انتاج الضأن من الحملان غليظة الذيل وعلاقته بمستوى الغذاء

١ـ معدلات النمو وصفات الذبيحة

ف. الحمصي ، ج . عبد الحافظ

استخدم فى هذه التجربة ٢٤ من الحملان الاوسيمى الذكور الفردية لقياس تأثير التغذية خلال فترة الحمل وكذلك خلال السنة الأولى من العمر على معدلات النمو وصفات الذبيحة و يمكن تلخيص النتائج فيما يلى :

١ـ كان الوزن عند الميلاد للحملان الناتجة من أمهات غذيت على مستوى عالى أثقل بدرجة معنوية عن تلك الحملان الناتجة من أمهات مغذاه على مستوى منخفض.

٢ـ زاد الوزن عند الذبح ووزن الجسم فارغا ووزن الذبيحة زيادة جوهرية بزيادة مستوى الطاقة المأخوذ .

٣ـ سجلت حملان المجموعه H أعلى نسبة من التصافى (١٣ر٥٥ ٪) بالمقارنة بنسبة ١٣ر٥٠ ٪ ، ٨٨ر٥١ ٪ للمجموعة L والمجموعة M على التوالى :

٤ـ زاد طول الذبيحة زيادة معنوية بزيادة مستوى التغذية وعلى ذلك يمكن القول بان تحديد مستوى التغذية فى المراحل المبكرة من حياة الحيوان يؤخر التطور الطبيعى للجهاز الهيكلى للحيوان وبالتالى يقلل من كفاءته فى انتاج اللحم.

٥ـ كان متوسط نسبة الدم بعد الذبح ٨٧ر١٠ ٪ ، ١٥ر٦ ٪ ، ٩١ر٥ ٪ للمجاميع H, M, L على التوالى .

٦ـ لقد زادت أوزان المخلفات والأعضاء المختلفة للحيوان بزيادة مستوى الطاقة المأخوذ ، بينما سلكت النسب المئوية لها الاتجاه المعاكس لاوزانها المطلقة.

٧ـ أنتجت حملان المجموعة H قطع اثقل عن تلك الناتجة من المجموعة L , M وكان أكبر تأثير للتغذية على أوزان كل من القطن ، الصدر ، الرقبة ، والذيل .

Dept. of Anim. Production,
Faculty of Agric., Assiut University,
Head of Dept. Prof. Dr. A.M. El-Gammal.

MUTTON PRODUCTION FROM FAT-TAILED LAMBS IN RELATION TO PLANE OF NUTRITION . I. BODY PERFORMANCE AND CARCASS TRAITS .

(With 3 Tables)

By

F.F. EL-HOMMOSI and G.A. ABD EL-HAFIZ.

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SUMMARY

Twenty four Ossimi single male lambs were used in this study to measure the effect of plane of nutrition during pregnancy and first year of age on body performance and carcass traits. The following results were obtained:

1- Lambs from ewes receiving high plane of nutrition, being significantly ($P \leq 0.05$) heavier at birth by 26.2% than those from ewes subjected to low level of nutrition.

2- Slaughter weight, empty body weight and hot carcass weight increased significantly ($P \leq 0.05$) with increasing level of energy intake.

3- Group H scroed higher values (55.13%) for dressing percentage compared to 50.13% and 51.88% for group L and M, respectively.

4- Carcass length increased significantly ($P \leq 0.01$) with the increase in level of nutrition. Therefore, restrictuion of nutrition during early stages of life altered the normal development of skeletal system of lambs and in turn, decreased their capacity for mutton production.

5- Blood percentage was found to be 10.87, 6.15 and 5.91% for group L, M and H, respectively.

6- The weight of body offals and organs tended to increase with increasing level of energy intake. The percentages of offals and organs were the reverse of their absolute weight.

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7- Lambs in group H produced heavier cuts than those in group L and M. The most pronounced effect of treatment was that on weight of loin, breast, neck and tail.

