دراسة تأثير البروتين في العليقة على الزيادة في وزن الجسم وكفاءة تحويل الغذاء ومكونات الذبيحة في الأغنام الأوسيمي والصعيدي

دكتور فيصل الحمصي ، دكتور جلال عيد عبد الحافظ

قسم الانتاج الحيواني ـ كلية الزعة ـ جامعة اسيوط

الملخص العربي

استخدم فى هذه التجربة ١٥ رأسا من الكباش البدرية من كل من الأغنام الأوسيمى والصعيدى قسمت حيوانات كل نوع الى ثلاث مجاميع لدراسة تأثير مستوى البروتين المهضوم فى العليقة على النمو والكفاءة التحويلية وصفات الذبيحة . وقدرت كل من الزيادة فى وزن الجسم ووزن الذبيحة ومكوناتها من اللحم والدهن والعظام .

وقد اتضح من النتائج أن معدل الزيادة فى وزن الجسم فى المجموعة التى كانت تتغذى على علائق بها ١٤٪ بروتين مهضوم قد فاقت معدل الزيادة فى المجموعات الأخرى التى غذيت على علائق تحتوى على ١٧٪ أو ٢٤٪ من البروتين المهضوم .

وجد أن نسبة التصافى فى الأغنام الأوسيمى تتراوح ما بين ٥٤ر٢٣٪ الى ٥٥ر٣٢٪ بينما كانت فى الصعيدى تتراوح ما بين ٥٣ر٠٢٪ الى ٥٦ر٢١٪ لوحظ أيضا أن ذبائح الأغنام الصعيدى كانت تحتوى على نسبة عالية من اللحم والعظام أكبر من ذبائح الأوسيمى ومن ناحية أخرى كانت ذبائح الأوسيمى محتوية على نسبة أعلى من الدهون .

اتضح من التحليلات الاحصائية أن الفروق فى الصفات التى درست سواء بين الأنواع أو بين المعاملات غير جوهرية كما يمكن القول بأن المستوى المناسب من البروتين لتغذية الكباش البدرية لكل من الأغنام الأوسيمى والصعيدى هو ١٤٪

كما وجد أن هناك ارتباط معنوى موجب بين وزن الذبيحة وكمية الدهن بها = ٦٧٥٥ر للأوسيمى ر = ٦٨١٤ر للصعيدى كذلك وجد ارتباط معنوى موجب بين محيط صدر الحيوان قبل الذبح ووزنه الحى ووزن الذبيحة .

كما وجد انحدار معنوى لكل من وزن الذبيحة ووزن الجسم على محيط الصدر قبل الذبح

Faculty of Agriculture, Dept. of Animal Production.
Head : Prof. A. Darwish.

THE EFFECT OF DIETARY PROTEIN LEVEL ON LIVEWEIGHT GAIN, FEED EFFICIENCY AND CARCASS MEASUREMENTS OF OSSIMI AND SAIDI SHEEP

(with 4 tables)

By

F.F. El-Hommosi and G.E. Abdel-Hafiz

(Received 21/4/1975)

SUMMARY

Fifteen young rams from each Ossimi and Saidi sheep were distributed into three groups to study the effect of dietary protein level on growth rate and on carcass composition. Body weight gain, carcass weight, and amount of lean, fat and bone in the carcass were also determined. The results indicated that animals of both breeds fed either 7 or 24% D.P. gained less weight than when 14% D.P. ration was fed. Dressing percentage of Ossimi ranged between 54.23 to 55.32 and those of Saidi sheep ranged between 53.02 to 56.21%. Saidi carcasses has the higher percentages of lean and bone than those of Ossimi ones. On the other hand, Ossimi carcasses has more fatty tissues than Saidi carcasses. Statistical analysis indicated that there were no significant differences, either between the two breeds or between treatments in body gain and carcass composition. A suitable level of D.P. for feeding yearling rams of Ossimi and Saidi sheep was 14%.

Results illustrated that there was a significant positive correlation between carcass weight and amount of fat in it (r=0.6755 for Ossimi and 0.6814 for Saidi). Highly significant coefficients of correlation and regression were found between width at chest before slaughtering and body and carcass weight

INTRODUCTION

The view had already been expressed (PRESTON, 1963 and STOBO, ROY and GASTON 1967) that at equal levels of energy intake the live weight gain did not differe markedly with different levels of protein in the ration, although it tended to be lower at the lower levels of protein intake. Recently, STILES GRIEVE and GILLS (1974) found also that dietary protein level had no effect on average daily gain, feed intake or feed efficiency of heavy calves.

