs are illustrated in Figure 2. The first four weeks were the post-weaning transition period. During the following four weeks the farm suffered from shortage of berseem hay and flock feeding was irregular. The experimental growth period of the replacement ewe-lambs extended between weeks 9 and 20 post-weaning, a total of 12 weeks. During the following terminal four weeks the ewe-lambs continued to receive the growth diets but under the authority of the experimental farm staff rather than the research team.

The diets fed during these periods, dietary intake and intake characteristics, are summarized in Table 4. They were generated as per the NRC (1985) recommendations. Intake characteristics were within nutritionally and physiologically normal ranges. Roughage constituted more than 40% of total DMI. Therefore, the crude fibres fraction (CF%) was maintained above the 18% accepted critical minimum. Also, rumen degradable intake protein (DIP) represented two-thirds of the total protein intake.

Table 4. Dietary intake and calculated intake characteristics, DM basis, of growing ewe-lambs.

Ingredients & Nutrients	Before (4 wks)	Growth period: 0-4 wks	5-8 wks	9-12 wks	After (4 wks)
Average daily intake, per kg^0.75					
DMI, g					
Hay	5.17	39.34	45.30	39.24	39.59
Straw	38.06	4.29	0.00	0.00	0.00
Concentrate	46.82	48.42	48.82	53.73	51.98
Total DMI	90.06	92.06	94.12	92.97	91.57
ME, kcal	198.49	220.04	197.71	192.26	190.00
Total protein, g	10.24	14.86	14.42	14.34	14.11
Intake characteristics:					
ME, Mcal/kg DM	2.02	2.39	2.10	2.07	2.07
TP, % DMI	11.38	16.14	15.33	15.43	15.40
DIP, % TP	64.69	67.90	67.21	67.10	67.11
CF, %	23.33	20.93	18.80	17.78	17.92
Roughage, %	48.03	47.40	48.13	42.29	43.24

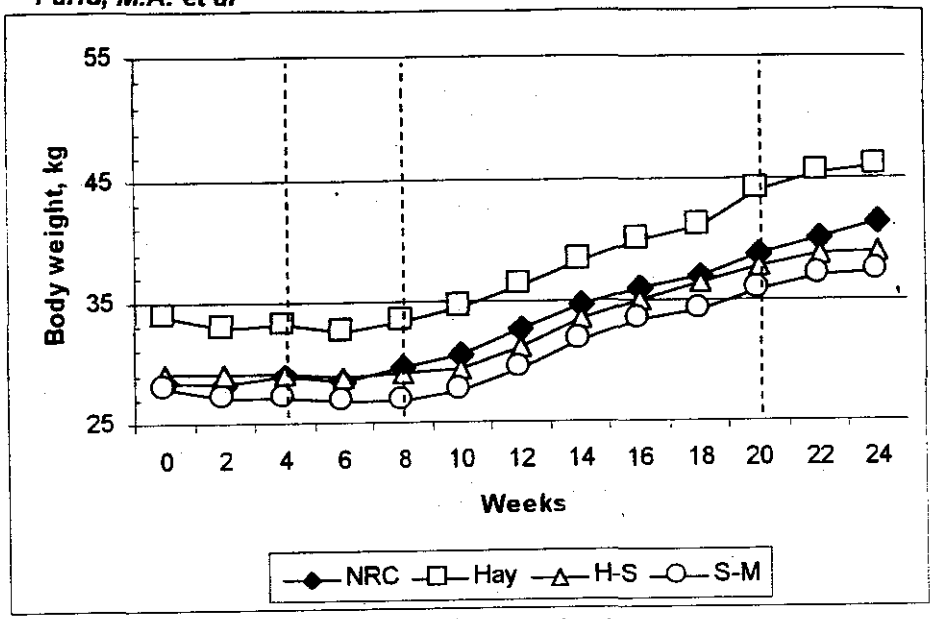

Figure 2. Growth curves of growing ewe-lambs.

Ewe-lambs originating from the hay-fed ewes exhibited heavier weights and faster growth rates than the controls throughout the 12-week experimental period. Least-square means are presented in Table 5. Whereas the ewe-lambs from the hay-fed ewes reached a weight of 44.06 kg and were growing at the rate of 0.13 kg/day, those from the control ewes weighed 38.79 kg and had a daily growth rate of 0.11 kg/day. The controls were heavier than the ewe-lambs from dams in the two straw-fed groups but growth rates were practically similar.

