

The effect of age and gender on the fat distribution in Merino lambs

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Abstract

The goal of this study was to determine the effect of gender on visceral and subcutaneous fat distribution of Merino lambs finished off under feedlot conditions. The diet (16% protein, 10MJ ME/kg feed) was fed *ad libitum* and animals had free access to water. A total of 108 lambs (58 wethers, 50 ewes) were divided into six groups. Groups of lambs were slaughtered every three weeks at respectively 90, 111, 132, 153, 174 and 195 days of age. The visceral fat was removed, weighed and expressed as a percentage of carcass mass, while the subcutaneous fat thickness was measured at the 13th rib. A growth curve was calculated for each gender, and the effect of age on the different fat parameters determined. The growth rates of male and female lambs did not differ and were respectively 45.2 g and 43.2 g per day. Age had a positive effect on % visceral fat with an increase of 0.029% for wethers and 0.032% for ewes per day. Similarly, fat thickness increased at a rate of 0.070 mm for wethers and 0.053 mm for ewes per day, indicating that gender had an influence on the rate of fat deposition. However, the inverse rate of deposition between the genders (visceral fat versus subcutaneous fat) warrants further discussion.

Keywords: Growth, fat thickness, sheep, age, feedlot

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Introduction

The Merino is a wool-type sheep that originated from Europe. The fluctuations in the wool prices over the past decade has resulted in distinct changes in the South African Merino industry, involving the adaptation of the breeding strategy for Merino sheep to enable an improved meat production capability (Olivier, 1999). Until recent years, lamb (meat) production has been a by-product of the wool industry and at present 65 - 88% of the total South African income from woolled sheep is derived from meat. Contributions are even higher in the case of mutton and dual-purpose sheep (Hoon *et al.*, 2000).

An ever changing market demand for leaner meat is increasing as consumers regard fat as unhealthy and associate it with high cholesterol levels and a higher risk for heart disease. The value of sheep carcasses depends on several factors, namely weight, conformation, proportion of the main tissues (muscle, fat and bone), distribution of these tissues through the carcass, muscle thickness and meat quality (Afonso & Thompson, 1996). In South Africa, an increasingly larger portion of lamb/mutton sheep is being finished off in feedlots. The question is then posed how these composite diets change the proportion of the main tissues. In this study Merino lambs (wethers and ewes) were finished off under feedlot conditions and slaughtered at different ages to measure both subcutaneous and visceral fat deposition.

Materials and Methods

A total of 108 Merino lamb (58 wethers and 50 ewes) were finished off under feedlot conditions and slaughtered at different ages. The lambs were fed a balanced diet (16 g protein/kg, 10 MJ ME/kg feed) *ad libitum* and had free access to water. Groups of lambs were slaughtered every three weeks at respectively 90, 111, 132, 153, 174 and 195 days of age. Sheep were weighed before slaughter to determine their live weights. After slaughter the visceral fat was removed, weighed and expressed as a percentage of their dressed carcass mass taken 48 h *post mortem* when the carcass had a core temperature ranging from 1.6 °C to 3.6 °C, while the subcutaneous fat thickness was measured at the 13th rib, 2.5 cm from the spine, using an electronic caliper.

A linear regression line was fitted to the visceral fat percentages and subcutaneous fat depth to calculate at what rate wethers and ewes respectively deposited their fat with an increase in age (Statgraphics, 2008).

Results and Discussion

The average live weight at the different slaughter ages of both wethers and ewes is given in Table 1. Wethers had a growth rate of 45.2 g per day, and ewes only achieved a growth rate of 43.2 g/day in their 105 days housed in the feedlot. All parameters measured are accompanied by a standard error (s.e.).

Wethers had a higher percentage of visceral fat at 90 days of age than ewes at the same age (Figure 1). However, the wethers deposited visceral fat at a lower rate with an increase in age than ewes, with ewes depositing 4.45% visceral fat at 195 days of age and wethers only 4.40% at the same age. Age therefore had a positive effect ($P < 0.001$) on percentage visceral fat deposited in both wethers and ewes, with an increase of 0.029% for wethers and 0.032% for ewes per day.