Studies of protein digestion in the stomach of sheep offered diets differing in crude protein content have indicated that between diets there is likely to be less variation in nitrogen (N) leaving the abomasum than in N intake. Thus on diets of low protein content, N is gained during the passage of digesta through the stomach, while losses of N from the stomach with diets containing higher levels of protein (HOGAN and WESTON, 1967).

The proportion of crude protein that becomes available to the sheep as amino acids is influence by deamination in the rumen, and, as El-SHAZLY (1958) had indicated that ammonia is the chief end product of protein hydrolysis in the rumen.

The nature of the diet effects greatly the balance between the breakdown and synthesis reactions of protein within the rumen. There is a better utilization in the presence of added carbohydrate (El-ASHRY, 1971). Moreover, there is a more rapid attack upon the fibrous components of the ration as the protein intake is increased (HUME, MOIR and SOMERS, 1970).

Egyptian sheep belong to the Middle East coarse wool group. Mutton was considered the most economic product from the sheep. Most investigations have been concerned mainly with performance in terms of liveweight increase and they have ignored the pattern and magnitude of carcass-weight changes over the fattening period.

In this study an attempt was made to determine if dietary levels of protein would show any effect on performance, efficiency of feed utilization and carcass components of Ossimi and Saidi rams.

MATERIALS AND METHODS

Thirty Ossimi and Saidi rams (18 months of age) were used in this study, fifteen animals from each breed. Animals of each breed were divided at random into three groups according to body weight. The experiment was carried out on the experimental farm, Faculty of Agriculture, Assiut University and extended from May to October 1974.

The experimental rations shown in Table (1) were fed to the three groups of animals at three levels of protein 7%, 14% and 24%. The energy level intake was the same in the three rations (1.7 X maintenance). The animals were individually fed one daily at 8 a.m.

Each animal was given 300 g. wheat straw per day as a sole roughage.

All sheep were weighed at two weeks intervals from the beginning to the end of the experiment. Water and food were withheld overninght before weighing.

Slaughter technique:

Animals left fasting for 12 hours prior to killing and liveweight, body measurements were estimated. Killing animals were followed according to the rules of Islam, severing the head, atlas and cranium bones by using a sharp knife. When bleeding was completed, the animals were skinned and dressed out. Hot carcasses were weighed, carcass measurements were taken. Fore and hind quarters were weighed separately

Subjective assessments of carcass composition or bone, fat, and lean meat content were also carried out.

Ammonia-N determination:

TABLE 1. Composition of the experimental rations.

Ingredients	Rations		
	I (7% D.P.)	II(14% D.P.)	(III(24%D.P.)
Oats.	42	27	7
Wheat bran	35	20	25
Undecorticated cotton seed cake	20	40	—
Decorticaed cotton seed meal	—	10	50
Crushed horse beans	—	—	15
Lime stone.	2	2	2.
Common salt	1	1	1

D.P. = Digestible protein

Ruminal samples were collected via stomach tube from two animals of each group using suction pump. Ruminal samples were taken before feeding as well as at 4, 8, 12 and 24 hours after feeding.

Free ammonia in fresh strained ruminal liquor samples was determined by the CON-WAY microdiffusion method (CON-WAY, 1957).

Statistical analysis of the data were carried out according to SNEDECOR (1962).

RESULTS AND DISCUSSION

A summary of performance data is given in Table (2). These results show that the average final weight of animal given 14% D.P.(II) was higher than those given either 7% (I) or 24% (III) level. Considering the average final body weight of group (II) of Ossimi and Saidi sheep as 100, the corresponding values for the groups (I) and (III), will be 96.23% and 95.87% in Ossimi and will be 93.23% and 97.28% in Saidi sheep respectively. The data also illustrated that Ossimi groups has higher final body weight than Saidi ones at any level of protein intake. Statistical analysis (Table 3) revealed that the differences between treatments or between breeds were not significant.

In respect to body weight gain, results showed that animals of the two breeds fed either 7 or 24% D.P. gained less weight than when a 14% D.P. ration was fed. In Ossimi sheep, groups I & III gained 87.06% and 83.70% of group II respectively. The corresponding figures were 77.11 and 91.56% in Saidi ones. These results are in

TABLE 2. Performance data for rams receiving different levels of protein.

