EFFECT OF FEEDING LEVELS ON THE PRODUCTIVE PERFORMANCE OF BARKI SHEEP

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ABSTRACT

Towards identifying potential production of Barki sheep, this study was implemented to evaluate performance of Barki ewes at late gestation and lactation period by feeding them on standard allowances (Tomi 1963) vs. a higher level 120% of that allowances. Twenty Barki ewes 2-3 years old and 46.5 kg live body weight at the last six weeks of gestation were divided into two equal groups (10 ewes each) that received 100% and 120% of Tommi allowances (1963). The first group (T1) and second are (T2) were fed 1 and 1.2Kg /head/day concentrate feed mixture, respectively beside 2 kg berseem and 200g rice straw / head.

The weight of lambs at birth and weaning were not influenced by the level of feeding. The average daily gain of lambs in T2 was improved by 8.0% compared with T1, but the differences between the two treatments were not significant.

Daily actual milk yield in T2 was significantly (P≤0.05) increased and 4%- fat corrected milk yield was improved by 33.70% compared with T1. Milk composition indicated that ewes in T2 had higher (P≤0.05) ash, lactose, total solids (TS) and solids not fat (SNF) %, while fat and crude protein (CP) % were not affected compared to ewes in T1. Regarding the daily milk nutrient yields, it could be observed that fat, protein and total solid yields were significant higher in T2 comparing with T1. Based on new born growth performance measurements, it could be emphasized on 100% of Tommi allowances (1963) as satisfying level to cover the nutritional requirements of barki sheep.

Key words: *level of feeding, pregnant and lactating Barki ewes, lambs growth, milk yield and composition.*

INTRODUCTION

Barki sheep is representing a major proportion of sheep population in Egypt. It mainly located in western coastal zone of Egypt where they depend on grazing natural range as major part of feed.

This nomadic and extensive feeding system may not able to afford for animals the maximum and efficient feed allowances that succeed to exhibit their genetic potential.

Aiming to recognize production threshold of Barki sheep, this study was designed to test responses of offering Barki ewes, during the critical production stages of late 45 days of gestation and first 60 days of lactation, two feed allowances (Tommi ,1963, allowances as basic level and 110% of it as high level) on body weight, milk yield and composition and growth of produced lambs from birth until weaning.

MATERIALS AND METHODS

This study was carried out at Animal Nutrition Research Unit, Radiobiology Applications Department, Nuclear Research Center, Atomic Energy Authority.

Animals and feeding:

Twenty late pregnant Barki ewes (last 45 days of gestation) at 2nd and 3rd seasons were used in this experiment. The ewes were assigned to two equal groups (10 ewes each). The first group (T1) were fed, per head/daily, 1Kg concentrate feed mixture (CFM), 2 kg berseem (*Trifolium alexandrinum*) and 200 g rice straw (100% of Tommi, 1963, allowances). The second group (T2) were received the same ration of T1 with extra 200 g CFM (120% of Tommi, 1963, allowances). Chemical composition of the experimental rations were analyzed according to A.O.A.C. (1996). The

Table (1): Chemical analysis (%) of different experimental rations, (DM basis).

Item	CFM	RICE straw	Berseem
Dry matter (DM)	84.88	92.5	19.01
Organic matter(OM)	93.2	81.03	86.19
Crude protein (CP)	14.7	3.14	13.81
Crude fiber (CF)	12.69	34.05	14.36
Ether extract (EE)	1.9	2.05	2.41
Nitrogen free extract (NFE)	63.91	41.79	35.79
Ash	6.8	18.97	33.63

FCM= Concentrate feed mixture

half quantity of CFM was offered at 9 am and the second half at 3 pm. The rice straw and berseem were offered daily at 10 am. The chemical composition of the experimental rations are shown in Table (1).

Weight of ewes and their lambs:

Ewes and lambs were weighed directly after lambing, within 15 hr, and then at 15, 30, 45 and 60 days post- lambing as lambs were weaned at 60 days old.

Daily milk yield and chemical composition:

The lambs were separated from their dams after the second meal at 3 pm till the next day. The ewes were completely hand milked and the daily milk yield was recorded at 15, 30, 45 and 60 days post lambing. Milk contents of fat, protein, lactose, solids not fat (SNF) and total solids (TS) were determined using Milko-Scan (model 130 series- type 10900 FOSS electric- Denmark). Fat corrected milk (4%) was estimated by equation of Gaines (1928): as 4%- FCM = 0.4 M + 15 F, where M = milk yield (Kg/d) & F= Fat yield Kg.

Statistical analysis:

Data of milk yield and milk composition were statistically analyzed according to SAS (1996) procedure. The model applied was:

$$Y_{ijkl} = \mu + T_i + a\,(T)_{ij} + Wk + E_{ijkl}$$

Where: Y_{ijkl} = parameter under analysis, μ = overall mean, Ti = the fixed effect of treatment where (i) = 1, 2, a $(T)_{ij}$ = the random effect of animal (j) within treatment (i), *WK* = the fixed effect of time, *Eijkl* = experimental error.

