EFFECT OF ENERGY LEVEL ON DIGESTION COEFFICIENTS AND PERFORMANCE OF EWES DURING PREGNANCY AND LACTATION IN SOUTHERN SINAI.

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SUMMARY

Sixty adult Barki ewes (3-4) years old and averaged 46.7±1.77 Kg live body weight) were used to study the effect of energy level on digestion coefficients and performance of ewes during pregnancy and lactation stages. Animals were assigned into three equal group (20 each) received one of the three level of energy 80,100 and 120% TDN respectively according to NRC (1985). Feeding trails during early pregnancy (3 months after mating), late pregnancy (last 2 months before lambing), early lactation (1st month) after parturition and late lactation period for complete evaluation of nutritive value and digestion coefficient. Voluntary feed intake, chemical composition has been carried out. Milk production and productive trails were estimated. The main result showed that the DM intake was increased ($p<0.01$) with high energy level (120 and 100% TDN) than low energy level (80% TDN). The animal group fed 80% TDN level (R_1) recorded the highest digestibility coefficients for DM, OM,CP, EE, NFE and nitrogen balance followed by 120 and 100% TDN level (R_3 and R_2) respectively. CP and CF digestibility decreased ($P<0.01$) with increasing feeding energy. Nutritive values (TDN and DCP intake g/Kg BW) were significantly ($p<0.01$) increasing with feeding level. However TDN and DCP percentage of dry matter intake were higher in ewes group fed ration containing 80% TDN compared to 100 either or 120% TDN groups. Animals received high energy level R3 recorded higher mean body weight before lambing followed by R2 and R1 while, those fed 100% TDN (R2) recorded lower mean in body weight loss just after lambing .Average daily gain of lambs from birth to weaning as will as milk yield scored the highest value for R3 followed by R2 and R1 .Reproductive performance in terms of conception rate and lambing rate were improved with higher level of energy compared to 80% TDN group. Moreover, results reflect the role of high energy level on subsequent fertility where groups R2 and R3 scored the higher average letter size. It could be concluded that increasing the energy level in the diet of the ewes improved rate of growth, daily gain, birth weight and daily milk yield.

***Keywords**: energy level; sheep; digestibility; milk yield; productive and reproductive performance.*

INTRODUCTION

Nutrition is a major factor affecting the physiological and metabolic status of sheep. Age and weight differ at puberty among heifers receiving diets with higher energy content compared with those receiving diets with lower energy content (Bergfeld *et al.*, 1994).

Nutritional components especially energy level is the most important factor affecting digestibility, body weight ,body weight changes, birth weight, milk yield (Maninen and Huhta, 2001 and El-Ashry *et al.*, 2003).

Shahin (2000) mentioned that optimal energy allowances during rearing of sheep depend on the breed, age, feed cost and effects on health, longevity and performance, the high energy level can be applied in the stages such as late gestation and early lactation to maximize the milk production and pre-weaning average daily gain of the lambs. Zedan (1995) reported that energy intake and poor body condition after calving delay the return of normal function of the ovaries; conception rate tends to decrease when energy intake is inadequate. Thus, optimal feeding before calving help animals to reach parturition in good body condition insures maximum production and high reproductive efficiency. It is an established fact that high level of feeding during late pregnancy has positive effect on their preformance pre and post calving of dairy cows (Bayoumi, 1995 and El-Ashry *et al.*, 2003).

The present study aimed to studying the effect of different levels of energy on nutrient digestabilities and productive perfermance of Barki ewes during the metabolic stresses of pregnancy and lactation.

MATERIALS AND METHODS

This study was conducted at Ras Sedr Research Station in south Sinai, belongs to the Desert Research Center, Cairo, Egypt.

Animal and feeding:

Sixty Barki ewes (2- 3 years old and averaged 46.72 Kg ±1.77 live body weight) were randomly assigned with in age class to three experimental groups. Animals were group housed in partially shaded pens. Feed allowances were adjustment to (80 %, 100 % and 120 % TDN) for groups 1, 2 and 3 respectively, as per weight and physiological state according to NRC, (1985). The basal ration composed of concentrate feed mixture (CFM) and roughage (berseam hay and rice straw) as ratio of 30:70, 60:40 and 40:60 in early and late pregnancy and lactation period ,respectively. The concentrate feed mixture consisted of 81 % yellow corn, 15.4 % cotton seed meal, 1.2 % limestone, 1.2 % salt and 1.2% vitamin and mineral.