Performance data	Rations					
	I (7 % D.P.)		II (14 % D.P.)		III (24 % D.P.)	
	Ossimi	Saidi	Ossimi	Saidi	Ossimi	Saidi
No. of rams	5	5	5	5	5	5
Initial wt. Kg	40.20± 0.64	40.14± 1.35	40.00± 0.77	40.14± 1.71	40.60± 1.31	40.40± 1.09
Final wt., Kg	56.20± 2.68	52.94± 3.06	58.40± 3.19	56.74± 3.81	56.00± 2.47	55.30± 3.48
Daily gain, g	98.00±11.48	71.11± 8.85	102.22± 13.39	92.22± 8.03	85.56± 8.11	84.44± 8.24
Daily S.V. intake, g	800	800	810	820	790	790
Kg S.V./Kg gain	8.99± 1.43	11.27± 1.79	7.92± 1.14	8.89± 0.80	9.23± 0.69	9.36± 1.02
Ammonia N mg %	44.22	38.28	49.72	46.72	62.89	53.23
Final fasted wt., Kg	54.60± 2.67	50.70± 2.98	55.50± 3.89	54.70± 3.09	53.90± 2.47	53.00± 3.48
Carcass wt., Kg	30.20± 1.35	28.50± 2.09	30.60± 2.41	29.20± 2.41	29.50± 1.70	28.50± 2.41
Dressing %	55.31	56.21	55.32	53.02	54.23	53.77
Fore quarter wt., Kg	15.30± 0.89	14.70± 1.05	15.50± 1.05	15.20± 1.01	14.20± 1.07	15.20± 1.19
Fore quarter %	50.63	52.27	50.48	52.05	48.13	53.20
Hind quarter wt., Kg	13.69± 0.59	12.80± 0.95	14.30± 1.23	13.10± 1.03	14.50± 1.58	13.00± 1.19
Hind quarter %	46.22	45.33	46.57	44.86	49.15	44.84

D.P.=Digestible proteiu. S.V.=Starch value

TABLE 3. Analysis of variance of effect of breed, portein level on body weight, body gain and carcass components.

S. of V.	Mean squares										
	d.f.	Final body wt.	Body gain	Carc-ass wt.	F.Q. wt.	H.Q. wt.	Lean wt.	Fat wt.	Bone wt.	Lean bone	Effici-ency
Between breeds	1	17.63	653.33	9.07	0.07	11.65	6.81	23.94	0.0003	0.63	8.96
Between treatments	2	9.22	826.64	2.31	1.07	0.27	0.44	0.35	0.7845	0.17	11.92
Breed X Treat .	2	1.52	138454*	1.57	1.57	0.14	6.86	0.18	0.3505	0.14	20.18*
Error	24	53.29	392.93	22.40	5.41	6.39	9.18	5.77	0.8610	0.81	5.90

* Significant at 5% level.

F.Q. = Fore quarter.

H.K. = Hind quarter.

agreement with JONES, JACOBS and MARTIN (1974) findings with bull calves, that maximum gains occurred when the diet contained from 14.3 to 18.7% D.P. They also found that minimum level of dietary protein at which maximum nitrogen retention occurred was 15.3% D.P. Similarly, HOWES (1972) concluded that increasing protein above or below the basal level (11.4%) did not result in better performance for yearling steers. This deviation in dietary protein cause a reduction in weight gain. However, statistical analysis (Table 3) indicated that the differences between the three tested rations and between the two breeds were not significant. Gains were not affected by D.P. levels of 16.3, 18.4 or 20.5% (BROWN and LASSITER, 1962) or 14.7, 15.2 or 18.3% (MARRILL and MELTON, 1973).

Data in Table (2) indicated that, trends in feed efficiency approximated average gains. In Ossimi and saidi sheep group II (14% D.P.) had the highest efficiency. The differences both, between the two breeds or between treatments were not significant (Table 3). Therefore, these results suggest that the most suitable level was 14% D.P. where above or below this level, daily gain and efficiency of food utilization decrease.

