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THE EFFECTS OF LIMITED DIET AND FASTING PRIOR TO SLAUGHTER ON PHYSICAL AND CHEMICAL PROPERTIES OF MEAT FROM AWASSI LAMBS

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Thirty Awassi male lambs were used to evaluate limiting diet and fasting period on live weight loss, physical and chemical characteristics of meat. Limiting diet and fasting period had deterimental effect on slaughter weight. Distressed animals lowered significantly leg and rack fat contents, but no significant effect was observed on carcass lean content. Chemically determined fat of rack decreased ($p<0.05$) as a result of limited feeding and fasting lambs. The moisture content was higher in stressed ($p<0.05$) than in the controled animals.

Both limited feeding and fasting resulted in lower ($p<0.01$) liver glycogen. Liver pH had higher ($p<0.05$) value in fasting lambs than in the controls. The distressed animals reduced ($p<0.05$) in fat content. Moisture percent of liver was not affected by limited diet, but it was reduced ($p<0.05$) by the 2 days of fasting No interaction between limiting diet and fasting treatments was observed among all experimental measurements.

INTRODUCTION

In Iraq, the system of lamb and mutton production has not yet well established. Lambs are subjected to different types of stress throughout their life from birth upto slaughter, particularly, during the period of marketing.

It is well known that animal stress due to restricted diet (Jacobs et al., 1973), transport (Shorthose, 1977), fasting (Kirton et al., 1968) and fatique (Hedrick, 1965) reduces the efficiency of meat production and lowers the quality of meat. Since little information is available concerning the influence of pre-slaughter stress of Awassi lambs on body weight loss, carcass characteristics and meat quality, the present study was undertaken to investigate the effects of limited diet and fasting period prior to slaughter on live weight loss, physical and chemical properties of meat.

MATERIALS AND METHODS

Thirty Awassi male lambs, 29.5 kg in average weight, were subjected to a preliminary period of 8 weeks. They received a conventional diet consisting of a concentrate mixture (2% of their live weight) plus green roughage ad lib. The lambs were randomly divided into two groups A and B. Group A was given limited diet (by lowering the energy intake); whereas group B was fed on the same above- mentioned conventional diet. At the end of two weeks, animals in each group were randomly subdivided into three groups, namely, A0, A1 and A2 and B0, B1 and B2. Animals in O groups were treated as a control. While animals in the 1st and 2nd groups were fasted for one and two days respectively. Lambs were weighed weekly during the conventional and limited feeding periods and again at 7:00 a.m., 1:00 p.m. and 7:00 p.m. during the fasting period. Water was kept off from the animals 12 hrs prior to slaughter. On a third consegative day, the respective animals were slaughtered and dressed at 8:00 to 10:00 a.m. according to commercial practice followed in Iraq. Immediately after slaughter, samples of liver were taken from each lamb and frozen in air tight polyethylene bags for subsequent analyses, namely: pH value (Salih, 1985), glycogen concentration (Carrol et al, 1956) and chemical composition (moisture, protein, fat and ash) (AOAC, 1970). The right leg and left rack wholesale cuts were physically separated into bone, fat and lean components. The mixture of lean and fat components of rack cuts was ground and samples were taken for moisture, protein, fat and ash determination (AOAC, 1970). Least- squares analysis for data were made as outlined by Harvey (1960). Differences between means were tested according to Duncan (1955)

RESULTS AND DISCUSSION

The change in the mean live weight over the experimental period are illustrated in Fig. 1. The average live weight increased from 32.0 to 37.2 kg during the preliminary period. However, Average body weight in the 2nd period of those fed a limited diet decreased from 37.7 to 37.0 kg. (i.e. 70 g/ day was reduced). It is concluded that animals had been subjected to a dietary stress. Some workers have observed that feeding lambs a limited diet prior to slaughter reduced live weight (Jacobs et al, 1973 and Murray and Slezacek, 1976). A further loss in live weight was noticed during the pre-slaughter fasting. This could be due to loss in fill gut contents, offal weights and

empty body weight. Detailed information regarding such parameters were covered by Rashid and Salih (1985).

Dietary stressed lambs exibited lower leg and rack fat contents ($p<0.05$) than the controls (Table 1). The results revealed significant differences in the fat content of those two cuts between fasted and unfasted lambs. This indicate that adipose tissue could have been catabolized to compensate for the reduced nutrient intake. No significant effects of treatments were observed on lean content.

The chemically determined fat content of rack joints decreased significantly in stressed animals as compared to those of the controls (Table 2). This is in agreement with the findings of Ray and Mandigo (1966). The fat percent also decreased from 25.85 to 22.19 and down to 19.40 as lambs were subjected to o,1 & 2 days of fasting. Kirton et al.(1968) observed significant reduction in carcass fat percent resulting from 2 days of fasting lambs.However, the moisture content was higher in stressed animals than in the controls. In the same manner, percent of moisture increased as the fasting period prolonged. The protein & ash contents were unaffected by neither the limited diet nor fasting.

Both limited feeding & fasting attributed to lower ($p<0.01$) liver glycogen (Table 3).In the stressed animals, this is undoubtedly catabolized to meat energy needs.Liver pH had higher ($p<0.05$) value in fasting lambs than the controls. While limited feeding caused no effect of pH value. In regards to the chemical analyses of liver, limited feeding of fasting treatments reduced ($p<0.05$) the fat content. Contrary results have been reported by Carr et al. (1973). More research is needed to clarify such a point.Moisture percent of liver was not affected by limited diet, but it was reduced ($p<0.05$) by 2 days of fasting. Similar results have been reported by Carr et al. (1973). No interaction between limited diet and fasting was observed among all experimental parameters.