In order to facilitate the management of feeding the physiological states of the ewe i.e. early and late pregnancy, were calculated assuming day 15 of the mating season as the starting date. Aflushing regieme of concentrate feed mixture was used for all animals, two weeks prior mating season and extended to three week after mating season at the rate of 150 g/h/d.

Management and procedures:

The CFM was individually weighed for each animal and offered daily at 8.0 a.m. while roughage was offered at 4.0 P.m. Animals were weighed before morning feeding on two consecutive days at beginning and end of the feeding trials which conducted in each stage of pregnancy (two stages) during the post 90 th days and next 60 th day (late pregnancy).

Fresh water was available for free choice drinking once daily after the morning feed except during the digestibility trails where it was measured twice daily

At the end of early pregnancy stage (last 3 months of pregnancy) .three animals from each group were randomly chosen to be used in a conventional digestibility and nitrogen balance trials. Ewes were placed individual in metabolism cages as described by Maynard *et al.*, (1978).

The experimental animals were adapted to the cages for 14 days as a preliminary period followed by a 7 days collection period .feed residues if any, were collected, weighed and subtracted from the amount offered to calculate the actual feed intake. Feed and feces samples were quantitatively collected for each animal weighed and a 10 % aliquot was taken and the composite samples were dried .The dry samples were ground to pass throught 1mm .screen sieve and analyzed for proximate components according to A.O.A.C.(1990). Fiber constituents (NDF and ADF) were determined according to Goering and Van Soest (1970).Ewes were weighed at the beginning and then biweekly interval .Body weight changes were recorded at biweekly intervals for each animal during early, late pregnancy and lactation period . The offered diets were calculated and corrected biweekly according to ewes body weight and physiological stage early .Weight of lambs were recorded at birth and then weekly up to weaning at 4months . During lactation period all ewes were hand milked weekly to determine the total milk yield for each animal groups.

Statistical Analysis

Data were analyzed according to SAS (2000) .Means were separated by Duncan's multiple range test (Duncan, 1955)

RESULTS AND DISSCUSION

Chemical composition:

Chemical analysis of ingredients feedstuff is presented in Table (1). Based on dry matter percentage, the organic matter of the concentrate feed mixture (CFM) were the highest compared to the other

ingredients, while the ash content was relatively high in rice straw compared to the other ingredients; i.e. berseem, and concentrate feed mixture. A decrease in crude protein was found in the rice straw compared to berseem hay and concentrate feed mixture, whereas CF was the lowest in CFM compared to rice straw and berseem hay. Nitrogen free extract (NFE) content was the highest in CFM compared with Rice straw and Berseem hay while NDF and ADF were recorded the highest value in rice straw compared with berseem hay and CFM. Similar trend was observed by Gado *et al*, (2006), who found that NDF and ADF contents of untreated rice strow were increased compared to CFM and berseem hay.

Table (1): Chemical composition of the experimental rations (% on DM basis).

Item	Rice straw	Berseem hay	Concentrate feed mixture (CFM)
OM	80.58	85.34	91.87
DM	91.26	90.75	90.41
Ash	19.42	14.66	8.13
CP	3.20	14.99	14.00
CF	35.10	29.00	6.51
EE	1.43	2.59	2.82
NFE	40.95	38.76	68.54
NDF	66.00	46.00	36.00
ADF	44.00	36.00	29.00

Voluntary feed intake during pregnancy period:

Data of voluntary feed intake of ewes fed different levels of requirements are summarized in Table (2). During early pregnancy, R3 scored the highest value of total DM intake either expressed as g/Kg BW as g/kg $BW^{0.75}$ followed by R2 and R1 respectively.

Table (2): Voluntary feed intake of ewes during pregnancy period.