It is quite clear from data in Table 4, that Ossimi had relatively larger carcasses than Saidi sheep. Ossimi carcases equals 105.96%, 104.45% and 130.51% of Saidi ones in groups I, II and III respectively. Dressing percentage of Ossimi ranged between 54.23% to 55.32% and those of saidi sheep ranged between 53.02 to 56.21%. Present results of dressing percentage for both Ossimi and Saidi sheep are higher than those reported by BRADFORD, WEIR and TORELL (1960) for 120day lambs of Sufflok and South down sheep (48.3% for sufflok and 49.1% for southdown). On the other hand, our findings are in accordance with

those reported by JANCENKO (1963), who reported dressing percentage ranged between 50 - 56% for crossbred sheep.

From data presented in Table (4), it is interesting to note that, Saidi carasses had the higher percentages of lean and bone than those of Ossimi ones. On the other hand, Ossimi carcasses had 41.00 % 29.59% and 35.83 more fatty tissues than saidi ones in groups I, II and III respectivley. This may be due to that Ossimi sheep had greater tendency of fat deposition specially in the caudal region (Fat tail).

Data in Table (4) illustrated that carcasses of Ossimi sheep contained 59.9- 60.2 % lean 22.3- 23.4% fat and 16.7- 17.5 % bone. The coorresponding figures of Saidi sheep were 63.5 - 65.3% lean, 16.8 - 18.3% fat and 16.9 - 19.7 %bone. TIMON and MAURICE (1965) reported that the carcasses of Clun Forest sheep contain approximately 55% muscle, 28% fat and 16% bone.

TABLE 4. **Composition of Ossimi and Saidi rams carcasses.**

Groups	I		II		III	
Breeds	Ossimi	Saidi	Ossimi	Saidi	Ossimi	Saidi
Carcass wt.	30.2 ±1.35	23.5±2.09	30.6 ±2.41	29.2 ±2.41	29.5 ±1.70	28.5 ±2.41
Lean : wt.	18.18±1.50	18.10±0.88	18.32±1.54	18.78±1.56	17.68±0.88	18.60±1.45
%	60.2	63.5	59.9	64.3	59.9	65.3
Fat : wt.	6.74±0.35	4.78±0.92	6.92± 0.88	5.34 ±1.47	6.90 ±1.49	5.08±1.05
%	22.3	16.8	22.6	18.3	23.4	17.8
Bone : wt.	5.28±0.21	5.62±0.64	5.36 ±0.44	5.08 ±0.38	4.92 ±0.16	4.82±0.45
%	17.5	19.7	17.5	17.4	16.7	16.9
Lean/Bone	3.44±0.30	3.22±0.61	3.42 ±0.30	3.69 ±0.42	3.59 ±0.27	3.86±0.37

Statistical analysis (Table 3) show that there are no significant differences, either between the two breeds of sheep or between treatments in carcass components mentioned above. Statistical analysis also illustrated that there was a significant postive correlation between carcass weight and amount of fat in it (r= + 0.6755 for Ossimi and + 0.6814 for Saidi). Our findings are in accord with the results reported by BARTON (1957) which indicated that, with increasing weight of carcasses of rams there is a corresponding increase in the amount of fat.

On careful study of results presented in Table I and II, it is clear that the concentration of ammonia N in rumen liquor increased by increasing amount

of crude protein in diets. This may be attributed to the great losses of nitrogen in th ration contained 24% protein, since breeakdown of protein by microflora exceeded synthesis reactions within the rumen Similar results were reported by HOGAN and PHILLIPSON (1960) who found that losses of nitrogen from the stomach contents occur when the amount of nitrogen in the diet increased. The greatest losses occur when little disgestible carbohydrate is available (PHILLIPSON, DOBSON, BLAKBURN and BROWN (1962)

It is interesting to note that ammonia which arises from deamination is a toxic substance and must be excreted by the body as urea. Considerable amount of energy will be used in this processes. Accordingly, the efficiency of conversion of protein decreased with increasing its intake.

Relationship between width at chest and body weight, and carcass weight :

The coefficients of correlation between width at chest and body weight for both Ossimi and Saidi sheep was + 0.6059 with a regression coefficient of 0.72099 ± 0.1810 and both were highly significant ($p<0.01$). The corresponding coefficients of correlation between width at chest before slaughtering and carcass weight was + .0.6329 with a regression coefficient of 0.5II3 ± 0.1162 and those coefficients were highly significant ($p< 0.01$).

Assuming that the relationship between width at chest and body and carcass weight is linear, it is possible to predict the body and carcass weight by regression formula of the nature $Y = ax + b$, where Y is body weight or carcass weight in Kg and x, the width at chest in cm . The a and b are the statistical constants derived from the characteristics of the flock to which these sheep belong.