Also, data of lamb's weight were analyzed according to SAS (1996) procedure. The statistical model was as follows:

$$X_{ij} = \mu + A_i + E_{ij}$$

Where: X_{ij} = represents observation, μ = overall mean, A_i = the effect of treatment (ration), E_{ij} = experimental error.

RESULTS AND DISCUSSION

Live body weight of ewes:

Table (2) shows that the average live body weight of ewes at lambing were 47.70± 0.81 and 46.18± 0.77and at weaning were 39.80± 0.81 and 39.45 ±0.77 Kg for T1 and T2 groups, respectively. Plane of nutrition had no significant effect on ewes weight at lambing and weaning. These results agree with the findings of **Aziz and Al-Dabbagh (2008)** who found that Hamdani ewes fed high plane of feeding (1000 g/ewe/day) showed a significant (P< 0.05) increase in body weight gain during the last period of pregnancy but treatment had no significant effect on body weight at lambing and weaning.

On the other hand, **Mahouachi *et al.* (2004)** fed D'man ewes 1 Kg of hay supplemented with concentrate at three levels

Table (2): Effect of treatment on ewes live body weights (kg; SE) pre-lambing and post-lambing

Period	Treatments	
	T1	T2
	100 % of feed requirements	120% of feed requirements
Pre – lambing		
45 days	42.20 ± 0.81	42.00 ± 0.77
15 days	53.22± 0.81	52.82 ± 0.77
Day of lambing	47.70 ± 0.81	46.18 ± 0.77
Post- lambing		
15 days	42.90 ± 0.81	41.72 ± 0.77
30 days	40.10 ± 0.81	39.90± 0.77
45 days	39.50 ± 0.81	39.09 ± 0.77
60 days	39.80 ± 0.81	39.45 ± 0.77

(200, 570, and 800g/ ewe /day) during the last 45 days of pregnancy, and they indicated that live body weight of ewes after lambing was significantly higher ($p<0.05$) for ewes fed high level comparing with the other groups. These results indicated that ewe body weight after lambing is largely dependent on the level of nutrition at late pregnancy and post-lambing.

Performance of lambs:

Lambs growth performance in respect of birth weight, weaning weight, daily gain and total gain are presented in **Table (3).** No significant differences between the low and high feeding levels were observed, regarding the weights of lambs at birth and weaning and total and daily gain. The lack of effect due to increased feeding level from 100 to 120 % of Tommi allowances on lamb birth weight**,** may suggest that 100 % feeding allowance is entirely cover the nutritional demands for foetal growth. Another explanation, is supported by **Celi *et al.* (2008)** that nutrient restriction during pregnancy shifted nutrient partitioning towards the uterus to sustain foetal growth. This homeorhetic adaptation was continued during early lactation although being not sufficient to sustain milk production. So, on the same nutritional and physiological basis, the insignificant differences found between the two feeding levels regarding lambs' weaning weight, might interpreted as nutrients (fat / protein) could be transfered from body reserves to supply milk synthesis and consequently increase milk supply for new born lambs. Meanwhile, the more daily gain accompanied the high feeding level was not significant. Results obtained are in harmony with those obtained by **Hashemi *et al.*, (2008)** who fed karakul ewes at 90 – d after insemination on nutritional levels of 90, 100 and 110% of the NRC standard and found that feeding the higher level for 3 months before parturition increased lamb birth weights. Moreover, **Abdalla (1998)** reported that level of feeding had no effect on both lamb' weight and subsequent body weight changes postpartum.

On the other hand, **Demirel *et al.* (2000)**, found that average lamb birth weights were 3.97, 4.15, 4.02 and 4.5Kg for ewes fed 80,100,115 and 130% of NRC allowances during late pregnancy, respectively. They reported that the 4th group had significantly higher birth weight than the other groups. Also, results indicated that average daily gain (ADG) of lambs in T2 was improved by 8.0% compared to that in T1, but the differences were not significant.

Table (3): Performance of lambs (X±SE) suckled their dams while fed two levels of nutrition.

Variable	T1	T2
No. of lambs	10	11
Birth weight (kg)	4.34± 0.24	4.49± 0.23
Weaning weight (kg)	12.74± 0.24	13.57± 0.23
Total gain (kg)	8.40±0.52	9.08±0.49
Average daily gain (g)	140.1±0.01	151.3±0.01

Milk yield and milk composition:

Data of milk yield, 4% FCM, and yield of some milk constituents over the first 60 days of lactation are presented in **Table (4).** Ewes of the second group (T2) had higher ($P<0.05$) daily milk yield than those of the first group (T1). Average milk yield was improved by 32.1 % and 4% FCM yield by 33.70% for T2 compared to T1. The results show that milk yield increased with increasing the level of nutrition which is in close agreement with **Al- Jassim *et al*. (1999)** who observed that Awassi ewes given high level of concentrate (1350 g) per head per day, produced more ($P<0.05$) milk than those fed on medium (1150 g) and low (950 g) levels during lactation period. Earlier similar results were recorded by **Gardner and Hogue (1964)** that milk yield was significantly increased by feeding the crossbred Rambouillet x Columbia ewes 17 % more digestible energy than that recommended by NRC (1957) during lactation stage. Also, comparable results in respect of milk yield are obtained by **Treacher (1971)** who estimated 21 % more milk yield between high and low feeding levels. In general, **Forbes (1974)** reported that milk produced from ewes fed on high plane of nutrition was significantly higher than those kept on low plane of nutrition during lactation. Results presented in Table (5) indicated that high level of feeding (T2) increased significantly ($p<0.05$) the percentages of lactose, TS and SNF, while percentages of milk

Table (4): Daily yields of actual milk, 4%-FCM and some milk constituents of ewes fed two levels of requirements.