INTRODUCTION

Differences in plane of nutrition at any age from the late foetal stage to maturity, not only alter growth generally but also affect the different regions, the different tissues and the various organs differntially (LAWRIE, 1974). In addition, RENOLDS et al., (1966) and EL-TAWIL (1970), reported that plane of nutrition was a major source of variation in the percentage of whole-sale cuts.

There is a full agreement in the literature that increasing the nutritional level during fattening results in increasing fatness and contributes markedly to an increased dressing percentage (FIELD et al., 1967, POPANOV, 1970, EL-HOMMOSI and ABD EL-HAFIZ, 1979).

Most of the experiments measured the influence of plane of nutrition during fattening. However, experiments concerning the effect of energy intake throughout pregnancy and early period of growth on carcass characteristics are limited.

Accordingly, the objective of this study was undertaken to measure the effect of plane of nutrition during pregnancy and first year of age on body performance, dressing percentage, organs and offals and different meat cuts.

MATERIALS AND METHODS

This study was carried out on the Animal Production Experimental Farm, Faculty of Agriculture, Assiut University, Assiut, Egypt.

Twenty four Ossimi single male lambs were included in this study. Lambs were produced by three groups of ewes subjected to three levels of

energy during pregnancy and lactation period assigned as low (L), Medium (M) and High (H). The low level was 0.36 Kg. starch value/day (S.V.) which was sufficient to maintain maternal body weight and foetus development . The corresponding values for M and H were 0.64 and 1.1 Kg. S.V., respectively.

Lambs were kept with their mothers from birth to weaning. From weaning till 12th. month of age, lambs of the L and M groups received 100% and 140% of the recommended level reported by GARRETT et al.(1959), for growing lambs:

$$T.D.N. = 0.029\ W^{0.75}\ (\ 1 + 5.1\ G\ )$$

Where : W = Body weight in Kg.

G = Gain in Kg./day.

The calculated T.D.N. was converted into S.V. whereas, lambs of the H group were fed ad lib. The average daily intake during this period was 0.36, 0.55 and 0.65 Kg. S.V. for L, M and H groups, respectively.

Slaughtering and carcass studies:

Slaughtering was carried out when lambs reached the 12th. month of age. All lambs were fasted 24 hours prior to salughter and were weighed immediately before and after slaughtering. Blood weights were determined by the difference between these two weighings, and they were estimated as the percentages of empty live weights. Following salughtering and dressing, the weights of body offals, internal organs and hot carcass were recorded. The weights of offals and organs were converted to percentages of the empty live weight. The tail of each carcass was removed and its weight was recorded.

The hot carcass was then cut longitudinally into two equal halves. The left side was left without any treatment, while the right one was chilled in a cooler at an average temperature of 4°C. Cold weight (of the right side) was recorded following a chilling period of 24 hours. Loss during cooling period was converted to a percentage of hot carcass weight (of the right side). The chilled side was subdivided into

bone-in joints following the procedure described by TIMON and MAURICE (1965). Each joint was weighed to the nearest gm. Joint weight was converted to a percentage of chilled side weight.

Carcass length was measured (to the nearest millimeter) with a steel tape from the anterior edge of the pubic bone to the anterior edge of the first rib as described by YEATS (1965).

Fat thickness over the longissmus dorsi muscle between 12th. and 13th. ribs was also measured using a caliper. Three measures were taken and the average of the three masurements were obtained.

Statistical analyses of the data were carried out according to SNEDECOR (1962) and DUNCAN (1955).

RESULTS AND DISCUSSION

Body performance and carcass measurements:

Data in Table (1), show that the mean birth weights of lambs from ewes in treatment H were significantly ($P < 0.05$) heavier by 26.2% than those from ewes in treatment L. Similar results were reported by ADU and OLALOKU (1979), who found that lambs birth weights were significantly and positively related to energy intake and to plasma glucose concentrations. Therefore, adequate feeding during pregnancy is necessary to ensure satisfactory birth weights.