Hence, , $Y = 0.72099 \times - 11.93$, and $Y = 0.5113X - 16.86$ will be the two regression eqution that can be applied for body and carcass weight respectivelyin the flock of Ossimi and Saidi sheep. Where Y is the anticipated body weight or carcass weight in Kg at a given width at chest in cm . x

In order to test the applicability of these results, the expected body weight and carcass weight were calculated using the equations obtained. It was very interesting to find that the differences between the calculated weight of body and carcasses and those which were actually estimatd were not significant ($t= 0.1792$ & 0.9182 for body and carcass weight respectively, $d.f = 13$).

Therefore, it may be suggestied that the width of chest in Ossimi and saidi sheep is higly recommended to estimate both pody and carcass weight.

REFERENCES

Barton, R.A. (1957). The problem of over-fat meat. Sheep farming Annual (1957) : 61 - 73.

Bradford, G.E., Weir, W.C. and Torell, D.T. (1960). Growth rate, carcass grades and net returns of Suffolk and Southdown - sired lambs under range conditions. *J. Anim. Sci.* 19 : 493 - 501.

Brown, L.D. and Lassiter, C.A. (1962). Protein-enrgy ratios for dairy calves. *J. Dairy Sci.* 45 : 1353-1356.

Con-Way, E.J. (1957). Microdiffusion analysis and volumetric error, 4*th*. Ed. London, Crosby Lockwood and Son.

El-Ashry, M.M. (1971). The effect of level and source of nitrogen on growth and nitrogen metabolism in the rumen of growing ewes. U.A.R. *J.Animal Prod.*IINo. I : 121-128.

El-Shazely, K. (1958). Studies on the nutritive value of some common Egyptian feeding stuffs. I. Nitrogen retention and ruminal ammonia curves. *J. Agric. Sci.* 51 (2) :149.

Hogan, J.P. and Phillipson, A.T. (1960). The rate of flow of digesta and their removal along the digestive tract of the sheep. *Brit. J. Nutr.* 14 : 147.

Hogan, J.P. and Weston, R.H. (1967). The digestion of chopped and ground roughages by sheep. II. The digestion of nitorgen and some carbohydrate fractions in the stomach and intestine. *Aust. J. Agric. Res.* 18 : 803 - 819.

Howes, A.D. (1972). Effects of dietary volatile fatty acids and protein on feedlot performance and carcass traits of steers. Can. *J. Anim. Sci.* 52 : 343 - 350.

Hume, L.D., Moir, R.J. and Somers, M. (1970). Synthesis of microbial protein in the rumen. I. Influence of the level of nitrogen intake. *Aust. J. Agrec.* Res.. 21 : 283.

Jancenko, F.N. (1963). Methods of increasing mutton and wool production in the mountains of north Caucasus. Zivotnovodstov 25 : 24-46. (Anim. Breed. Abstr. 31 : 2098)

Jones, G.M., Jacobs, L.P. and Martin, L.J. (1974). Feed consumption and growth of dairy and bull calves fed calf starters differing in protein content. *Can. J. Anim. Sci.*. 54 : 315-324.

Marrill, J.L. and Melton, S.L., (1973). Protein required in starters for calves fed milk once or twice daily. *J. Dairy Sci.* 56 : 927 - 931.

Phillipson, A.T., Dobson, M.J. Blackburn, T.H. and Brown, M,. (1962). The assimilation of ammonia nitrogen by bacteria of the rumen of sheep. *Brit. J. Nutr.* 16 : 151.

Preston- T.R. (1963). The nutrition of the early weaned calf. Wid Rev. Nutr. Diet., 4 : 121 - 139.

Snedecor, G.W. (1962). Statistical methods. Iowa State Univ. Press, Ames Iowa. U.S.A.

Stiles- R.P., Grieve, D.G. and Gillis, W.A. (1974). Effects of three protein levels with and. without added fat on the performance and carcass characteristics of heavy veal calves *Can. J. Anim. Sci.* 54 : 79 - 86.

Stobo, I.J.F., Roy, J.H.B. and Gaston, H.J. (1967). The protein requirement of the ruminant calf. I. The effect of protein content of the cncentrate mixture given to calves weaned at an early age. *Anim. Pod.* 9 : 7 - 21.

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

Author's address : F.F. El-Hommosi. Dept. of animal production. Fac. of agric. Assiut.