Effect of levels of barley in Diets on Meat quality of Awassi Lambs.

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SUMMARY: The influence of different levels of barley in concentrate diets (0, 45 and 90%) on the meat quality characteristics of 36 Awassi lambs were investigated, by the evalutation of organ-oliptic qualities of longissimus dorsi (LD) and psoas major (PS). Diet contained 90% barley produced carcasses with higher pigment content of muscle, water binding capacity and lower cooking loss. Barley levels had no significant effect on pH. This experiment reveals that substantially high levels of barley can be used successfully in concentrate diets of fattening Awassi lambs

INTRODUCTION: The influence of nutrition on production of meat from animal carcasses is evident (Ely et al., 1979). The sheep industry is currently seeking methods to increase the efficiency of lamb production, methods involve through increasing marketing weight and meatiness characteristics (Latham et al., 1966 Crouse et al., 1983). Barley is the major constituent of concentrate diets in Iraq and considerable quantities of barley are currently being fed to live stocks mainly to improve feed efficiency and increase feed intake (Waldo, 1973; AL-Ani et al., 1989). Several experiments have been conducted to investigate the benefits of using different levels of barley in concentrate diets (Anderws et al., 1969, Ørskov et al; 1971 AL-Ani et al; 1989). This experiment was designed to study the effect of different levels of barley in concentrate mixtures on some quality characteristics of Awassi lamb meat.

MATERIALS AND METHODS: Thirty six Awassi lambs, 5-6 months old and 25 kg in weight were divided at random into three equal groups, housed in three pens and fed concentrate diets containing different levels of barley (0,45 and 90%) (Table 1). Diets were gradually introduced to the lambs during a period of three weeks before start of the experiment, and fed once daily (0800h) at a rate of 2.5 % of body weight. Water and mineral blocks were available ad libitum for all groups at all times. The lambs were slaughtered 90 days after commencing the experiment and after an overnight fast (water was provided). The carotid arteries and jugular veins were severd without stunning. Hot carcasses were weighed and chilled (4 c° for 24h). Samples from chilled carcasses were taken for chemical analyses and quality determination and included the longissimus

dorsi (LD) at the last rib level and psoas major (PS). pH was measured after 24h using combined glass electrodes (korkeala et al., 1986). Pigment iron content was determined according to the technique described by Hornsey (1956) and water binding Capacity (WBC) was determined in a sample of ground meat. WBC was expressed as a percentage weight loss of meat sample after centrifugation at 200 xg for 10 min.(Monin and Touraill, 1983). Cooking loss was measured by the water bath heated method (pinkas et al., 1982). Data was subjected to two ways analysis of variance (snedecor and cochran, 1980).

Table 1. Composition of the experimental diets

	Levels of Barley %		
	0	45	90
Ingredients(%)			
Ground barley	-	45	90
Wheat bran	30	30	-
Ground wheat	30	15	-
Ground corn	30	-	-
Soyabean meal	7	7	7
Premix*	3	3	3
chemical composition (%)			
Dry matter	90.0	91.2	92.0
Crude protein	14.7	14.9	13.9
Neutral detergent fiber	22.7	22.0	24.1
Ash	8.3	7.1	8.7
Digestible energy	69.8	68.1	66.5

* Mineral and vitamins mixture (Vita plast) C.Richter and co. kg, wels, Austria.

RESULTS AND DISCUSSION: Increasing the level of barley in the diets have no effect upon final body weight, hot and cold carcass weight (Table 2). Muscle and meat characteristics are presented in (Table 3). 24h postmortem pH values were slightly higher for LD muscles and the effect of the different diets on pH lacked significance, similarly no significant effect was reported by pinkas et al., (1982). Lambs fed 90% barley level had significantly ($p<0.01$) redder muscles. Increasing pigment content of muscles was significantly ($p<0.01$) associated with increasing level of barley in the diets.

Table 2. Effect of level of barley on initial, final, fasting weight, hot and cold carcass weights (kg).

	Level of barley %			significane of effects
	0	45	90	
Initial weight	25.1	24.8	25.1	NS
Final weight	40.3	41.2	39.7	NS
Fasting weight	39.7	39.7	38.4	NS
Hot carcass weight	17.6	18.6	16.3	NS
Cold carcass weight	17.2	18.0	15.7	NS

Table 3. Effect of muscle typing and levels of barley on some quality characteristic. (means)

	Levels of barley (%)						Significance of effects	
	0		45		90		muscles	levele of barley%
	LD	PS	LD	PS	LD	PS		
PH24h post mortem	5.62	5.56	5.70	5.61	5.64	5.57	NS	NS
Haeminic iron(u/g)	8.9[a]	8.25[a]	8.8[b]	8.75[b]	10.88[c]	10.75[c]	NS	**
WBC(%)	35.59[a]	35.24[b]	34.26[c]	34.20[c]	32.20[d]	32.18[d]	*	**
Cooking loss(%)	20.25[a]	20.40[a]	16.35[b]	16.27[b]	14.15[c]	14.20[c]	NS	**

Each value represents the mean of 12 animals.
a,b,c,d Mean in the same row without a comman letter in their superscription differ at (P<0.05)
NS no signifcant
* (P<0.05)
** (P<0.01)

This finding confirms those Valin et al.,(1987) who noticed an increase in colour intensity of veal due to diets containing high level of starch and low levels of lipids. Similarly, Janicki et al., (1963) claimed that increased fat content and decreased moisture percentage of carcasses attribute to progressive diminution in the myoglobin content of LD muscle.

The statistical analysis also revealed that muscle typing had significant effect on haeminc iron content. When LD and ps muscles were compared the former had higher pigment content and pH. Similarly Briand et al., (1981) had indicated that LD muscle typifies the fast twitch red muscle. The slightly higher pH observed here may be attributed to the higher content of red fibers (Lawrie, 1985). WBC was significantly ($p<0.05$) affected by diet and type of muscle (Table 3). WBC of LD muscle was lower than PS muscle in the three diets Hamm (1960) showed that both in beef and pork the LD has lower water binding capacity than the PS. Diet containing 90% barley attributed to lowest WBC values in both muscles . whereas the other two barley levels resulted in negligible differences in WBC. Lowest and highest cooking loss were displayed by muscles of lambs fed 90 and 0% barley respectively, and where was no significant difference between the two muscles in this aspect. Response of WBC and cooking loss in both muscles must be affected by diets (Abdul Wahab et al., 1989). AL- Ani et al.,(1989) used the same diets showed that diets contained 90% barley produced carcasses with less lipid (15.7%) and high protein (19.8%) contents in comparison with 0% barley which produced carcasses of high lipid low protein percentage (18.6 and 16.4 %) respectively. Since kemp et al; (1972) had attributed increased cooking loss to higher fat content of lamb meat. The difference in fat percentage in the present study could have affected cooking loss and WBC. On the other hand saffle and Bratzler (1959) as cited by Lawrie (1985) claimed that muscles with high content of intramuscular fat tend to have a high water binding capacity, which disagrees with the findings of the present study. This can be explained by the fact that fat - tailed Awassi lambs have always lower intramuscular fat than European sheep.

CONCLUSIONS: It is suggested that differences in barley contents of diet result in significant difference in carcass composition of Awassi lambs and that substitution of higher level of barley in fattening diet would help produce leaner with higher pigment content and WBC and lower cooking loss meat.

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