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THE EFFECT OF TAIL DOCKING AND SEASON OF SLAUGHTER ON CARCASSES OF AWASSI-CROSS RAM LAMBS

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Background:
Sheep of the Awassi breed, which are the most widespread of the fat-tailed type in South West Asia (Epstein, 1985), were imported into New Zealand from Israel in the early 1990's. This was partly for their milk-producing ability, but mainly with a view to exporting Awassi or Awassi-cross lambs to Middle-East countries where local consumers prefer meat from such lambs relative to lambs of other breeds farmed in New Zealand. This paper reports results of two studies in which certain productive characteristics of Awassi-cross ram lambs were evaluated under New Zealand farming conditions. These included characteristics of pelts, adipose tissue fatty-acid content, and the effects of tail docking and season of slaughter on carcass characteristics.

Objectives:
- To determine whether the fatty-acid composition of subcutaneous fat differed between Awassi-cross and Texel-cross lambs.
- To compare the strength, thickness and other characteristics of pelts from Awassi-cross and Texel-cross lambs.
- To determine whether tail-docking of Awassi-cross lambs affected carcass fatness characteristics.
- To compare weight-adjusted measures of carcass fatness and muscularity of Awassi-cross lambs slaughtered during either early or late winter.

Methods:
The ram lambs involved in the two trials reported here were raised under pastoral conditions on the AgResearch Flock House farms near Bulls, New Zealand. Management of the animals and slaughter procedures followed normal commercial practice.

The 72 October-born ram lambs of Trial 1 were out of either Romney or Poll Dorset ewes, and were sired by either Awassi or Texel rams. Half the lambs were slaughtered in early winter (13 May) and half in late winter (6 August). Growth, carcass composition and meat quality results for these lambs were reported by Holloway et al. (1994). The two aspects reported here are the fatty-acid composition of a subcutaneous fat sample (using procedures described by Johnson et al. (1988)) taken after slaughter from beside the tail of those lambs in the late-winter group (n=36), and some characteristics of the pelts from a sub-sample of Awassi-cross (n=15) and Texel-cross lambs (n=17) in the late-winter group.

For Trial 2, the Awassi-cross ram lambs were made up of 31 with tails and 35 that had their tails removed within 3 weeks of birth (leaving 5-7 coccygeal vertebrae). They were out of either Romney, Coopworth or Poll Dorset ewes (n=21, 23, & 22, respectively), and were slaughtered either in early winter (8 June, n=33) or late winter (24 August, n=33). Carcass evaluation, which included a detailed physical dissection of the right hind leg cut, and statistical analyses were as described by Holloway et al. (1994).

Results and Discussion:
Figure 1 shows the concentrations of those fatty acids in the subcutaneous fat that showed highly significant differences ($P<0.01$) between the Awassi-cross and Texel-cross lambs. The general pattern shown was for the Awassi-cross lambs to have higher concentrations of certain saturated fatty acids (18:0, i15:0), and lower concentrations of some unsaturated fatty acids (16:1, 18:1, 18:3, 20:1). It should be noted, however, that the concentration (%) of some important saturated fatty acids did not differ between the two groups (e.g. (with Awassi-X values first): 14:0, 4.02 vs 3.84 ($P=0.54$); 16:0, 21.58 vs 21.26 ($P=0.62$); 17:0, 2.05 vs 2.44 ($P=0.07$)). In light of the importance of lipid in meat as a source of precursors of lamb flavours (Ford & Park, 1980), it is possible that differences in fatty-acid composition of the size shown in Figure 1 could lead to meat from Awassi-cross lambs differing in flavour acceptability for certain consumers.

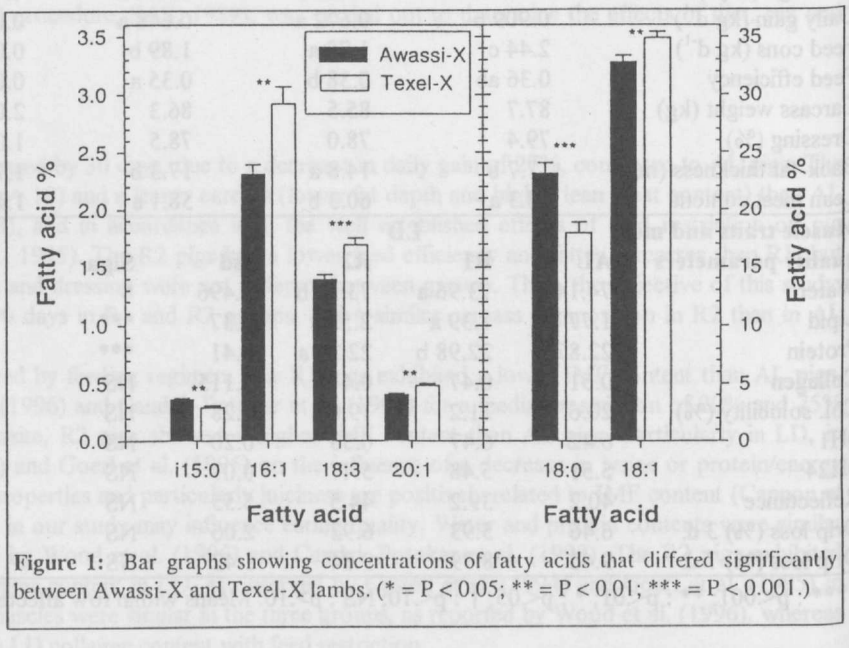

Figure 1: Bar graphs showing concentrations of fatty acids that differed significantly between Awassi-X and Texel-X lambs. (* = $P < 0.05$; ** = $P < 0.01$; *** = $P < 0.001$.)

