قسم : الانتاج الحيواني - كلية الزراعة - جامعة أسيوط.
رئيس القسم : أ . د . / عبد الله مرسي الجمال .

انتاج الضأن من الحملان غليظة الذيل وعلاقته بمستوى الغذاء

٢ - الصفات الطبيعية للذبيحة واستخدام قطع الذبيحة كدليل على مكوناتها

فيصل الحمصي ، جلال عبد الحافظ

اجريت هذه التجربة لدراسة :

١ - تأثير مستوى التغذية على الصفات الطبيعية والكيماوية للذبيحة .

٢ - المكونات الطبيعية للذبيحة وعلاقتها بمكونات قطع الذبيحة المختلفة .

استخدم في هذه التجربة ٢٤ راسا من ذكور الاغنام الاوسيمي المفرده غذيت على ثلاث مستويات من التغذية . وقد أمكن الحصول على النتائج التالية :

١ - زادت أوزان كل من اللحم والدهن والعظم زيادة جوهرية بزيادة مستوى التغذية واحتوت ذبائح الحيوانات التي غذيت على مستوى منخفض على نسبة مرتفعة من اللحم عن تلك التي غذيت على المستوى المتوسط أو العالي . أكثر قطع الذبيحة احتواء على اللحم هي الفخذ والكتف والسره وعلى العكس كانت منطقة القطن والضلوع من ١ - ٦ والصدر أقل القطع احتواء على اللحم .

٢ - زاد دهن الذبيحة سواء كوزن مطلق أو كنسبه مئوية بزيادة مستوى الطاقة المأخوذة .
أكثر مناطق ترسيب الدهن هي منطقة السره والصدر والقطن بينما اقل القطع احتواء على الدهن منطقة الضلوع والكتف والرقبة والفخذ .

٣ - وجد ان نسبة العظم في الذبيحة تتناقص جوهريا بزيادة مستوى التغذية أكثر قطع الذبيحة احتواء على العظم هي الرقبة والضلوع .

٤ - في جميع المعاملات كانت زيادة نسبة الدهن في الذبيحة مصحوبة بانخفاض في كل نسبة اللحم والعظم .

٥ - وجد انه يمكن الاعتماد على مكونات الفخذ للتنبوء بمكونات الذبيحة من اللحم والدهن والعظم في حملان الاوسيمي .

٦ - تتناقص نسبة الرطوبة والبروتين في اللحم بزيادة مستوى التغذية بينما زاد الدهن داخل العضلات زيادة جوهرية بزيادة مستوى التغذية . كان لحم منطقة القطن أكثر احتواء على البروتين بينما كان لحم منطقة الكتف أكثر احتواء على دهن داخل العضلات .

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. II- PHYSICAL AND CHEMICAL CHARACTERISTICS OF CARCASS USNING SAMPLE JOINTS AS AN INDEX OF CARCASS COMPONENTS.

(With 6 Table)

By

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

(Received at 11/6/1980)

SUMMARY

Twenty four Ossimi single male lambs were used to study the effect of plane of nutrition during pregnancy and first year of age on physical and chemical composition of carcass. Moreover, the relationship between physical components of the carcass and carcass joints were estimated. The results obtained could be summariezed as follows:

1- Lean; fat and bone weights of carcass increased significantly (P/ 0.01) with increasing level of nutrition. Carcasses from animals feeding on low level of nutrition had higher values of lean percentage than those from lambs received medium or high levels. Leg, shoulder and flank were the most leany joints. Contrarily, loin, 1st.-6th. ribs and breast were the least leany ones.

2- Dissectible fat, both as weight or percentage, increased with increasing the level of energy intake. Considerable fat was deposited in flank, breast and loin. While the least cuts in this respect were the 1st.-6th. ribs, 7th.-12th. ribs, shoulder neck and leg.

3- Bone percentage in the carcass decreased significantly with increasing the level of energy intake. Neck, 1st.-6th. ribs and 7th.-12th. ribs were the bony cuts in the carcass.