Item	R1 (80 % TDN)	R2 (100 % TDN)	R3 (120 % TDN)	±SE
No. of Animal	20	20	20	
Initial body weight	47.07	46.50	46.60	±1.77
During early pregnancy at 3 months				
Voluntary feed intake				
TDM intake g/Kg BW	22.45	28.06	33.68	
TDM intake g/Kg $BW^{0.75}$	10.31	12.19	13.98	
Crude protein intake				
TCP intake g/Kg BW	2.32	2.89	3.47	
TCP intake g/Kg $BW^{0.75}$	1.87	2.21	2.54	
During late pregnancy				
Voluntary feed intake				
TDM intake g/Kg BW	25.85	32.31	38.77	
TDM intake g/Kg $BW^{0.75}$	11.46	13.55	15.53	
Crude protein intake				
TCP intake g/Kg BW	2.98	3.72	4.47	
TCP intake g/Kg $BW^{0.75}$	2.27	2.68	3.07	

R1:80% TDN, R2:100% TDN, R3:120 % TDN, TCP = Total crud protein, TDM = Total dry mater

The results are in agreement with the findings of Almeida *et al.* (1999); Dawa (2003), El- Ashry *et al* (2003), and Shahin (2004b) The found that increasing energy levels in the diet or energy supplementation resulted in increasing feed intake.

The total dry mater intake (g/Kg BW and g/Kg $BW^{0.75}$) during late pregnancy was decreased in ewes fed level 80% of maintenance requirements compared to both 100% and 120% levels respectively. Total crude protein intake (expressed as g /Kg BW and g /Kg $BW^{0.75}$) were greater for ewes offered R3 followed by R2 and R1. Due to increasing the level of concentrate, the level of feed intake was increased from 125% during early pregnancy to 150% during late pregnancy. So animals in early and late

pregnancy fed high energy level (R3) increased the total DM intake and total crude protein intake . These results are in agreement with Shalaby (2000), who found that increasing energy levels in the concentrate feed mixture increased the DM intake expressed as g/Kg $B.W^{0.75}$

Voluntary feed intake during lactation period:

Results of voluntary feed intake of lactated ewes during (early and late lactation) were summarized in Table (3) During early lactation ,the lowest total dry matter intake (g/kg BW) was recorded in R1(33.7 g/Kg BW) which decreased by 20 and 33.3% than those recorded for R2 and R3 respectively. Similer by ,the crude protien intake (g /Kg BW) of experimental rations (R2 and R3) were increased by 16.7% and 33.4%, respectively, compared to ewes fed R1.This might be related to the higher dry matter intake. The present results are in agreement with those obtained by Shahin *et al*, (2006). Shehate (1972) confirmed that higher DM intake is mainly due to higher energy intakes. Whereas in late lactation, total dry matter and crud protein intake (g/Kg BW and g/Kg $BW^{0.75}$) were decreased compared to early lactation. This might be attributed to the higher milk yield in early lactation compared to late lactation.

Table (3): Voluntary intake of ewes during Lactation period

Item	R1 (80 % TDN)	R2 (100 % TDN)	R3 (120 % TDN)
During early lactation at 2 month			
Voluntary feed intake			
TDM intake g/Kg BW	33.73	42.16	50.59
TDM intake g/Kg $BW^{0.75}$	13.99	16.54	18.97
Crude Protein intake			
TCP intake g/Kg BW	4.38	5.48	6.58
TCP intake g/Kg $BW^{0.75}$	3.02	3.58	4.11
During late Lactation at 2 month			
Voluntary feed intake			
T DM intake g/Kg BW	25.57	31.96	38.36
TDM intake g/Kg $BW^{0.75}$	11.37	13.44	15.41
Crude protein intake			
TCP intake g/Kg BW	3.14	3.92	4.71
TCP intake g/Kg $BW^{0.75}$	2.36	2.78	3.19

TCP = Total crud protein. *TDM = Total dry mater.*

Voluntary intake and nutrient digestibility:

The results of dry matter intake and digestion coefficients during early pregnancy in the digestibility trial are presented in Table (4). In the early pregnancy the corresponding average body weight was 51.66, 52.00 and 51.83 Kg for groups R1, R2 and R3, respectively. Voluntary feed intake revealed that ewes fed 120 % allowances ration (R3) showed significantly ($P<0.01$) higher total dry matter intake by 47 and 20% than those fed 80% (R1) and 100% (R2), respectively. Moreover, ewes fed 80 % allowances (R1) showed a significant ($P<0.01$) lower total DM intake by 18 % than those fed 100% (R2) allowances. These results are in agreement with the findings of Almeida *et al.*, (1999) and Dawa (2003). Also, El Ashry *et al.*, (2003) Shahin (2004b) and Shahin *et al.*, (2006) found that increasing energy levels in the diet or energy supplementation resulted in increasing feed intake.

