SOME QUALITY TRAITS OF AWASSI LAMB AND DESERT GOAT MEATS AS AFFECTED BY METABOLIC TYPES OF MUSCLE AND NUTRITION

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INTRODUCTION

The goat is an important dual-purpose farm animal in Iraq. Does are kept for milk and bucks for meat production.
The influence of production conditions on carcass characteristics and composition of Awassi Lambs is well known while little information is available on the influence of diet fed conditions and metabolic types of muscles on the characteristics of Lamb muscles and meat quality. Moreover no information is available on desert goat kid carcass characteristics or meat quality.
The metabolic type of a particular muscle is of great interest from the point of view of meat production and consumption. Since it is not only related to a number of important organoleptic qualites such as colour, taste and texture(Ashmore 1974) but to the efficiency of certain techniques followed in meat production. Therefore the present investigation was carried out to compare Awassi lambs and desert goats for meat quality.

MATERIALS AND METHODS

Ten Awassi ram lambs and ten male desert goat kids, 5-6 months of age and weighing 29.75 and 27.10 Kg respectively, were used lambs and kids were divided into two equal groups for the two experimental diets (Table 1).Animals were gradually introduced to the high level (4% of body weight) concentrate mixture. Molassed NaOH-treated wheat straw was provided ad lib as a basal diet. At the target weight (40 kg for lambs and 35 kg for goats) animals were slaughtered after an overnight fast with water provided, by severing the carotid arteries and jugular veins without stunning. Carcasses were weighed and chilled for 24h (4°c),samples for chemical analyses and quality determinations were taken 24h later from the longissimus dorsi(LD), at the last rib level, the supra spinatus (SS)muscle and the tensor fascia latae(TFL).The muscles studied were chosen according to available information on metabolic characteristics (Briand et al.,1981,Pinkas et al,1982, and Valin et al ,1982).
PH was measured on the 24h samples using combined glass electrodes(korkeala et al 1986). Pigment iron content was determined according to the technique described by Hornsey (1956). Water binding capacity (WBC) was determined on a sample of ground meat mixed with Kcl 0,15 M and Hcl 0,15 M or NaOH 0,15 M.
WBC was expressed as the percentage of weight loss after centrifugation at 200 g for 10 min. (Monin and Touraille, 1983) cooking loss was measured by the water bath heated method (pinkas et al.,1982).
Data was analyzed by the methods of snedecor and cochran (1980).

RESULTS

Longissimus dorsi (LD) as a fast red muscle had the highest pigment content in both species ($P<0.01$) (Table 2).
Pigment content was significantly higher in goat muscles ($P<0.01$)than in sheep muscles. Differences in pigment content du to different diets lacked significance. Cooking loss was higher ($P<0.01$) in LD muscle than in the two other muscles

in both species. No significant differences were observed in cooking loss due to different diets. WBC value for LD muscle was the lower and PH was slightly higher in red muscles than in white muscles but there were no significant differences between the three types of muscles. Goat muscles after 24h post mortem also attained negligibly higher PH. WBC was effected by diet level, type of muscles and species ($P<0.01$).

Table 3 reveals the characteristics of supra spinatus muscle (SS) (slow red muscle). PH was negligibly higher in SS than in the two other muscles. While water binding capacity was higher in the former muscle than in either the LD or TFL muscles in both species. goats and sheeps fed high UDP diet displayed higher WBC ($P<0.01$) than their contemporaries fed the low UDP diet. SS muscle had the lowest cooking loss in both species ($P<0.01$).

Table 4 present the muscle characteristics of tensor fasciae latae muscle (TFL) as

TABLE1
Composition of the experimental diets

Ingredients		
Molassed NaOH-treated straw(g/kg DM)		
Straw	700	
Molasses	200	
Concentrate mixture g/kg DM:	Low UDP	High UDP
Barley	39	30
Corn	39	30
Soyabean meal(SBM)	20	18
Formaldehyde treated soyabean meal(FTSBM)	-	20
Minerals and vitamins mixture+	2	2
Chemical composition of the concentrate mixture		
Metabolisable energy(MJ/kg DM)++	12.24	11.46
Total nitrogen(g/kg DM)	25.69	34.59
Rumen degradable protein(g/kg DM)	115	114
(g/MJ of ME)	1.404	1.419
Rumen undegradable protein(g/kg DM) (UDP)	47.5	110

+mineral and vitamins mixture: type Vita plast, C.Richter & Co KG, Wels, Austria

++in vivo estimate obtained from equation ME=0.81 DE(MAFF,Ministary of Agriculture Fisheries and Food, 1975).

TABLE 2
PH_{24}, haemin iron content of fresh muscle, water binding capacity, and cooking loss of LD muscle samples taken from sheep.