Average daily gain from birth till weaning (at 4 months of age) was 83, 90 and 122 gm. for group L, M, and H, respectively. This illustrates that lambs from ewes receiving high plane of nutrition still scored higher values of daily gain than those from ewes fed on low level of nutrition. Similar results were found by GARDNER and HOGUE (1963), who reported that gains of lambs from birth to 90 days of age could be increased significantly by feeding ewes 125% vs. 100% of the National Research Council (N.R.C., 1957) lactation requirements for digestible energy.

From weaning till reaching one year of age, the average daily gain was found to be 70, 88 and 94 gm. for group L, M and H, respectively. It is interesting to not that increasing energy intake resulted in an

increase in daily gain. Results of this study agree with those reported by ABD EL-HAFIZ and EL-HOMMOSI (1975), who found that energy level affected significantly the daily gain. Also the correlation between body weight and food intake was highly significant.

Slaughter weight, empty body weight and hot carcass weight increased significantly ($P \leq 0.05$) with increasing the level of energy intake (Table, 1). As expected, feeding on high level of nutrition resulted in increasing the dressing percentage. Group H scored, on the average, higher values (55.13%) for dressing percentage as compared to 50.13% and 51.88% for group L and M, respectively. POPANOVE (1970), working on Saraja lambs, found dressing pecentage to be 54.02 for fattened lambs as against 46.52 for unfattened controls. However, in the present study differences between treatments were not significant.

Results in Table (1), showed that carcass length increased significantly ($P \leq 0.01$) with the increase in level of nutrition. This indicates that restricted nutrition during early stages of life alters the normal development of skeletal system of lambs and in turn decreases their capacity for mutton production.

Data of blood percentage (Table 1), show that lambs in treatment L scored higher values as absolute weight or as a percentage than those in treatment M and H. It is interesting to note that increasing degree of fattiness resulted in lowering the amount of blood bled from the body after slaughter. This may be because bleeding was not complete in the case of overfatness.

Fat depth measurements over the longissmus dorsi muscle were significantly greater ($P \leq 0.01$) for lambs receiving high plane of nutrition. It is found to be 1.6, 2.4 & 3.7 millimeter for groups L, M and H, respectively. GALAL et al., (1971), reported fat depth values of 0.37 and 0.34 cm. for Barki and 5/8 Merino lambs, respectively.

Shrinkage in carcass weight after chilling differed between treatments and decreased significantly (Table 1) with increasing level of energy intake. Variation between the three groups was attributed mainly to the variation in fatty tissues in the carcasses, which affected moisture, evaporation during chilling time, YEATS (1965) agreed that carcass shrinkage varies according to individual fat status and air conditions in the chiller. He added that well finsihed (i.e. fat) carcasses are likely to lose least weight and poorly finished one, such as boner and caner types, most.

Offals and Organs:

It can be observed from Table (2), that the weight of body offals and organs tended to increase with increasing level of energy intake. The most pronounced effect, however, was that on pelt, lungs and trachea, kidneys and omentum. Analysis of variance (Table, 2), shwoed that the difference of pelt weight due to level of nutrition was significant only between group L and group H. This may be attributed to the increase in actual size of lambs in group H, this in turn causing the increase of the surface area of hide.

Weight of head and feet increased slightly with increase in nutritional level but the difference between treatments was not significant. These results point out that head as well as feet were early developing parts. Similar results were reported by AL-AMIN (1976).

Concerning weights of full and empty digestive tract, differences due treatments were not significant (Table, 2). However, weights of digestive tract were slightly heavier for animals in treatments M and H as compared to those in treatment L. It can be concluded that increasing level of energy intake during early life of the lamb might have helped in the full development of the digestive tract.

With respect to the internal organs, heart, lungs, trachea, liver and spleen, results in Table (2), illustrate that plane of nutrition

affected their weights but the differences due to treatments were not significant, except for lungs and trachea with the difference between group L and group H being significant ($P \leq 0.05$).