Detestation coefficient and nutritive values of the three experimental rations are shown in Table (4). It is clearly indicated that ewes fed 80 % TDN (R1) significantly showed the highest ($P<0.05$) digestibility coefficients of OM, CP, CF, EE and NFE compared to those fed 120% (R3) and 100% (R2) but digestion coefficient of CP and CF were lower in R3 compared to R1 and R2. This might be attributed to increase rumen microbial activity and differences in rate of digestion as reported by Shahin *et al*, (2004). Digestion coefficient of CP was higher in R1 (80%). This result was in agreement with those reported by Shahin *et al* ,(2006). It was clear that most nutrient digestability (OM, CP, CF, EE and NFE) increased with ewes fed 80 % level which might be due to decrease dry matter intake for R1. In addition, Steingass *et al.*, (1994) found that the nutrient digestability decreased linerly with the increase of feeding level. Shahin *et al.*,(2006) found that the increase of dietary energy led to lower of CF digestion in male buffalo calves. NDF and ADF digestibility were not affected with treatments.

Nutritive values expressed as TDN and DCP of the experimental rations (early pregnancy) are presented in Table (4).

Ewes of R3 fed ration containing 120 % TDN recorded highest nutritive values expressed as TDN and DCP g/Kg B.W followed by R2 (100% TDN) and R1 (80 % TDN) .Whereas the lowest TDN and DCP intake(g/Kg BW) was recorded for R1 (80%). This might be related to the decreased nitrogen intake(mg/Kg BW). The present feedings were nearly to those obtained by Shahin, (2000) reported that high level of energy resulted an increased nutritive value as TDN and DCP. Also the value of TDN and DCP% of dry mater intake were significantly ($P<0.05$) higher with ewes fed 80 % TDN (R1) compared to both R3 and R2 which might be due to increase digestion coefficient of R1.

Table (4): Voluntary feed intake and digestion coefficient and nutritive value by ewes during early pregnancy in digestibility trial

Item	R1 (80 % TDN)	R2 (100 % TDN)	R3 (120 % TDN)	±SE
Average body weight	51.66	52	51.83	±2.79
DMI g/Kg BW				
Rice Straw	6.60c	8.04^{b}	9.68^{a}	±0.196
Berseem Hay	5.50^{c}	6.69^{b}	8.07^{a}	±0.163
Concentrate feed mixture (CFM)	5.86^{c}	7.14^{b}	8.60^{a}	±0.174
Total dry mater intake	17.97^{c}	21.88^{b}	26.35^{a}	±0.534
Digestion coefficient %				
DM	68.64	65.52	67.62	±1.56
OM	72.46^{a}	65.88^{b}	67.69^{b}	±1.35
CP	66.59^{a}	57.22^{b}	55.37^{b}	±1.50
CF	68.50^{a}	64.13^{ab}	61.49^{b}	±1.42
EE	64.79^{a}	56.96^{b}	62.27^{a}	±1.35
NFE	75.91^{a}	69.24^{b}	73.30^{ab}	±1.64
NDF	55.38	56.75	56.80	±1.61
ADF	60.54	55.76	55.45	±1.64
Nutritive value				
TDN intake g/ kg BW	11.48^{c}	12.73^{b}	15.66^{a}	±0.121
TDN % of DMI	63.93^{a}	58.23^{b}	59.48^{b}	±1.04
DCP intake g/kg BW	1.23^{b}	1.28^{b}	1.50^{a}	±0.03
DCP % of DMI	6.86^{a}	5.88^{b}	5.71^{b}	±0.154

a .b and c: Group means with different letters within the same row are significantly different at ($P<0.05$).

Digestation coefficients and nutritive value:

Nutritive values:

Nitrogen utilization:

Data of nitrogen metabolism for ewes fed ration containing different level of energy were summarized in Table (5). Ewes fed R3 showed significantly highest value of nitrogen intake, feacal nitrogen, urinary nitrogen and total nitrogen excretion (mg/Kg B.W).The nitrogen intake (mg/Kg B.W) was lowest in R1 compared to R2 and R3 which might be due to decreased feed intake. Also the urinary nitrogen (mg/Kg BW) was the lowest in R1 followed by R2 and R3 may be due to lowest drinking water.

Table (5): Nitrogen utilization and water intake of ewe's early pregnancy period.