Pelts from the Awassi-cross lambs were significantly larger than those from the Texel-crosses (Table 1), which may be due to the greater frame size of the former group, as shown by greater weight-adjusted carcass lengths (Holloway et al., 1994). In addition to being larger, the Awassi-cross pelts were also thinner, contained less fat, and showed less strength (Table 1). However, the difference in strength is unlikely to significantly affect the quality of the leather (Dr S. M. Cooper, personal communication) and is probably more than off-set by the lower fat content.

Table 2 shows that tail-docking had no significant effect on any of the carcass characteristics measured except the expected effect on tail weight and a consequent increase in dressing-out% as a result of the tail being a non-carcass item. These results contrast with some studies with straight Awassi sheep where tail-docking has led to increased levels of fat cover on the carcass (Epstein, 1985), particularly on the hindquarter.

A clear season-of-slaughter effect was shown on fatness and bone lengths, with lambs slaughtered in late winter being less fat and having longer carcasses and femur bones at the same weight (Table 3 & Figure 2). Tibia bones were also longer ($P < 0.01$,). Bones which were longer at the same weight led to similar muscle to bone ratios (M:B) based on the femur bone and muscles surrounding it (Holloway et al. 1994), but lower levels of an objectively-measured muscularity index (Purchas et al. 1991). Similar effects of season on leg composition were reported by Holloway et al. (1994) for lambs of Trial 1, but in both cases season and age effects were confounded.

Conclusions: With respect to the objectives above:

- Fat from Awassi-cross lambs contained more saturated fatty acids.
- Awassi-cross lambs had larger but thinner pelts, with a lower fat content.
- Tail-docking had minimal effects on carcasses of Awassi-cross lambs.
- Lambs kept through a winter were less fat and had longer bones.

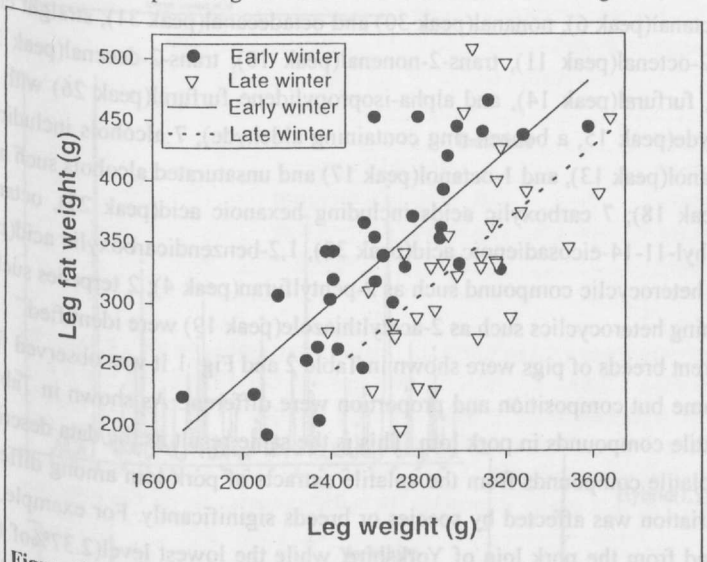

Figure 2: Scatter-plots and regression lines showing the greater fatness of the early-winter lambs when compared at the same leg weight.

Table 1: Characteristics of pelts from Awassi-X and Texel-X ram lambs at the tanned "crust" leather stage.

	Group	
	Awassi-X	Texel-X
Number of pelts	15	17
Leather area (m^2)	0.78	0.75**
Thickness at neck (mm)	2.30	2.81**
Thickness at belly (mm)	1.22	1.60**
Fat% at green stage	7.5	13.7**
Grain load (N)	363	580**
Parallel tear strength ($N.mm^{-1}$)	43.3	47.4*

Table 2: Least-squares means showing the effect of tail docking on carcass characteristics of Awassi-X ram lambs. All characteristics except carcass weight have been adjusted to a constant carcass weight.

	Tail	No tail
Number of carcasses	31	35
Carcass weight (kg)	16.65	17.11
Dressing-out %	41.6	42.3*
Tail weight (g)	260	114**
Carcass length (mm)	1069	1071
Fat depth C (mm)	1.58	1.81
Rump fat depth (mm)	5.62	5.73
Tissue depth GR (mm)	4.28	4.59
Leg fat %	11.62	12.16
M. longissimus fat %	1.68	1.64
Leg Muscle %	68.20	67.69
Leg Bone %	18.85	18.81
M:B (femur)	7.22	7.13
Femur length (mm)	185	185
Femur weight (g)	156	158
Muscularity	0.422	0.420

Table 3: Least-squares means showing the effect of season of slaughter on carcass characteristics of Awassi-X ram lambs. All characteristics except carcass weight have been adjusted to a constant carcass weight.

	Early Winter	Late Winter
Number of carcasses	33	33
Carcass weight (kg)	15.63	18.13**
Dressing-out %	42.1	41.8
Tail weight (g)	187	187
Carcass length (mm)	1062	1077*
Fat depth C (mm)	2.13	1.26***
Rump fat depth (mm)	7.42	3.93***
Tissue depth GR (mm)	5.28	3.59***
Leg fat %	13.05	10.73***
M. longissimus fat %	1.86	1.46**
Leg Muscle %	67.07	68.83***
Leg Bone %	18.72	18.84
M:B (femur)	7.21	7.15
Femur length (mm)	183	187*
Femur weight (g)	156	159
Muscularity	0.426	0.416*

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