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Effect of Interaction Between Breed and Plane of Nutrition on Sheep Carcass Tissues

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THIRTY two indigenous Ossimi and Rahmany male lambs were used in the present study. Eight lambs (four from each breed); aged about five months and weighing about 18 kg were slaughtered at strat of the experiment. The other twenty four animals were fed either ad lib. or on a restricted feeding. The animals were divided equally on the basis of breed and Feeding level at the end of the experiment, the animals wer slaughtered when they attained about 35 kg LBW.

After slaughtering and skinning, the rib saddle joint of relatively more fat than Ossimi ones and that restricted-were minced, well mixed and chemically analysed.

The results showed that Rahmani lambs tend to put on relatively more fat than Ossimi ones and that restricted-feeding animals had higher percentages of muscle and protein in their carcasses than the ad lib - fed ones.

The results indicated also that the restricted level of nutrition had a great minimizing effect on carcass fat weight gain.

The statistical analysis also revealed that the interaction (breed and feeding regime) effect was evident in percentages of muscle and fatty carcass.

Upon the basis of the present results one may suggest that feeding level has a specific effect on different carcass tissues of different breeds.

Key words : Breed differences Feeding regime Sheep carcass.

Several studies have been made on effect of different planes of nutrition on carcass components of native sheep. (Aboul Naga et al., 1973; El-Shobokshy et al., 1973 and Younis et al., 1975). However, it seems that no attention had been give to the inffuence of interaction between feeding regimes and breeds on major carcass of indigenous sheep. Therfore, this experiment had been performed to investigate this effect of interaction on carcass tissues of Egyptian fat tailed sheep.

Material and Methods

Animals and feeding System

Thirty two native weaned male Ossimi and Rahmani lambs aged about 5 months and weighing about 18 kgs. were used in the present investigation. Eight animals; four from each breed; were slaughtered at the beginning of the experiment. The remaining twenty four animal were fed either **ad lib**, or at a restricted scale and distributed equally on the basis of breed and feeding regime. The lambs of the restricted group were offered amounts of feed calculated according to Agricultural Research Council (ARC, 1965) recommendation to promote growth rates of 150 gm/day. The weight offered to the restricted animals was recalculated weekly from their live weight at the beginning of the week. The ration of all experimental animals composed of pelleted concentrate mixture (25% decorticated cotton seed meal, 25% corn, 25% rice bran. 10% wheat bran, 11% sesame meal, 1% bone meal, 2% lime stone and 1% salt and minerales) and berseem hay.

Management

The live weight of the animals was recorded weekly. Feed allowances were offered twice daily in two equal meals. Refusal was collected daily before the morning feed. The lambs were fed individually and excess of fresh water was provided.

Slaughter method, physical separation and chemical analysis of Saddle rib joints

The comparative slaughter technique had been used. The live weights of the animals were recorded after fasting overnight and before slaughter. The animals were slaughtered when they attained about 35 kg LBW. After slaughtering and skinning, the weights of different organs and offals were recorded. .

Each rib Saddle joint was physically dissected into its main components; bone, muscle and fatty tissue (Subcutaneous fat and intermuscular fat). All weights were recorded to the nearest 5 grams. The lean was minced and well mixed. The samples were

kept in plastic bags in a freezer for determinations of moisture, crude fat (EE), crude protein (CP) and ash according to A.O.A.C (1960) with the modification of Everitt and Jury (1966).

Statistical Analysis

Means, analysis of variance, standard errors and regression equations were estimated according to Snedecor and Cochran (1970). As the number of variables included in the present investigation was large, the perkin Elemer Computer (3220) of NRC was used to facilitate the analysis.

Results and Discussion

Table (1) gives mean percentages of major carcass tissues and chemical analysis of rib joints. The same table shows also the mean weight gains in the different tissues.

TABLE 1 : Mean values of starch equivalent (SE), digestible protein (DP) intake and percentages of physical components, chemical analysis and weight gains in different tissues.

Items	Breed					
	Ossimi			Rahmani		
	Plane of Nutrition				±S. E.	Significances
	Ad	Lib,	Ristricted	Ad	Lib.	Ristricated
SE intake/day (gm)	876.0	810.0	912.0	840.0	20.4	B*,F**,---
DP intake/day (gm)	110.0	95.0	130.0	100.0	—	
Physical Components						
Carcass muscle %	60.3	65.1	58.7	26.6	0.8	B ,F**,(BxF)*
Carcass fat %	27.2	22.3	30.5	62.1	0.3	B*,F**,(BxF)*
Carcass bone %	12.5	12.6	10.8	11.3	0.0	—,—,—
Chemical Analysis						
Moisture %	63.3	65.1	62.5	66.1	3.0	—,—,—
E. E %	17.7	15.5	19.8	16.1	0.4	B*,F**,—
Protein %	16.9	18.1	15.8	16.5	0.5	—,F*,(BxF)*
Ash %	2.1	1.7	1.9	1.3	0.0	—,—,—
Weight Gains in Carcass Tissues						
Carcass muscle weight gain (kgs)	6.3	6.8	6.1	6.4	0.5	B*,F*,(BxF)*
Carcass fat weight gain (kgs)	5.8	4.0	6.5	4.7	0.2	B*,F*,—
Carcass bone weight gain (kgs)	1.6	1.1	1.4	1.4	0.1	—,—,—

B = Effect of bread type, F = Effect of feeding regime, * = Significant at 5% level, and ** = Significant at 1% level.