Animals in group H had significantly ($P \leq 0.05$) higher values for omentum weight compared to group L and M. It can be concluded that increasing energy intake caused an increase in fat deposition in the body fat stores, among which is the omentum.

It was observed from results in Table (2), that percentages of offals and organs were in the opposite direction of their absolute weight, i.e., higher for small lambs which received low level of nutrition. This may be attributed to the increase in the size of the animal by overfeeding, the trunk is developing and fat is deposited, thus the weights of certain parts as a percentage of the weight of animals decline.

Carcass Joints:

Plane of nutrition had a significant effect on weights of different joints of the carcass except for flank in which the effect of treatment was not significant (Table, 3). Lambs in group H produced heavier cuts than those in goup L and M. The most pronounced effect of treatment was that on weight of loin, breast, neck and tail.

Lambs reared on low plane of nutrition produced lower percentages of leg, 7th.-12th. ribs, 1st. - 6th. ribs, brast and tail than those reared on medium and high planes of nutrition. The results for loin and shoulder percentage were the opposite. Percentages of neck and flank had no difinite trend. KNIGHT and FOOTE (1965),found that the full fed lambs had a higher pecentage of loin and rack than those on restricted rations.

In general, leg represents the highest percentages of the carcasses among different treatments. This is followed by the percentage of shoulder. The lowest percentage was that of the flank. Leg percentage varies

among different breeds from 25.24% (BOWMAN et al.,1968) to 43.4% (KIRTON et al., 1967). The percentage of the shoulder from 15.37% (MOWAFY,1968) to 27% (BELL et al., 1963).

Analysis of variance (Table, 3), indicated that the treatment affected significantly the percentages of loin and breast while for other joints the effect of treatment was not significant.

As expected, the percentage of tail as one of the main fat deposits of the fat-tailed sheep increased with the increase of level of nutrition, though the effect of treatment on tail percentage was not significant (Table , 3).

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Table (1)

Effect of plane of nutrition on body performance and carcass measurements

Item	Treatments			F test
	L	M	H	d.f. = 2, 21
	a	ab	b	
Birth Wt. (Kg.)	3.2 ±0.5	3.73±0.27	4.04±0.17	4.252*
	a	ab	b	
Weaning Wt. (Kg.)	13.26±0.99	14.45±0.50	18.59±1.41	7.299**
Daily gain (from	a	ab	b	
birth till weaning)	83 ±7	90 ±3	122 ±11	14.137**
Final Wt. (12th.	a	ab	b	
morth of age)	29.91±2.60	35.63±3.26	41.06±2.44	4.006*
Daily gain (from weaning till 12th. month	70 ±12	88 ±14	94 ±7	1.338N.S.
	a	b	b	
Empty body Wt. (Kg.)	26.88±2.38	32.39±2.88	37.17±2.01	4.961*
	a	ab	b	
Hot carcass Wt. (Kg.)	15.13±1.49	18.74±2.17	22.65±1.51	4.591*
Dressing%	50.13±0.90	51.98±1.47	55.13±1.54	3.193N.S.
	a	b	b	
Carcass length (cm.)	55.6 ±1.30	59.5 ±1.20	62.4 ±0.60	12.170**
Blood Wt. (gm.)	2990 ± 420	1980 ± 230	2310 ± 470	1.876N.S.
	a			
Blood % ⊕	10.87±1.02	6.15±0.70	5.91±0.98	9.366**
	a	ab		
Fat depth (mm.)	1.6 ±0.3	2.4 ±0.30	3.7 ±0.4	7.971**
	a	b	b	
Cooler shrink	5.84±0.57	3.53±0.51	2.56±0.50	10.202**

⊕ Related to empty body weight.

* P ⩽ 0.05 ** P ⩽ 0.01

N.S. : Not significatnt.