Item	R1 (80 % TDN)	R2 (100 % TDN)	R3 (120 % TDN)	±SE
Nitrogen intake mg/Kg BW	297.10^{c}	361.99^{b}	435.98^{a}	±8.85
Fecal nitrogen (mg/Kg BW)	99.13^{c}	155.07^{b}	194.77^{a}	±8.12
Fecal nitrogen % of intake	33.36^{b}	42.84^{a}	44.67^{a}	±1.48
urinary nitrogen (mg/Kg BW)	90.96^{b}	131.45^{a}	146.66^{a}	±6.99
urinary nitrogen % of intake	30.61	36.31	33.64	±2.13
Total nitrogen excretion mg/Kg BW	190.09^{c}	286.53^{b}	341.43^{a}	±7.42
Total nitrogen excretion % of intake	63.98^{b}	79.15^{a}	78.31^{a}	±1.61
Nitrogen utilization				
Nitrogen balance (mg/Kg BW)	107.01^{a}	75.45^{b}	94.55^{ab}	±6.02
% of nitrogen intake	36.02^{a}	20.84^{b}	21.68^{b}	±1.61
Drinking water				
ML/kg BW	42.56^{c}	64.57^{b}	84.16^{a}	±5.09
ML/DMI	2.36^{b}	2.94^{ab}	3.20^{a}	±0.229

A, b and c: Group means with different letters within the same row are significantly different at ($P<0.05$).

The nitrogen balance (mg/Kg BW and % of nitrogen intake) were significantly (P<0.01) the highest value of ewes fed 80% TDN (R1) followed by 120% TDN (R3) and 100% TDN (R2) respectively. This might be due to higher crude protein digestability. These results agreed with those reported by Lindberg (1989) who decleared that feacal nitrogen excretion increased significantly (P<0.05) with increasing gross energy intake in addition to increasing nitrogen intake. Water intake (ml/kg BW) for different treatments was significantly (P<0.01) different R3, had the highest water intake followed by R2 and R1 respectively. These results are in agreement with the findings of El-Shear, (1981), who stated that water intake consumed by sheep and goats were increased with increasing in feeding level.

Live body weight changes during pregnancy period:

Live body weight changes of ewes during early pregnancy are shown in Table (6). The average body weight changes in early pregnancy and weight loss just after kidding did not differ significantly among the three experimental groups. Mean while, ewes fed 80% TDN (R1) scored the highest value of body weight changes in late pregnancy followed by R3 and R2.

These results agree with those reported by Al-Deeb *et al*, (2003) , El-Ashry *et al* (2003) and Shahin (2004 a, b) .They reported that growth performance had been improved by increasing dietary energy density. The highest value of weight loss just after kidding was recorded for R3 followed by R1 and R2, respectively.

Live body weight changes during lactation:

Live body weight and body weight changes of ewes during lactation period are shown in Table (6). There were no significant difference in live body weight changes among the three experimental groups. Body weight changes at first 60 days scored the highest loss in R3 followed by R1 and R2 which might be related to the higher milk yiled of R3 and increasing twinning rate. Body weight changes at the next 60 days were varied significantly (p<0.05) .These results were in agreement with those obtained by El-Ashry *et al.*,(2003), Zaki and Shahin, (2004)and Shahin *et al.*,(2006)

Table (6): Average body weight changes of ewes during pregnancy and lactation period.

Item	R1 (80 % TDN)	R2 (100 % TDN)	R3 (120 % TDN)	±SE
Body weight during pregnancy ,kg				
Initial body weight	47.07	46.50	46.40	±1.77
Body weight changes ,kg				
After 3 months of pregnancy	4.66	5.04	5.53	±0.438
Late 2 months of pregnancy	6.33^{a}	4.77^{b}	5.10^{b}	±0.332
Overall average	10.99	9.81	10.63	±0.604
Body weight loss, just after kidding kg	5.96	5.93	6.33	±0.348
% of weight before kidding	10.26	10.53	11.06	±0.544
Body weight during lactation ,kg:				
Just after kidding	52.1	50.38	50.90	±1.77
After 60 days of lactation	47.78	46.53	46.43	±1.52
After 120 days of lactation	50.1	52.34	53.85	±1.40
Body weight changes ,kg				
First 60 days	-4.32	-3.85	-4.47	±0.786
Next 60 days	$+2.32^{b}$	$+5.81^{a}$	$+7.42^{c}$	±0.609
Overall 120 days	-2.00^{a}	$+1.96^{ab}$	$+2.95^{b}$	±0.334

A, b and c: Group means with different letters within the same row are significantly different at (P<0.05).