The ewe-lambs from all four dam groups had reached live body weights and were of age, about 9-10 months, believed suitable for being run with the rams in intensive production systems. Yet, those from the hay-fed dams at 44 kg live body weight are believed heavy for their age (9-10 months). The minimum average was 35.8 kg for ewe-lambs from the straw-Mufeed fed dams. In comparison, the 14 primiparous ewe used in the dam experiment were yearlings (12-16 months) and weighed only between 20 and 27 kg, similar to weaning weights realized in the present experiment, an evidence of inappropriate farm flock management. Additionally, during the terminal four weeks (weeks 21-24, Figure 2) the increase in live body weight of ewe-lambs was less than during the growing experimental period even though they continued to receive the growing diets, another evidence of inappropriate farm flock management.

Fattening ram-lambs

Post-weaning growth of ram-lambs from the different dam groups is illustrated in Figure 3. The dam group fed straw-Mufeed was not represented as there was only one lamb and it died after weaning. The periods were those explained in the previous section. The fattening period extended between weeks 9 and 20 post-weaning, a total of 12 weeks.

Table 5: Post-weaning growth rates of growing replacement ewe-lambs.[1]

	Dam feeding groups:			
	NRC control	Hay group	Hay-Straw	Straw-Mufeed
Ewe-lambs, post-weaning (growing) stage:[2]				
Starting weight, kg	(8) 29.57±1.613^{ab}	(3) 33.33±2.634^{a}	(9) 29.10±1.521^{ab}	(5) 26.88±2.040^{b}
Ending weight, kg	(8) 38.79±1.697^{ab}	(3) 44.06±2.772^{a}	(9) 37.85±1.600^{ab}	(5) 35.78±2.147^{b}
Growth rates, kg/day:				
0- 4 wks	(8) 0.11±0.012^{a}	(3) 0.11±0.021^{a}	(9) 0.08±0.012^{a}	(5) 0.09±0.016^{a}
5- 8 wks	(8) 0.12±0.011^{a}	(3) 0.13±0.018^{a}	(9) 0.13±0.011^{a}	(5) 0.14±0.014^{a}
9-12 wks	(8) 0.10±0.012^{b}	(3) 0.15±0.019^{a}	(9) 0.10±0.011^{b}	(5) 0.09±0.015^{b}
Total period	(8) 0.11±0.007^{a}	(3) 0.13±0.011^{a}	(9) 0.10±0.006^{a}	(5) 0.11±0.008^{a}

1. Least-square means ± SEM, numbers in parenthesis are numbers of animals.
2. Average age at start of ewe-lambs growth experiment was 6.5 months, ~ 28±2 weeks.

a-b Means in a row not sharing a superscript were significantly ($P<0.05$) different according to Duncan's multiple range test.

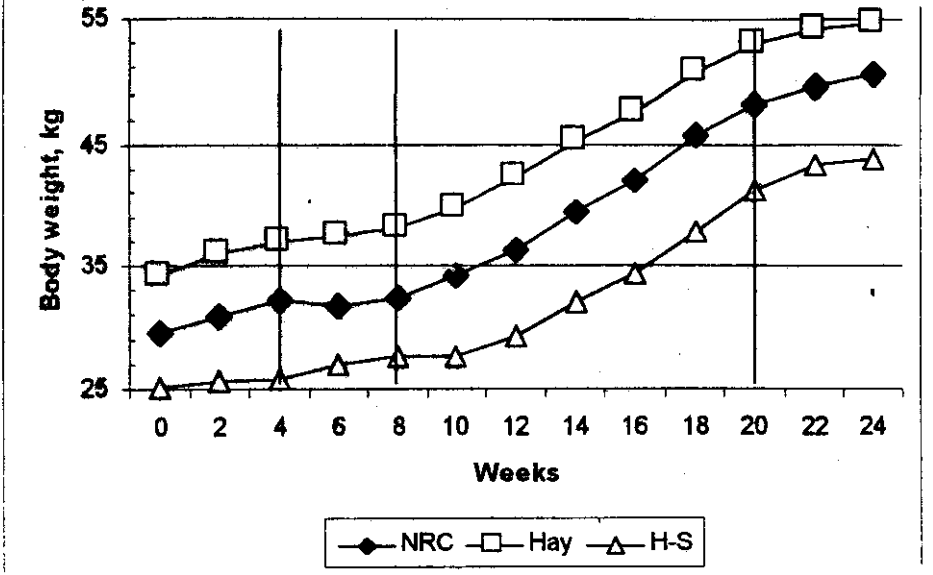

Figure 3. Growth curves of fattening ram-lambs.