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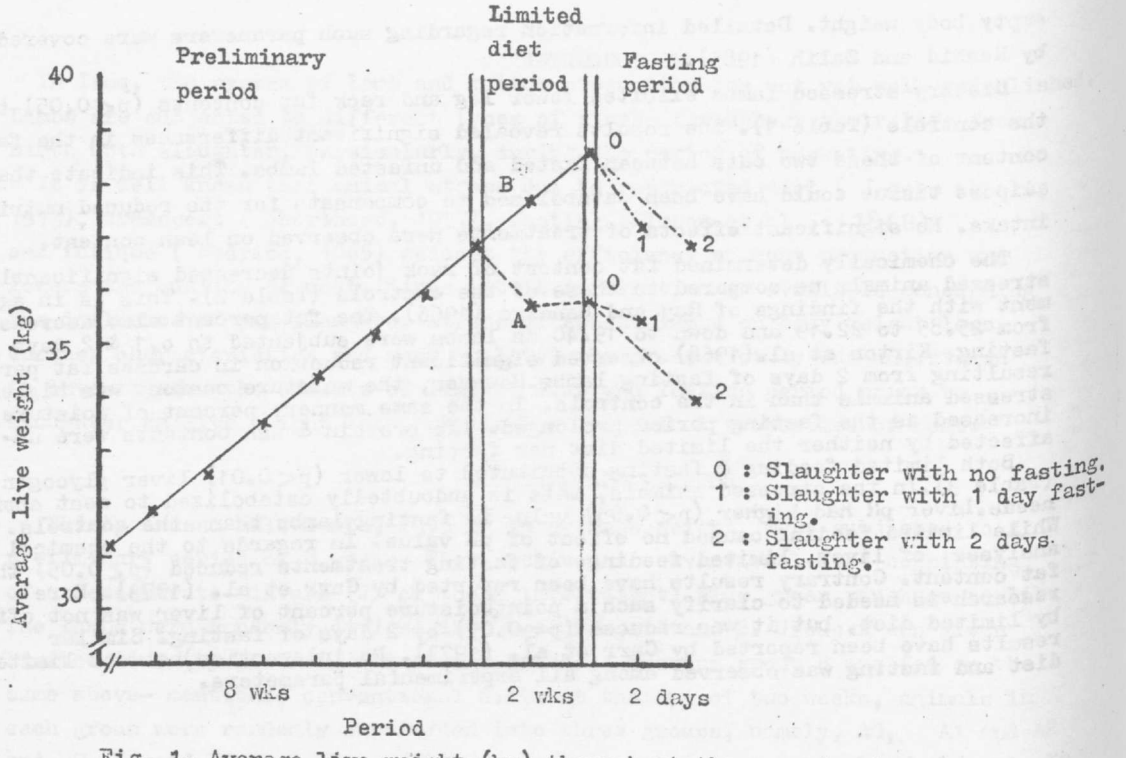

Fig. 1. Average live weight (kg) throughout the experiment.

Table 1. The effects of limited diet and fasting on physical dissection of rack and leg cuts.

Treatment	No. of animals	leg			rack		
		lean%	Fat%	Bone%	lean%	Fat%	Bone%
Diet							
conventional	15	65.36	19.16[a]	14.12[a]	56.65	26.31[a]	16.06
limited	15	66.25	17.01[b]	16.70[b]	58.85	22.91[b]	17.61
Fasting							
no fasting	10	64.76	20.40[a]	14.61[a]	56.22	27.50[a]	15.68
1 day	10	66.02	17.95[b]	15.50[b]	57.75	24.51[b]	16.72
2 days	10	66.65	15.92[b]	16.12[b]	59.30	22.01[b]	17.94

Means within each column followed by the same letter are not significantly different ($P > 0.05$).

Table 2. The effects of limited diet and fasting period on chemical composition of lean and fat mixture of rack fat.

Treatment	No. of animals	Chemical composition			
		Moisture%	Fat%	Protein%	Ash%
Diet					
conventional	15	56.95[a]	23.69[a]	14.75	4.32
limited	15	59.22[b]	21.22[b]	14.14	4.96
Fasting					
no fasting	10	55.51[a]	25.85[a]	13.67	4.06
1 day	10	58.51[b]	22.19[b]	14.26	4.84
2 days	10	60.23[c]	19.40[c]	15.10	4.94

Means within each column followed by the same letter are not significantly different ($P > 0.05$).

Table 3. The effects of limited diet and fasting period on glycogen level, pH and chemical analysis in liver.

Treatment	No. of animals	glycogen (mg / gm)	pH	Chemical analysis			
				Moisture%	Fat%	Protein%	Ash%
Diet							
conventional	15	8.73[a]	6.34	68.74	3.90[a]	17.78	3.67[a]
limited	15	6.93[b]	6.42	69.57	2.98[b]	18.14	4.63[b]
Fasting							
no fasting	10	13.60[a]	6.20[a]	70.53[a]	5.10[a]	17.05[a]	3.11[a]
1 day	10	6.75[b]	6.42[b]	68.72[ab]	3.16[b]	18.14[b]	4.38[b]
2 days	10	2.90[c]	6.51[b]	68.22[b]	2.05[b]	18.69[b]	5.00[c]

Means within each column followed by the same letter are not significantly different ($P > 0.05$)