Table (1) also shows that for both feeding regimes, Rahmani animals consumed greater amounts of starch equivalent (SE) intake/day than Ossimi sheep. Likewise, for both breeds, the **ad lib.** Feeding animals consumed-as it was expected highly significant starch equivalent than the restricted ones.

Worthy of note is that the rib Saddle joint is well known to represent the whole carcass with regards to its physical and chemical components. (Hankins and Howe, 1970; Kirton and Barton, 1962 and Dinkel et al., 1965). Therefore, the rib Saddle cuts had been used in the present study and the following regression equations had been established and were used to prediet the percentage of different carcass tissues :

$$\text{Carcass muscle } \% = 37.042 + 0.530\ (\times)$$

$$\text{Carcass fat } \% = 5.060 + 0.073\ (\times)$$

$$\text{Carcass bone } \% = 9.241 + 0.430\ (\times)$$

where $(\times)$ is the tissue percentage in the sample rib joints.

It would be of interest however, to state that the results of physical and chemical analysis of this study had demonstrated that the higher fed animals had higher percentages of fatty tissues and ether extract. The muscle percentage and protein analysis showed the reverse, whilst the carcass bone percentage was not affected by feeding regimes. The present results are compatible, generally, with those stated by Knight and Foote (1965).

It is of especial interst however, to state that the ratio of one tissue to another throws light on the relative effect of nutrition on the principle tissues of the carcass. Judging from this point of view, however, it would be of interst to note that the high plane of nutrition eventually resulted in more fat in the carcass relative to muscle and bone. As fat increases, the proportion of muscle and bone must change. However, it had been observed that the percentage of fat increases and muscle percentage decreases whilst bone percentage changes at a slow rate relative to muscle and fat.

It is worth to claim that, the present finding that the restricted carcasses had higher muscle percentage that the ad lib. ones

is in agreement with the report of Drew and Reid (1975), who observed that sheep fed a restricted diet had carcasses that had more lean tissue than those from sheep fed **ad lib.**

The results shown in table (1) clearly demonstrate the marked effect of breed and feeding regime on weight gains in carcass muscle and fatty tissues. On the other hand, the statistical analysis revealed that both factors had no effect on weight gains in carcass bone.

The interaction (B × F) effect on weight gains in carcass muscle was significant ($P < 0.05$). However, the appearance of this interaction effect may substantiate the hypothesis that muscle growth rate of different breeds differ under different planes of nutrition.

Tail which is considered store in the animal's body was found 5.16 and 4.53 as a percentage of LBW for Ossimi sheep reared under ad lib. and resterícted feeding regimes, respectively. The corresponding figures for Rahmani animals were 5.87 and 4.93, respectively. This finding is in accordance with the results of physical and chemical analysis of the present investigation in showing that carcasses of Rahmani sheep were fatter than those of Ossimi ones and the higher levels of feeding produced larger amounts of fat. The present findings accords well with El-Ashry and El-Shahat, 1984).

It is worth noting that, for both breeds, weight gains in carcass muscle of the restricted fed animals were significantly greafter than those of the ad lib, ones; whilst the carcass fat weight gain showed the reverse; e.g. the values of weight gains in carcass fat were significantly higher in the ad lib. fed animals. On the other hand. carcass bone weight gain was not affected statistically by differences in feeding regimes.

The present results, however, indicate that the restricted level of nutrition has great minimizing effect on carcass fat weight gain.

However. the present findings is compatible with hypothesis that tissues are retarded in growth and development by the restricted nutritive supply in reverse order of their early maturing.

Finally upon the basis of the results of the present study one may conclude that breed differences in major carcass tissues exist under different planes of nutrition.

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تاثير التفاعل بين نوع الحيوان ونظام التغذية على انسجة ذبائح الأغنـــام

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فى هـــذه التجربة اســـتخدم ٣٢ حيـــوان من أغنـــام الاوســيمى والرحمـانى ، حيث ذبحت ٨ حيوانات (٤ أغنـام من كل نوع) فى بدء التجربة ، وغذيت الحيوانات الباقية (٢٤ رأس) تبعـــا لمقررات مجلس البحوث البريطانى أو تبعا لنظـام التغذية الحره .

وزعت الحيوانات على المعاملات التجريبية بالتساوى تبعا لنظـام التغذية ونوع الحيوان . وذبحت الحيوانات فى نهاية التجربة على وزن يقرب من ٣٥ — ٣٧ كجم وزن حى ، وذلك لدراسة تأثير التفاعل بين نظـام التغذية ونوع الحيوان على الانسجة الرئيسية لذبائح الأغنـام .

ولقد أستخدمت التحاليل الفيزيائية والكيميائية والزيادة فى أوزان أنسجة الذبحة كأدلة لدراسة تأثير العوامل المختلفة على أنسجة الذبيحة .

ولقد أوضح التحليل الاحصائى بأن للتفاعل بين نوع الحيوان ونظام التغذية تأثير معنوى على نسب اللحم الأحمر والنسيج الدهنى فى الذبائح ، بينما لم يؤثر هذا التفاعل على نسبة العظم فى الذبيحة كذلك كان لهذا التفاعل تأثير معنوى على نسب البروتين والزيادة فى وزن اللحم الأحمر فى الذبيحة . يستنتج من هذه التجربة ان لكل نوع من التغذية تأثير معين على الانسجة المختلفة لذبائح الأنواع المتعددة من الاغنـام .