4- In all treatments, the increase in fat percentage was accompanied by a decrease in percentages of lean and bone.

5- The leg joint components cold be used as reliable indices to predict dissectible lean, fat and bone in the carcasses of Ossimi lambs.

6- Moisture and protein contents decreased with increasing the level of energy intake. While intramuscular fat increased significantly with increasing level of nutrition. Loin meat had highest values of protein. Contrarily shoulder's meat scored higher percentage of intramuscular fat.

INTRODUCTION

Many studies have been conducted to determine the effect of plane of nutrition on lamb's carcass measurements (ELY and NOBLE, 1964, SHELTON et al., 1969 and EL-HOMMOSI and ABD EL-HAFIZ, 1979). Most researches were in agreement with increasing energy levels in the diet usually resulted in greater fat deposition.

ANDREWS and ROSKOV (1970) showed marked nutritional effects on the carcass comosition of early weaned lambs. On the other hand, CRADDOCK et al. (1974) found that carcass measurements, quality factors and chemical composition of carcass were not affected by changes in protein and energy levels.

In cattle, GRIFFITHS (1978) showed that the higher level of feeding increased the separable fat and total fat in the carcass.

The purpose of this study was to compare the physical and chemical composition of the carcasses of fat-tailed lambs under different nutritional levels throughout pregnancy and first year of age. This study also provided an opportunity to examine the relationships between physical composition of carcass and carcass's joints.

MATERIAL AND METHODS

This study was carried out at the Animal Production Experimental Farm, Faculty of Agriculture, Assiut Univ., 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. strach value/day (S.V.). The corresponding values for M and H group were 0.60 and 1.1 Kg. S.V., respectively.

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

Lambs were slaughtered when they reached the 12th. month of age. Following slaughtering and dressing, the hot carcass was cut longitudinally into two equal halves. The right side was chilled for 24 hours in the cooler at an average temperature of 4°C. The chilled side was subdivided into bone-in joints following the procedure described by TIMON and MAURICE (1965). Each joint was weighed and physically separated to its physical components, viz lean, fat and bone. The percentages of lean, fat and bone was calculated for each joint and also for the right half of the carcass.

Meat samples were taken from leg, loin and shoulder joints for chemical analysis. Chemical analysis were carried out according to the A.O.A.C. (1960) methods to determine moisture, intramuscular fat (ether extract) and protein.

The results have been evaluated by analysis of variance according to SNEDECOR (1962). The singificance of group differences was tested by DUNCAN'S multiple range test (1955). Correlation and regression methods were employed to investigate the various relationships.

RESULTS AND DISCUSSION

Lean:

Mean weights dissectible components in right half of chilled carcasses are presented in Table (1). These data show that lean weight increased significantly (P/_ 0.01) with increasing level of energy intake (Table, 3). Considering lean weight of L group as 100%,the corresponding values will be 122% and 144% for group M and H, respectively. This shows that increasing the level of energy intake during early life of the animal was associated with the full development of muscular tissue. ANDREWS and ORSKOV (1970)showed marked nutritional effects on the carcass composition of early weaned lamb especially protein which increased with the increase in protein intake.

On the other hand, lean percentage was found to be 66.31%, 62.43% and 63.96% for L, M and H treatments, respectively. It is quite clear that carcasses from animals fed on a low level of nutrition had higher values of lean percentage than those from animals which received medium and high levels of energy intake. These results are mainly due to more fatty tissues present in carcasses of M and H groups.

Comparing physical composition of different joints (Table, 2), it could be noticed that the lean weight in all joints increased with increasing level of energy intake. On the other hand, it was observed also that the percentages of lean in different cuts were in the reverse of absolute weight of lean (Table, 2). KEMP et al. (1970), reported that as the weight of the animal increased the percentage of edible portion significnatly decreased for major cuts and total carcass.