Birth weight

Data of birth and weaning weights of lambs are showen in Table (7).live body weight of lambs at birth were not varied significantly (P<0.05) among groups. The highest birth weight was recorded in R1 followed by R2 and R3. On the other hand, average daily gain (ADG)at the first 60 days and overall mean at 120 days were significantly (P<0.05) different among groups. Also , lambs fed R3 120%TDN showed higher ADG at 60 days and overall mean of 120 days followed by R2 (100% TDN) compared to R1(80 % TDN) . These results agreed with those reported by Al-Deeb *et al.*, (2003),El-Ashry *et al.*, (2003) Shahin (2004 a,b) and Shahin *et al.*,(2006) .They reported an improvement of growth performance of animals as a result of increasing dietary energy density .

Milk yield:

Milk production of different experimental groups as a affected by energy level are summarized in Table (7). Results revealed that milk production tended to increase as energy level increases although differences were not significant. Overall mean of milk production of R2 and R3 was higher by 6.5 and 11.7% compared to R1.

Table (7): Birth weight and daily gain of lambs from birth to weaning and daily milk yield.

Item	R1 (80 % TDN)	R2 (100 % TDN)	R3 (120 % TDN)	±SE
Body weight of lambs ,kg				
Birth weight	3.79	3.93	4.07	±0.194
first 60 days	12.88[b]	14.86[a]	15.38[a]	±0.528
Overall 120 days	19.32[b]	21.89[a]	22.26[a]	±0.898
Body weight changes, kg:				
First 60 days	9.09[b]	10.93[a]	11.31[a]	±0.431
Overall 120 days	15.53[b]	17.96[a]	18.19[a]	±0.816
Average daily gain/g/day				
First 60 days	151.5[b]	182.1[a]	188.5[a]	±8.00
Overall 120 days	129.4[a]	149.6[b]	151.6[b]	±7.00
Daily milk yield , ml/liter				
Early lactation(First 60 days)	842.2	863.5	883.5	±75.14
Late lactation(Next 60 days)	336.8	392.3	443.8	
Total (120 days)	589.5	627.9	663.7	±26.07

a. b and c: Group means with different letters within the same row are significantly different at (P<0.05).

This trend of increases was paralled to mean values of pre-weaning average daily gain; values were 182.1 and 188.5 g/h/d compared to 151.5 g/h/d, respectively. Likewise, average daily gain over 120 d lactation period was followed the previous trend, values were 149.6 and 151.6 g/h/d compared to 129.4 g/h/d, respectively with differences being significant (P<0.05).

These results are in agreements with those obtained by Bayoumi (1995); Ekinic and Broderick (1997) and El-Ashry *et al* (2003) and Shahin *et al* (2006) who concluded that milk yiled increased with increased energy level .El-Ashry *et al.*,(2003) Concluded that buffalo group fed ration containing 120% energy level and 87.5 % protein level showing highest milk production and best feed efficiency without any adverse effects on performance of Buffalo .

Productive and reproductive performance:

Results of reproduction and productive trails are illustrated in Table (8). Conception and lambing rates were found to be 80, 75 and 85% for groups R1, R2 and R3 respectively, with differences being insignificant. It is clear from results in Table (8) that high level of energy (R2 and R3) scored higher fecundity rate (120 and 1.33%), respectively compared to 80% in R1.

Table (8): Mean values of reproductive and productive performance of ewes classified by different types of diet.

Item	R1 (80 % TDN)	R2 (100 % TDN)	R3 (120 % TDN)
No of ewes joined	20	20	20
Ewes aborted	1	0	0
No of ewes conceived	16	15	17
Conception rate	80	75	85
Ewes kidding	15	13	15
Kidding rate	75	65	75
Average birth weight, Kg	3.79	3.93	4.07
Lambs born alive	15	15	20
Weaned lambs	15	15	18
Average letter size	1	1.15	1.33
Kg born/ewes joined	2.84	2.95	4.07
Kg-weaned ewes joined	14.49	16.41	20.03
Average weaning weight	19.32	21.89	22.26

The impact of high levels of energy (R2 and R3) was clear in both birth and weaning weights. These results coincided with the results of milk production and average daily gain reflects the need to increase energy level to maximize sheep production.