Means on the same raw bearing different litters differ significantly

Table (2)

Effect of plane of nutrition on weights and percentages of offals and organs in Ossimi lambs.

Item	Treatments						F test d.f. = 2, 21	
	L		M		H			
	Wt. gm	%	Wt.gm	%	Wt. gm	%	Wt.	%
Head	2160±170	7.94	2510±160	7.90	2650±140	7.08	N.S. 2.675	N.S. 2.061
Pelt	2340±170 a	8.67	2940±250 ab	9.12	3280±130 b	8.80	** 6.104	N.S. 0.130
Feet	790±60	3.03	800±190	2.99	1000±40	2.69	N.S. 1.032	N.S. 0.906
D.T.F.	5240±440	19.81	5690±750	17.49	5970±560	15.56	N.S. 0.447	N.S. 3.518
D.T.E.	2130±220	8.05	2500±250	7.75	2610±80	7.05	N.S. 1.624	N.S. 1.096
Liver	430±37	1.65	425±39	1.64	527±36	1.40	N.S. 1.889	N.S. 1.781
Heart	140±19	0.52	171±22	0.54	180±17	0.49	N.S. 1.189	N.S. 0.190
Lungs and trachea	388±36 a	1.44	467±35 ab	1.47	524±21 b	1.41	* 4.660	N.S. 0.133
Kidneys	90±7 a	0.34	114±9 ab	0.36	137±14 b	0.38	* 5.314	N.S. 0.232
Kidney fat	45±9	0.16	47±12	0.13	78±10	0.21	N.S. 3.109	** 15.813
Spleen	52±6	0.20	64±21	0.20	67±8	0.18	N.S. 0.323	N.S. 1.000
Omentum	335±37 a	1.26	382±71 ab	1.20	586±70 b	1.53	* 4.733	N.S. 1.274

D.T.F. = Digestive tract full.

D.T.E. = Digestive tract empty.

* = $\angle$ 0.05 ** = P $\angle$ 0.01

N.S. = Not significant.

Means on the same raw bearing different litters differ significantly.

Table (3): Effect of plane of nutrition on weights and percentages of different joints (In half carcass).

Joints	Treatments						F test d.f. for treatments=2, , , , Error =21	
	L		M		H			
	Wt. gm.	%	Wt. gm.	%	Wt. gm.	%	Wt. gm.	%
Leg	a 1586±164	24.19±0.70	ab 2047±201	25.06±0.49	b 2325±129	24.29±0.34	* 4.854	* 5.227
Loin	a + 1015±87	15.86±0.34	b 1228± 48	14.87±0.68	c 1443±104	15.03±0.44	** 22.814	** 22.110
7th -12th ribs	a 330±34	5.16±0.21	b 447±52	5.36±0.27	b 502±41	5.22±0.19	* 4.233	N.S. 0.146
1st-6th ribs	a - 413±52	6.37±0.33	ab 511±49	6.38±0.44	b 616±40	6.45±0.28	* 4.657	N.S. 0.018
Shoulder	a +1299±107	20.43±0.41	b 1586±164	19.49±0.57	c 1830±106	19.16±0.44	* 4.422	N.S. 3.485
Neck	a - 616±40	9.95±0.68	ab 812±88	9.89±0.22	b 1006±89	10.41±0.43	** 6.537	N.S. 0.281
Breast	a - 881±105	13.51±0.49	ab 1235±132	15.09±0.27	b 1401±62	14.72±0.41	** 6.588	** 15.061
Blank	- 293±34	4.52±0.21	323±66	3.75±0.40	455±74	4.72±0.68	N.S. 2.037	N.S. 1.189
Tail fat ⊕	a -3945±480	3.95±0.84	b 6129±367	6.13±0.57	b 6601±1633	6.60±1.35	** 6.886	N.S. 2.264

⊕ Related to empty body weight. * P ⟨ 0.05 ** P ⟨ 0.01 N.S. = Not significant.
Means on the same raw bearing different litters differ significantly.