From results presented in Table (2), it is clear that leg, shoulder and flank were the more leany joints. On the contrast, loin, 1st.-6th. ribs and breast were the less leany cuts in the carcass.

Statistical analyses in Table (3) showed that plane of nutrition contributed 4.39% to the total variability in lean weight. While carcass joints seemed to be the most important factor in this respect, as it was responsible for about 76% of the total sum of squares.

Fat:

Data presented in Tables (1 and 3) illustrated that amount of dissectible fat in the carcass significantly (P/_0.01) increased by increasing level of energy intake. Plane of nutrition accounted for 9.70% of total variance (Table, 3). Total dissectible fat in the right half of the carcass was found to be 657, 1231 and 1447 gm. for L, M and H treatments, respectively. It is interesting to note that the amount of fat in the H group was greater by more than one fold of that in L goup (1441 vs 657).

It is quite clear from data in Table (1) that high plane of nutrition resulted in an increase in the percentage of fat in carcass. Similar results were reported by SHELTON et al. (1969) and AREHART and BANBURY (1973).

Since the increase in degree of fatness in the carcass is not acceptable by many consumers, it may be therefore be suggested that the pattern of feeding should be planned to produce carcass of reasonable fat content.

Dissectible fat, both as weights or percentages increased in all carcass joints with increasing level of energy intake (Table, 2). Considerable fat was deposited in flank, breast and loin. The least cuts in this connection were rib cuts, shoulder, neck and leg. Statistical analysis (Table, 3) indicated that joints differences were highly significant ($P \angle 0.01$) and showed a large portion of the variability.

Bone:

With increasing plane of nutrition there was a corresponding significant increase ($P \angle 0.01$) in the amount of bone in the carcass (Tables 1 and 3). Average weights of bone in carcasses of M and H groups were higher by about 19% and 32%, respectively, than those of L group.

On the other hand, bone percentage in the carcass decreased significantly ($P \angle 0.01$) with increasing the level of energy intake. A similar trend was also evident for boney tissue in different joints of the carcass (Table, 2).

The results also illustrated that neck, 1st-6th. ribs and 7th.-12th. ribs were the boney cuts in the carcass. Statistical analyses (Table, 3) show that treatment differences in the weight and the percentage of bone represented a small portion of the variability (3.85% for bone weight and 2.43% for bone percent). On the other hand, joints accounted for 81.92% and 78.02 of thetotal sum of squares for both weights and percentages of bone, respectively.

Comparing the percentages of dissectible lean, fat and bone (Tables 1 & 3). It is apparent that the increase in fat percentage was accompanied by a decrease in the percentages of lean and bone. These findings agree with those reported by KEMP and PARTON (1966).

Predictive Value Of Sample Joints:

Lean:

The correlation and regression equation between lean weight of different carcass joints and total lean in the carcass are presented in Table (4). It is quite clear that carcass lean weight was highly significant correlated with that of all joints. From correlation coefficients, regression equations and standard error of the estimate (Table, 4), it could be concluded that in Ossimi sheep leg joint gives the more accurate estimate of the total lean in the carcass. Present results confirm results reported by EL-HOMMOSI and EL-ALAMY (1979) in another group of Ossimi males slaughtered at two years of age.

Also, BRZSTOWSKI and LEWCZUK (1977), found that the percentage of meat in the carcass was highly correlated ($P \angle 0.01$) with the percentage of meat in the leg, shoulder and breast plus flank.

Dissectible Fat:

Results in Table (4) indicate that total dissectible fat in the carcass was highly correlated ($P \angle 0.01$) with the weight of dissectible fat in all joints of the carcass except 1st. - 6th. ribs joint. It may be suggested that breast plus flank, leg and shoulder were the most accurate predictors of total fat in Ossimi males carcasses. The data also indicated that fat weight in 1st.-6th. ribs & joint is not highly related to measure of dissectible fat in the carcass. BARTON and KIRTON (1958) found that leg and loin in combination gave a more accurate estimate of total fat in the carcass.