Dietary intake and intake characteristics are summarized in Table 6. Diets were generated as per the NRC (1985) recommended allowances. Roughages, berseem hay and rice straw, constituted 52% of the total DMI and the crude fibres fraction was maintained at more than 20%. Rumen degradable intake protein (DIP) was two-thirds of the total protein intake. At the start of the 12-week fattening period, ram-lambs from the hay-fed dam group were heavy at 38.08 kg as compared to 32.32 kg for the controls (least-square means are summarized in Table 7).

Table 6. Dietary intake and calculated intake characteristics, DM basis, of fattening ram-lambs.

Ingredients & Nutrients	Before (4 wks)	Fattening period: 0-4 wks	5-8 wks	9-12 wks	After (4 wks)
Average daily intake, per kg^0.75					
DMI, g					
Hay	9.96	47.64	48.73	40.34	34.67
Straw	43.76	12.35	13.43	17.90	22.30
Concentrate	52.01	53.49	49.95	51.71	58.55
Total DMI	105.74	113.47	112.12	109.9	115.53
ME, kcal	201.92	228.35	220.89	225.8	238.51
Total protein, g	12.22	17.42	16.68	15.65	16.78
Intake characteristics:					
ME, Mcal/kg DM	1.91	2.01	1.97	2.05	2.06
TP, % DMI	11.57	15.35	14.88	14.24	14.52
DIP, % TP	65.98	67.68	67.68	64.90	60.38
CF, %	22.85	21.01	20.14	21.74	20.01
Roughage, %	50.57	52.86	55.43	52.96	49.32

Table 7: Post-weaning growth rates of fattening ram-lambs.[1]

	Dam feeding groups:			
	NRC control	Hay group	Hay-Straw	Straw-Mufeed
Ram-lambs fattening stage:[2]				
Starting weight, kg	(9) 32.32+2.510^{ab}	(12) 38.08+2.173^{a}	(3) 27.69+4.347^{b}	Missing[3]
Ending weight, kg	(9) 48.25+3.083^{a}	(12) 53.09+2.670^{a}	(2) 41.24+6.539^{a}	
Growth rates, kg/day:				
0- 4 wks	(9) 0.14+0.016^{a}	(12) 0.15+0.014^{a}	(3) 0.05+0.027^{b}	
5- 8 wks	(9) 0.20+0.012^{a}	(12) 0.18+0.011^{a}	(2) 0.17+0.026^{a}	
9-12 wks	(9) 0.22+0.018^{a}	(12) 0.19+0.016^{a}	(2) 0.24+0.039^{a}	
Total period	(9) 0.19+0.012^{a}	(12) 0.18+0.011^{a}	(2) 0.15+0.025^{a}	

1. Least-square means ± SEM, numbers in parenthesis are numbers of animals.
2. Average age at start of ram-lambs fattening experiment was 6.5 months, ~ 28±2 weeks.
3. Only one ram-lamb was weaned in this group and it soon died.

a-b Means in a row not sharing a superscript were significantly ($P<0.05$) different according to Duncan's multiple range test.

At the age of 9-10 months fattened ram-lambs from the hay-fed dams weighed 53.09 kg and were growing at the rate of 0.18 kg/day. Their mates from the control dams weighed 48.25 kg and their growth rate was 0.19 kg/day. Corresponding figures for those from the hay-straw dam group were only 41.24 kg and 0.15 kg/day.

Average daily gain during the first four weeks of the fattening period (0-4 weeks) were less than during succeeding periods, weeks 5-8 and 9-12 (Table 7). This was probably due to the retarded growth during the four weeks that preceded fattening because of hay shortage at the farm.