Item	T1	T2
Actual Milk yield (g/h/day)	406.8^{b}±14.4	540.8^{a}±13.7
4 % Fat corrected milk yield (g/head/day)	427.2^{b} ±35.3	571.3^{a} ± 33.5
Milk fat yield(g)	17.5^{b}± 1.4	23.71^{a}± 1.3
Milk protein yield (g)	18.68^{b}± 1.4	25.12^{a}± 1.4
Milk TS yield (g)	70.57^{b}± 5.7	97.3^{a}± 5.5

Table (5): Chemical composition of ewe's milk produced during the first 60 day of lactation period.

Parameters	T1	T2
Fat %	4.37±0.07	4.46±0.07
CP%	4.59±0.03	4.63±0.03
Lactose%	7.83^{b}±0.12	8.43^{a}±0.12
TS %	17.41^{b}±0.16	18.11^{a} ± 0.16
SNF %	13.03^{b}±0.13	13.54^{a}± 0.13
Ash%	0.64^{a}±0.01	0.58^{b}±0.02

fat and protein had not significantly differed due to the feeding levels. Similar results were obtained by many investigators (Gardner and Hogue, 1964, **Mahouachi *et al.*, (2004)** and Aziz and Al-Dabbagh, 2008) who reported that percentage of milk fat and protein were not affected by dietary energy level during late pregnancy and early lactation.

However, due to the higher quantity of milk produced, the yields of all milk constituents were significantly (P<0.05) higher with the high plane of feeding. These results are in harmony with those reported by **El-Ashry *et al.* (2003)** who cleared that buffaloes fed 120 % energy level had significantly (P<0.05) higher milk, 7% -FCM, fat, protein, lactose, SNF, TS and ash expressed as daily yield. However, corresponding values of milk constituents which expressed as percentages were not significantly different, in comparison with 100% energy level.

CONCLUSION

In conclusion, it seems that 100% Tommi allowances is reasonably covering the feed requirement of Barki sheep especially in the critical production stages, late pregnancy and lactation, and that 120 % of the feed allowances only caused slight improvement in milk yield.

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تأثير مستوى التغذية على الأداء الإنتاجى لأغنام البرقى

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نحو التعرف على الحدية الإنتاجية للأغنام **البرقى نفذت هذه الدراسة لتقييم إنتاجية النعاج البرقى فى** مرحلتى الحمل المتأخر والرضاعة عند تغذيتها على مستوى غذائى قياسى (مقررات تومى ١٩٦٣) ومستوى اعلى يمثل ١٢٠% من مقررات تومى. استخدم فى هذه الدراسة عشرون نعجة برقى متوسط اعمارها ٢-٣ سنوات ومتوسط اوزانها ٤٦,٥ كيلوجرام فى المرحلة الاخيرة من الحمل (أخر ٦ اسابيع)، وزعت عشوائيا الى مجموعتين متساويتين (عشرة بكل مجموعة) ، المجموعة الاولى والثانية غذيتا على ١ و ١,٢ كيلوجرام مخلوط علف مركز للرأس / يوم على التوالى طبقا لمقررات Tommi, بجانب ٢ كيلو برسيم و ٢٠٠جم قش أرز/ رأس.

وزن الحملان عند الميلاد والفطام لم يتأثر بمستوى التغذية ومعدل الزيادة اليومية للحملان فى المجموعة الثانية تحسن بنسبة ٨% مقارنة بالمجموعة الاولى، ولكن الاختلافات كانت غير معنوية.

انتاج اللبن فى المجموعة الثانية زاد بنسبة معنوية واللبن المعدل لنسبة الدهن قد تحسن بنسبة ٣٣,٧٠ % مقارنة بالمجموعة الاولى .

اوضح تحليل اللبن للنعاج بالمجموعة الثانية ارتفاع نسبة اللاكتوز والجوامد الكلية وجوامد اللبن اللادهنية بينما نسبة الدهن والبروتين لم تتأثر. كما أن كميات الدهن والبروتين والجوامد الكلية ارتفعت بالمجموعة الثانية مقارنة بالمجموعة الاولى وذلك طبقا لزيادة ادرار اللبن بالمجموعة الثانية .

وبناء على ذلك فإن مقررات تومى تبدوا مناسبة للأغنام البرقى ومستواها الإنتاجى