Bone:

According to the values of correlation coefficients, analysis of variance and standard errors of the estimates, it can be concluded that leg, neck and loin were excellent predictors for carcass's bone.

In general, comparing results of lean, fat and bone (Tables 4 and 5), it is quite clear that physical separation of leg was an accurate method of predicting lean, fat and bone in the carcass of Ossimi lambs.

Chemical Composition:

Means and standard errors of chemical composition are presented in Table (6). Generally, these data revealed that plane of nutrition during early life of age had significant effect (Table, 6) on chemical composition of carcass.

Comparing the percentages of moisture,fat and protein in the three treatments,it was found that both moisture and protein contents follow similar trend and decreased with increasing level of energy intake. However, the intramuscular fat (ether extract) increased significanty with increasing plane of nutrition. PALLSON and VERGES (1952), reported that high plane of nutrition increased the percentage of intramuscular fat and decreased the percentage of moisture in sheep, both soon after birth and in older animals.

Since high levels of feeding led to precious fat development, it may be suggested that choosing feeding scale during early life of age is one of the important factors which determine the maturity age (Slaughter age).

Irrespective of plane of nutrition, it will be noted that the composition of meat varies in different joints of the carcass. Loin meat had highest values of protein. On the contrary, shoulder's meat scored higher percentage of intramuscular fat than meat of leg and loin. Similar results were reported by EL-HOMMOSI and ABD EL-HAFIZ (1979). VESELY and PETERS (1966) found that the amount of fat in shoulder muscles was significantly greater than loin or leg muscles.

REFERENCES

Andrews,R.P. and Orskov,E.R. (1970): The nutrition of early weaned lambs. I.The influence of protein concentration and feeding level and sex on body composition at two live weights. J. Agric. Sci., Camb., 75: 19-26.

Arehart,L.A. and Banbury,E.E. (1973): Effect of energy on the performance of early-weaned lambs. Kansas Agric.Exp. Sta. Prof. Rep., 197.

A.O.A.C. (1960): Official Methods of Analysis (10th. Ed.). Association of Official Agricultural Chemists. Washington, D.C.

Barton, R.A. and Kirton, A.H. (1958): The leg and the loin as indices of the composition of New Zealand lamb and mutton carcasses. N.Z.J. Agric. Res., 1 : 783-789.

Brzstowski,H. and Lewczuk,A. (1977): The relationship of the amount of meat, fat and bone in the carcass with the weight and composition of carcass cuts in sheep.Zeszty Naukowe Akademii Rolinczo-Technicznej w Olsztynie 164: 41-49. (A.B.A. 46, 4383).

Craddock,B.F., Field,R.A. and Riley,M.L. (1974): Effect of protein and energy levels on lambs carcass composition, J. Anim. Sci., 39: 325-330.

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

El-Hommosi, F.F. and Abd El-Hafiz, G.A. (1979): Effect of different concentrate levels in diets of Ossimi lambs. II- Physical & chemical characters of carcass. Assiut Vet. Med. J., 6: 73-90.

El-Hommosi, F.F. and El-Alamy, M.A. (1979): The relationship between lean, fat and bone in the carcass and carcass joints of Ossimi and Saidi rams. 14th. Arab. Vet. Cong., 1979-Cairo, Egypt.

Ely,D.G. and Noble,R.L. (1964): The feasibility of feeding lambs during the summer and the effect of two concentrate: roughage ratios on certain live measurements and carcass composition. Okla. Agric. Exp. Sta.Misci. Puble.

Garrett,W.N., Meyer,J.H. and Lofgreen,G.P. (1959): The comparative energy requirements of sheep and cattle for maintenance and gain. J. Anim. Sci., 18: 528-547.

Griffiths,T.W. (1978): Effects of variations in energy and protein intake on digestibility, nitrogen balance and carcass composition in British Friesian castrate male cattle. Anim. Prod., 26: 233-243.