Furthermore, flock management at the farm level was believed below optimum as the ram-lambs, similar to the ewe-lambs, grew less during the terminal four weeks (Figure 3) after the experimental fattening period had ended at week-20 even though they continued to receive the fattening diet but were not under the authority of the research team.

DISCUSSION

In an attempt to investigate the production potential of native sheep a producer should target for growing ewe-lambs as replacements and for the early fattening of ram-lambs, the present findings are compared to results from the literature for the Barki and Ossimi sheep breeds.

Ewe-lambs from control and hay-fed ewes were heavier at birth, 3.83 and 3.63 kg, than the average birth weight of Barki and Ossimi ewe-lambs (Table 8), being 3.15 and 3.00 kg, respectively. Birth weight of ewe-lambs from the two straw-fed groups were less than the averages of the two breeds, but were within the range of cited literature. At weaning, ewe-lambs from all four dam groups were heavier than the average of cited results, and were at or above the high end of the range. Those from the hay-fed ewes were particularly heavy, weighing 27.8 kg at four months of age.

Consequently, growth rates from birth to weaning at the age of four months were greater than those cited from the literature. Ewe-lambs from the hay-fed group grew at 220 g/day and their control mates at 160 g/day. These are about 169% and 123% of the average growth rate values listed in Table 8 for Barki and Ossimi sheep, and exceeded the higher end of the range.

Post-weaning, average weights recorded at the age of 9-10 months were a maximum of 44.08 kg for ewe-lambs from the hay-fed dams and a minimum of 35.78 kg for those from the straw-Mufeed fed dams. All were greater than average weights recorded at 12 months of age for both Barki and Ossimi (Table 8), 30.7 and 33.8 kg, respectively. Growth rates observed in the present study were 110 and 130 g/day for ewe-lambs originating from control and hay-fed ewes, respectively, twice as much as that cited for Barki and Ossimi sheep, 51 and 60 g/day, respectively.

Noteworthy, the ewe-lambs from the hay-fed dams at 44 kg live body weight are believed heavy for their age (9-10 months) and could be over-fat, a condition that might negatively affect their fertility. Using body condition scoring (BCS) to monitor the growing ewe-lamb condition is, therefore, essential to avoid over-fattening. This is common practice in western countries, and in grazing sheep countries to fine-tune supplementary feeding on the range.

Table 8: Literature summary of selected growth parameters of male and female Barki and Ossimi lambs.

Breed	Barki					Ossimi					
Reference no.	(1)	(2)	(3)	(4)	(5)	(2)	(5)	(6)	(7) Lambing season		
Treatments									W	S	Sp
Growing ewe-lambs:											
Live weight, kg:											
Birth	3.36	2.60	2.32	3.35	4.10	2.52	3.30	3.50	3.40	2.80	2.60
Weaning (4 m)	17.8	17.6	16.3	18.3	21.9	18.3	21.6	16.4	19.4	16.7	20.4
Yearling (12 m)	31.0	33.2	25.8	29.7	33.8	32.4	35.1	34.9	33.1	37.1	30.2
Daily gain, g:											
Birth-Weaning	117	125	116	124	148	131	152	108	133	132	148
Wean-Yearling	56	63	39	50	49	58	55	76	56	75	40
Growing ram-lambs:											
Live weight, kg:											
Birth	3.46	2.78	2.36	3.63	4.50	2.70	3.60	3.60	4.10	2.50	2.50
Weaning (4 m)	19.0	19.2	17.2	20.9	22.9	19.8	23.2	18.3	20.3	19.1	20.5
Yearling (12 m)	35.4	37.6	28.7	37.6	36.3	37.3	37.9	39.7	37.4	42.4	36.1
Daily gain, g:											
Birth-Weaning	127	137	124	144	153	143	163	122	135	138	150
Wean-Yearling	64	75	47	68	55	71	60	87	70	95	64

1- Fahmy *et al.* (1969), 2- Aboul-Naga *et al.* (1972), 3- El-Kouni *et al.* (1974),
4- Guirgis *et al.* (1982), 5- Labban and Radwan (1963), 6- Ghoneim *et al.* (1968),
7- Labban and Ghali (1969).

Table 9: Literature summary of selected fattening parameters of Barki and Ossimi ram-lambs.