Sheep	LD		Significance of effects		
	Low UDP	High UDP	Diet	Muscle Type	Species
PH_{24}	5.60	5.60	NS	NS	NS
Haemin iron (u/g)	9.1	9.0	NS	**	**
WBC (%)	39.5	39.2	**	**	**
Cooking loss(%)	25.8	25.1	NS	**	**

TABLE 2

PH_{24}, haemin iron content of fresh muscle, water binding capacity, and cooking loss of LD muscle samples taken from goats.

Goat	LD		Significance of effects		
	Low UDP	High UDP	Diet	Muscle Type	Species
PH_{24}	5.61	5.68	NS	NS	NS
Haemin iron(u/g)	11.3	11.2	NS	**	**
WBC(%)	38.6	38.1	**	**	**
Cooking loss(%)	23.5	23.2	NS	**	**

** P<0.01; * P<0.05; NS not significant.
greater ratio indicates lower WBC
Values are means of 5 animals, (UDP) undegradable protein.

TABLE 3

PH_{24}, haemin iron content of fresh muscle, water binding capacity, and cooking loss of SS muscle samples taken from sheep and goats.

Sheep	SS		Significance of effects		
	Low UDP	High UDP	Diet	Muscle	Species
PH_{24}	5.86	5.88	NS	NS	NS
Haemin iron(u/g)	8.4	8.5	NS	**	**
WBC(%)	36.7	36.1	**	**	**
Cooking loss(%)	22.2	21.2	NS	**	**
Goat					
PH_{24}	5.92	5.93	NS	NS	NS
Haemin iron(u/g)	10.1	9.9	NS	**	**
WBC(%)	35.8	35.2	**	**	**
Cooking loss(%)	20.2	19.9	NS	**	**

** P<0.01; * P<0.05; NS not significant.
greater ratio indicates lower WBC
Values are means of 5 animals, (UDP) undegradable protein.

TABLE 4

PH_{24}, haemin iron content of fresh muscle, water binding capacity, and cooking loss of TFL muscle samples taken from sheep and goats.

Sheep	TFL		Significance of effects		
	Low UDP	High UDP	Diet	Muscle	Species
PH_{24}	5.53	5.52	NS	NS	NS
Haemin iron(u/g)	4.9	4.8	NS	**	**
WBC(%)	38.5	38.2	**	**	**
Cooking loss(%)	25.5	25.2	NS	**	**
Goat					
PH_{24}	5.68	5.59	NS	NS	NS
Haemin iron(u/g)	6.5	6.3	NS	**	**
WBC(%)	37.4	37.1	**	**	**
Cooking loss(%)	23.1	22.9	NS	**	**

** P<0.01; P<0.05; NS not significant.
greater ratio indicates lower WBC
Values are means of 5 animals, (UDP) undegradable protein.

fast white muscle no,signficant difference was observed between sheep or goats in PH_{24}. Haemin iron(u/g) was signficantly higher ($P<0.01$) in goat TFL. But TFL had the lowest pigment content in both species.

CONCLUSIONS

The results of haemin iron (ug haemin iron/g fresh muscle) for sheep muscles were in accordance with those of Briand et al. (1981) and pinkas et al. (1982) who claimed that highest contents of white fibres and red fibres are found respectively in TFL and SS and according to level of pigmentation muscles have been classified into red and white muscles.

Results pertaining to TFL muscles agree with those of valin et al.1982)namely 9.1 u/g Haeminic iron for TFL muscle of sheep. Nevertheless, genetic factors may well be responsible for the higher pigment content of goats muscles.

The higher PH of red muscles observed here agrees with the finding of pinkas et al. (1982) and Monin and Touraille,(1983). Lawrie, (1985) reported that both the rate and the extent of the post mortem PH fall are influenced by intrinsic factors such as species, the type of muscle and variability between animals. The present results also showed a slightly higher PH for goat muscles. Cooking loss was higher in LD miscle than in the two other muscles ($P<0.01$). TFL was paler than LD and SS muscles. Lower WBC and higher cooking loss in LD muscle were probably related to the lower PH of this muscle (Lawrie, 1966 ; Bouton et al., 1976, Babiker and Bello, 1986). Higher WBC showed lower cooking loss in the three muscles. WBC values for sheep muscles tended to be lower than goat muscles.This could be explained by the findings of kemp et al (1972) who claimed increased cooking loss with increased slaughter live weight. Hence lambs in this study were slaughtered at hiavier body weights than goats (40 VS.35 kg) due to the difficulties in attaining higher weights in the latter at similar ages. Response of WBC and cooking loss in both species to diet level indicates that physical composition of muscles must be affected by diet level.

Goats fed the high UDP diet contained a higher ($P<0.05$) proportion of fat than goats fed the low UDP diet and goat wholesale cats were generally leaner ($P<0.01$) with higher ($P<0.01$)bone and lower($P<0.01$) fat proportions (Latif et al., 1987, Al-Jassim et al., 1988). Since kemp et al,(1972) had attributed increased cooking loss to higher fat content in the meat of lambs, the difference in fat level in the present study could have affected cooking loss and WBC.

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