Kemp,J.D. and Parton,R.A. (1966): Composition of lamb carcasses and cuts of New Zealand export grades. New Zealand J. Agric. Res. 9 : 590.

Kemp,J.D., Crouse, Winston Deweese,J.D. and Moody,W.G.(1970): Effect of slaughter weight and castration on carcass characteristics of lambs. J. Anim. Sci., 30 : 348-354.

Pallson,H. and Verges,J.B. (1952): J. Agric. Sci. 42, 1. (Cited by Lawrie, (1974): "Meat Science" 2nd Ed., Pergamon Press, Oxford,New York).

Shelton,M., Carpenter,Z.L. and Huston,J.E.(1969): Influence of sex, ration and stilbesterol on feedlot performance and carcass characteristics of early weaned lambs. Sheep and Angora Goat, Wool and Mohair Res. Per. Tex. Agric. Exp. Sta. Prod. Rep., 2631 : 3.

Snedecor,G.W. (1962): "Statistical Methods" 6th. Ed., Iowa State College Press, Ames, U.S.A.

Timon,V.M. and Maurice,B. (1965): Quantitative estimates of lamb carcass composition. I. sample joints. Anim. Prod. 7: 173.

Vesely,J.A. and Peters,H.F. (1966): Feedlot performance of five breeds of sheep and their carcass characteristics. Can. J. Anim. Sci., 46 : 139.

TABLE (1)

Mean weights (g) and percentages of carcass dissectible components of Ossimi lambs. (In chilled half carcass).

Component	Treatment	Mean Weight (g)	Mean %*	Range (g)
Dissectible lean	L	4184	66.31	2414-5407
	M	5082	62.43	3037-8515
	H	6003	63.96	4930-7226
Dissectible fat	L	657	10.41	138-1059
	M	1231	15.12	250-2554
	H	1447	15.42	698-2682
Bone	L	1469	23.28	965-1802
	M	1753	21.53	1301-1969
	H	1936	20.63	1591-2340

* Related to chilled half carcass.

L = Low. M = Medium. H= High.

TABLE (2)

Effect of plane of nutrition on physical composition of lamb's carcasses.

Components	Treatment	Leg Wt gm.	Leg %	Loin Wt. gm.	Loin %	1st.-12.th ribs Wt. gm.	1st.-12.th ribs %	1st.-6th. ribs Wt. gm.	1st.-6th. ribs %	Shoulder Wt. gm.	Shoulder %	Neck Wt. gm.	Neck %	Breast Wt. gm.	Breast %	Flank Wt. gm.	Flank %
Lean	L	1122	71	616	63	179	54	265	62	901	70	397	64	496	57	209	71
	M	1423	69	715	59	238	53	327	64	1062	67	514	63	598	49	205	68
	H	1615	69	827	57	295	58	327	63	1244	68	638	64	750	50	299	55
Fat	L	111	7	164	13	34	9	9	3	112	8	27	5	164	17	73	25
	M	212	11	236	19	34	10	17	4	165	10	60	7	380	29	106	28
	H	230	13	300	21	55	11	30	5	218	12	119	13	359	29	193	42
Bone	L	336	21	224	23	108	34	135	34	266	22	185	30	209	25	5	2
	M	390	21	262	21	147	35	159	32	330	22	220	28	240	21	6	2
	H	362	20	243	21	139	27	177	29	346	19	233	33	278	20	6	2

% Related to joint weight.

TABLE (3)

Analysis of variarce of the effect of plane of nutrition on physical composition of lamb's carcasses.