Breed	Barki							Ossimi					
Reference no.	(1)	(2)		(3)				(4)	(5)	(6)			(7)
Treatments		Weight for Age		Source of roughage and energy						Energy, % of recom.			
		light	heavy	(A)	(B)	(C)	(D)			100	120	140	
Age at start, month	8	9.5		6-8					7		4		3-4
Fattening period, day	85	~ 60		120				150	90		120		150
Starting weight, kg	21.0	19.3	30.3	30.6	30.6	30.5	30.8	20.0	37.8	20.3	20.2	19.5	16.0
Terminal weight, kg	37.4	29.5	41.8	51.5	47.5	46.8	46.4	41.2	50.4	36.2	37.4	41.4	35.1
Total gain, kg	16.4	11.4	11.2	21.1	17.1	16.5	15.7	21.2	12.6	15.9	17.2	21.9	19.1
Average daily gain, g	200	191	187	175	141	136	130	141	140	143	157	174	145
Dressing, % (without fat-tail)	45.4	40.2	43.5					47.4		47.2	46.8	49.9	
Feeding reference no.	(8)	(8)		(9)					(8)		(10)		(10)

1- Galal *et al.* (1971), 2- Younis *et al.* (1976), 3- Shawket *et al.* (2002),
4- Ragab *et al.* (1966), 5- Touny (1972), 6- Aboul-Naga & El-Shobokshy (1974),
7- El-Serafy *et al.* (1981), 8- Morrison (1959), 9- Kearl (1982),
10- Tommi (1963).

(A) Berseem hay + barley grains,
(B) *Atriplex halimus* + *Acacia cynophylla* + barley grains,
(C) *Atriplex halimus* + *Acacia cynophylla* + barley grains + date stones (low),
(D) *Atriplex halimus* + *Acacia cynophylla* + barley grains + date stones (high).

A system for scoring fat-tailed sheep was developed for use with Awassi sheep in Syria (Hossamo *et al.*, 1986). Similar scoring systems can be developed for other fat-tailed sheep.

The findings from the present experiment clearly illustrate the carry-over effect of ewe feeding and management during pregnancy and lactation on the performance of offspring, not only while in the nursing stage but in later life as well. The practical and economic implications are obvious.

Growth of nursing ram-lambs was similar in pattern to that of ewe-lambs described above, both for the effect of treatments imposed in the dam experiment and in comparison to results cited from the literature (Table 8). At weaning, they were heavier than the average weaning weight reported in the literature for Barki and Ossimi ram-lambs, being 19.84 and 20.20 kg, respectively. Weaned ram-lambs from the control and hay-fed dams were 21.72 and 27.83 kg. Their growth rates were 160 and 220 g/day, respectively, greater than 137 and 141 g/day reported for nursing Barki and Ossimi ram-lambs (Table 8). There were no growth differences between males and females in the present experiment.

The results of fattening ram-lambs in the present investigation were also compared with results from the literature utilizing Barki and Ossimi ram-lambs (Table 9). In some of these studies, animals at start of fattening were under-weight for their age. In addition, different feeding standards were used in the different experiments. Two of the experiments cited in Table 9 were apparently carried out under optimum conditions. In one experiment (Aboul-Naga and El-Shobokshy, 1974), Ossimi ram-lambs were started on fattening diets immediately after weaning at the age of 4 months. Average daily gains were 143 and 174 g/d when offered 100% and 140% of the allowances recommended by Tommi (1963). In another experiment (Shawket *et al.*, 2002), Barki ram-lambs were 6-8 months old and weighed an average of 30.6 kg when used for fattening for a period of 120 days using allowances recommended by Kearl (1982), which is not much different from the NRC (1985) allowances. Those receiving conventional berseem hay and barley grains diets had an average daily gain of 175 g/day and weighed 51.5 kg at the end of the fattening period. Corresponding values from their mates fattened on halophytic plants supplemented with barley grains and date stones were 130 g/day and 46.4 kg, respectively.

Ram-lambs fattened in the present experiment were not much different except those originating from hay-fed ewes. Those were heavier at start, 38.08 kg at 6-7 months of age, 53.09 kg after 90 days and an average daily gain of 180 g/day. They were superior to the others because of their better condition at the start of fattening due, at least in part, to the better feeding management of their dams. Therefore, as with the growing ewe-lambs, the carry-over effect of dam feeding and management during pregnancy and lactation on the performance of ram-lambs was evident, while in the nursing stage and during fattening as well.