These results are in a good agreement with the findings of Whitaker *et al* (1993), Marston *et al* (1995) and Shahin (2004b) they found that the conception rates were significantly improved by feeding levels of supplemented energy. on the reproductive parameteir (Kgs born/ewe joined and Kgs weaned/ewe joined) were better for R2 and R3 compared to R1 although differences were not significant.

CONCLUSION

It could be concluded that increasing the energy level in the diet of the ewes improved rate of growth, daily gain, birth weight and daily milk yield. Also high energy level (120%) seemed to cover animal requirements and increase twinning rate especially in Barki sheep.

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تأثير مستوى الطاقة على معاملات الهضم وأداء النعاج خلال فترة الحمل والرضاعة في جنوب سيناء.

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استخدم فى هذة الدراسة ٦٠ حيوان من النعاج البرقى الناضجة متوسط العمر ٣-٤ سنوات و متوسط وزن 46.7 كجم لدراسة تأثير مستويات مختلفة من الطاقة على معاملات الهضم واداء النعاج خلال فترة الحمل والرضاعة .تم تقسيم الحيوانات الى ثلاثة مجاميع متساوية ٢٠حيوان فى كل مجموعة وتم تغذية المجموعات R3،R1،R2 على مستوى ٨٠،١٠٠،١٢٠% من مجموع المركبات الغذائية المهضومة طبقا للمقررات NRC (١٩٨٥) .اجريت تجربة التغذية اثناء الفترة الاولى من الحمل(٣ شهور بعد التلقيح) واخر الحمل (شهرين قبل الولادة) واول واخر الحليب .وتم تقيم للحيوانات بعد ٣ شهور من الحمل وتم تقدير الغذاء المأكول والتركيب الكيمانى والقيمة الغذائية ومعاملات الهضم وقدر انتاج اللبن خلال فترة الحليب. وكانت أهم النتائج ما يلى: اظهرت المجاميع التى غذيت على مستوى عالى من الطاقة (١٠٠-١٢٠ %) من مجموع المركبات الغذائية المهضومة زيادة معنوية فى الغذء المأكول بالمقارنة بمستوى الطاقة المنخفض ٨٠%. كما اظهرت المجموعة الاولى المغذاة على على مستوى طاقة منخفض ٨٠% أعلى معامل هضم فى المادة الجافة والمادة العضوية والبروتين الخام ومستخلص الاثيرى والمستخلص الخالى من الازوت وميزان النيتروجين ثم المجموعة الثالثة ١٢٠% ثم المجموعة الثانية ١٠٠% عى التوالى . تبين أن معامل هضم البروتين الخام والالياف الخام انخفض مع زيادة المأكول من الطاقة . كما أن المأكول من مجموع المركبات الغذائية المهضومة والبروتين المهضوم ارتفع معنويا مع زيادة مستوى المأكول .ولكن المركبات الغذائية المهضومة والبروتين المهضومة كنسبة منوية من المأكول كانت عالية مع مستوى الطاقة المنخفض ٨٠% بالقارنة بالمستوى ١٠٠-١٢٠% . سجلت الحيوانات التى تناولت مستوى ١٢٠% من الطاقة أعلى وزن جسم قبل الولادة تليها المجموعة الثانية ثم المجوعة الاولى بينما المجموعة الثانية سجلت أقل فقد فى وزن الجسم بعد الولادة . كان معدل النمو اليومى للحملان من الميلاد حتى الفطام وكذلك انتاج اللبن أعلى قيمة للمجموعة الثالثة تلتها المجموعة الثانية ثم الاولى على الترتيب. كما تحسن الاداء التناسلى من حيث معدل الاخصاب ومعدل الولادات مع مستويات الطاقة الاعلى مقارنة بالمجموعة المنخفضة. و كان المستوى العالى من الطاقة قد انعكس على الخصوبة ومتوسط حجم البطن و كان عاليا فى المعاملة الثانية والثالثة. ويمكن أن نلخص إلى أن زيادة مستوى الطاقة في العليقة حسن كلا من معدل النمو، ومتوسط الزيادة اليومية ، وزن الميلاد و انتاج اللبن كذلك غطى احتياجات الحيوان وذاد معدل التوائم فى النعاج البرقى.