S.O.V.	d.f.	M.S.					
		Lean		Fat		Bone	
		Wt.	%	Wt.	%	Wt.	%
Treatments (T)	2	827127** (4.39)	260.27185** (2.79)	169789** (9.70)	63.7214** (5.20)	55996** (3.85)	228.5479** (2.43)
Joints (J)	7	4117998** (76.23)	872.6388** (32.69)	225677** (45.12)	1941.8951** (52.46)	340907** (81.92)	2100.4816** (78.02)
T x J	14	42891 N.S. (1.59)	138.791** (10.40)	12292 N.S. (4.92)	47.0689 N.S. (2.54)	3180 N.S. (1.53)	21.0977 N.S. (1.57)
Error	168	6731955 (17.80)	60.2196 (54.13)	8392 (40.27)	61.3532 (39.79)	2203 (12.71)	20.1758 (17.99)

* = P ∠ 0.05. ** = P ∠ 0.01. N.S. = Not significant.

Figures shown in paretntheses are the compontents of variance percentages attributed to source of variation.

TABLE (4)

Relationship between lean, fat and bone weight in different joints of the carcass and weights of lean, fat and bone in the carcass.

Component	Independent variate = x						
	Leg	Loin	7th-12th. ribs	1st-6th ribs	Shoulder	Neck	Breast + Flank
Lean:							
r	0.977**	0.9238**	0.9432**	0.8254**	0.9281**	0.9231**	0.9561**
Regression equation Y=	3.506x+227	5.586x+1071	14.778x+1587	11.348x+1401	5.075x-336	7.616x+1159	5.287x+674
Sy. X (g)	314	1363	1435	1435	1349	1395	1346
Fat:							
r	0.9375**	0.6973**	0.7645**	0.2229 N.S.	0.9010**	0.7571**	0.9701**
Regression equation Y=	5.386x+114	3.620x+264	14.804x+416	-	5.285x+240	8.338x+539	2.190x+181
Sy. X (g)	617	627	661	-	260	650	509
Bone:							
r	0.8909**	0.8247**	0.6899**	08100**	0.7943**	0.8574**	0.7842**
Regression equation Y=	3.060x+507	4.806x+474	6.759x+84	6.101x+961	4.132x+422	4.530x+754	4.759x+534
Sy. X (g)	268	289	310	295	287	285	291

Sy. X = Standard error of the estimate. * P ∠ 0.02. ** = P ∠ 0.01. N.S. = Not Significant.

TABLE (5)

Mean square values of regression analyses

S.O.V.	d.f.	M.S. Leg	Loin	7th.-12th. ribs	1st.-6th ribs	Shoulder	Neck	Breast + Flan
Lean:								
Due to regression	1	46060253**	41143518**	42910654**	32847087**	41537973**	41107963**	44088271**
from regression	22	98395	321882	241558	698952	303952	323498	188029
Fat:								
Due to regression	1	8795229**	1858928**	5836759**	499254N.S.	8127618**	5746432**	9407157**
from regression	22	54427	233349	188903	431516	84713	193008	26612
Due to regression	1	1693285**	1454500**	1016132**	1403710**	1347119**	1567448**	1325991**
from regression	22	20217	31065	50990	33373	63218	25931	36906

** = P ∠ 0.01 N.S. = Not significant.

TABLE (6)

Effect of plane of nutrition on chemical composition of lamb's meat.

Item		Leg			Loin			Shoulder			Significant Differences for.	
		L	M	H	L	M	H	L	M	H	Treatments	Joints
Moisture	%	75.72	74.43	74.36	73.69	73.44	72.95	74.68	74.25	73.27	*	**
	SE	0.15	0.43	0.46	0.37	4.59	0.56	0.74	0.51	0.54		
Protein	%	17.38	13.04	17.02	17.80	17.52	17.49	17.04	17.09	16.91	*	**
	SE	0.26	0.26	0.17	0.28	0.18	0.21	0.24	0.18	0.23		
E.E.	%	6.08	7.25	7.48	7.36	7.73	8.14	7.75	8.61	9.11	**	**
	SE±	0.28	0.27	0.66	0.37	0.60	0.26	0.69	0.28	0.36		

E.E. = Ether extract * = P ∠ 0.05 ** = P ∠ 0.01.