IMPLICATIONS

The over all experiment was carried out in attempt to investigate the inherent production potential of native sheep that producers are to target to insure high productivity and economic viability of sheep production enterprises. The main topics of concern included feed intake capacity and utilization and the management of feeding (Farid *et al.*, 2006a), reproductive efficiency of the ewe and production rate (Farid *et al.*, 2006b) and the performance of offspring pre- and post-weaning, and including raising replacement ewe-lambs and fattening ram-lambs (the present communication).

The results emphasized that presently prevailing flock management practices (i.e. nutrition, reproduction and health) are far from optimum. It is, therefore, unfair to brand the native breeds of sheep as being low and un-economic producers. Upgrading research philosophy, objectives and methodology is first priority.

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تأثير الرعاية الغذائية على إنتاج الأغنام فى جنوب سيناء : .
٣ - الحملان قبل وبعد الفطام .

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أجريت هذه الدراسة لتقييم معدلات النمو قبل الفطام فى الحملان، ثم بعد الفطام للحوليات التى تربى للإحلال فى القطيع والجوالي للتسمين . وكذلك دراسة تأثير تغذية الأم خلال الحمل وإنتاج الحليب على صفات النمو فى الحملان .

إستخدمت الحملان الناتجة من دراسة عن تغذية النعاج كانت تشمل أربع مجموعات : مجموعة المقارنة وكانت تغذى على علائق محسوبة طبقا للمقننات الغذائية الأمريكية ، مجموعة أعطيت الدريس ، تغذيه حرة ، وحده فى المرحلة الأولى من الحمل ثم أعطيت حبوب الذرة وكسب القطن ، أيضا تغذية حرة بالإضافة إلى الدريس ، حتى فطام الحوالى فى عمر ١٦ أسبوع . فى المجموعتين الباقيتين أستبدل دريس البرسيم إما بثلث البرسيم وقش الأرز أو قش الأرز مضافا إليه المفيد (مركب تجاري من المولاس واليوريا والأملاح المعدنية) .

جرى تتبع نمو الحملان خلال فترة الرضاعة حتى عمر ١٦ أسبوع . ثم بعد الفطام (لمدة ١٢ أسبوع ، خلال الفترة ٩-٢٠ أسبوع بعد الفطام) حيث أعطيت الحوليات علائق للنمو لكى تربى للإحلال فى القطيع وأعطيت الذكور علائق للتسمين ، كلتاهما محسوبة على أساس المقننات الغذائية الأمريكية . وقد قدرت كمية الغذاء المأكول يوميا ووزن الحيوان كل أسبوعين . كانت التغذية فى مجموعتين واحدة للحوليات التى تربى للإحلال والثانية لحوالى التسمين .

كان لتغذية الأم خلال الحمل والرضاعة تأثيرا معنويا ملحوظا على أداء الحملان خلال فترة الرضاعة وأيضا بعد الفطام ، فى فترة الرضاعة تفوقت الحملان ، ذكور وأناث ، من النعاج التى غذيت على الدريس على مثيلاتها من مجموعة المقارنة ، بينما كان نمو الحملان الناتجة من النعاج التى غذيت على قش الأرز متدنيا .

بالمثل ، تحققت ذات النتيجة بعد الفطام فى مجموعة الحوليات التى تربى للإحلال فى القطيع ومجموعة حوالى التسمين . إلا أن الحوليات من مجموعة الدريس زاد وزنها بمعدل يعتقد أنه أكبر من المطلوب حيث كان متوسط الوزن ٤٤ كيلو جرام فى عمر ١٠ شهور ، مما يعنى زيادة ترسيب الدهن فى الجسم وقد يؤثر سلبا على الكفاءة التناسلية .

مقارنة بالنتائج المنشورة عن النمو والتسمين فى سلالتى البرقى والأوسيمى ، من مصادر مختلفة ، فقد جاءت البيانات المتحصل عليها من الدراسة الحالية متفوقة عليها إجمالا ، مما يؤكد أهمية الإهتمام بالرعاية الغذائية للنعاج خلال الحمل والحليب ، ثم الحملان قبل وبعد الفطام ، لضمان نجاح وربحية أنشطة انتاج الأغنام.