Table 1 The means (\pm S.E.) depicting the different carcass variables at different slaughter ages for both rams and ewes

Gender	Slaughter age (days)	Live weight at slaughter (kg)	Carcass weight (kg)	Visceral fat %	13 th rib fat thickness (mm)
Wethers	90	30.13 \pm 1.07	11.77 \pm 0.60	0.97 \pm 0.14	0.69 \pm 0.10
	111	37.71 \pm 1.77	15.83 \pm 0.87	2.17 \pm 0.41	2.36 \pm 0.52
	132	44.33 \pm 1.64	18.89 \pm 0.84	2.76 \pm 0.36	3.33 \pm 0.57
	153	49.83 \pm 1.93	21.82 \pm 1.14	3.44 \pm 0.24	7.01 \pm 0.97
	174	48.80 \pm 1.92	22.51 \pm 0.95	3.64 \pm 0.17	5.64 \pm 0.51
	195	52.80 \pm 1.94	23.91 \pm 0.95	4.40 \pm 0.80	8.44 \pm 0.76
Ewes	90	31.36 \pm 2.10	12.04 \pm 0.83	0.82 \pm 1.72	0.52 \pm 0.12
	111	33.25 \pm 2.11	14.00 \pm 1.15	1.71 \pm 0.54	1.82 \pm 0.63
	132	41.31 \pm 1.90	18.15 \pm 0.88	2.66 \pm 0.22	3.45 \pm 0.49
	153	47.78 \pm 1.95	20.60 \pm 0.91	3.37 \pm 0.32	5.63 \pm 0.56
	174	49.33 \pm 1.40	22.96 \pm 0.73	3.26 \pm 0.36	3.69 \pm 0.19
	195	49.70 \pm 1.50	22.16 \pm 0.64	4.45 \pm 0.36	6.75 \pm 0.63

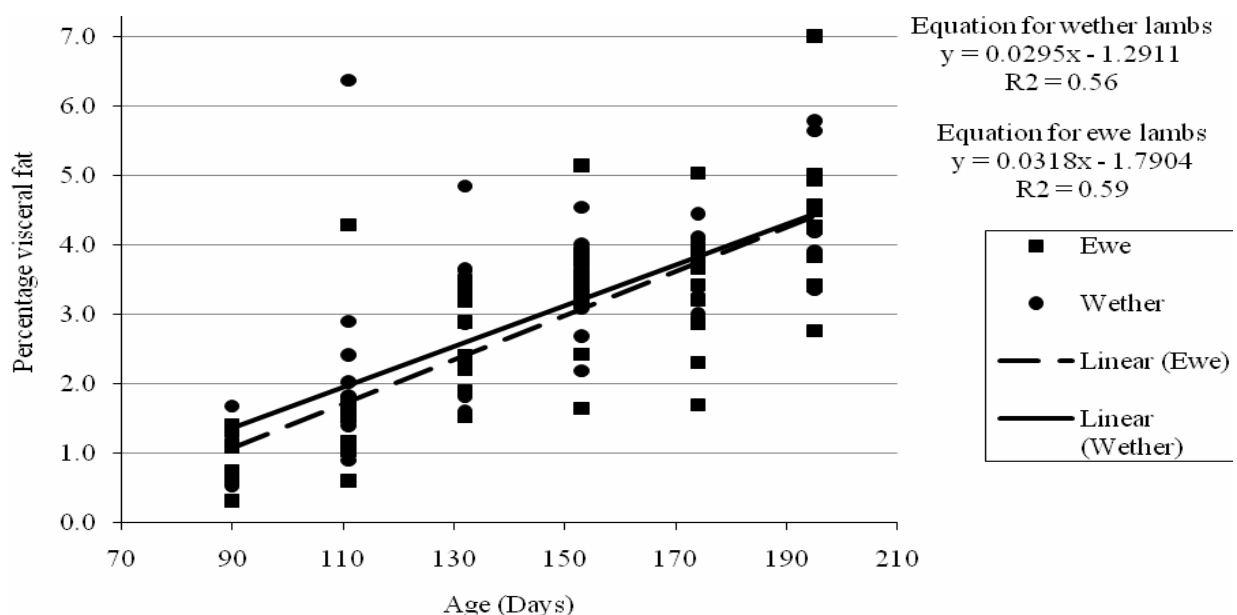


Figure 1 Increase in visceral fat percentage for Merino wethers and ewes with an increase in slaughter age.

The subcutaneous fat thickness at the 13th rib increased at rate of 0.07 mm for wethers and 0.05 mm for ewes per day (Figure 2). These results indicate that gender had an influence ($P < 0.001$) on the rate of fat deposition as well as the site of fat deposition.

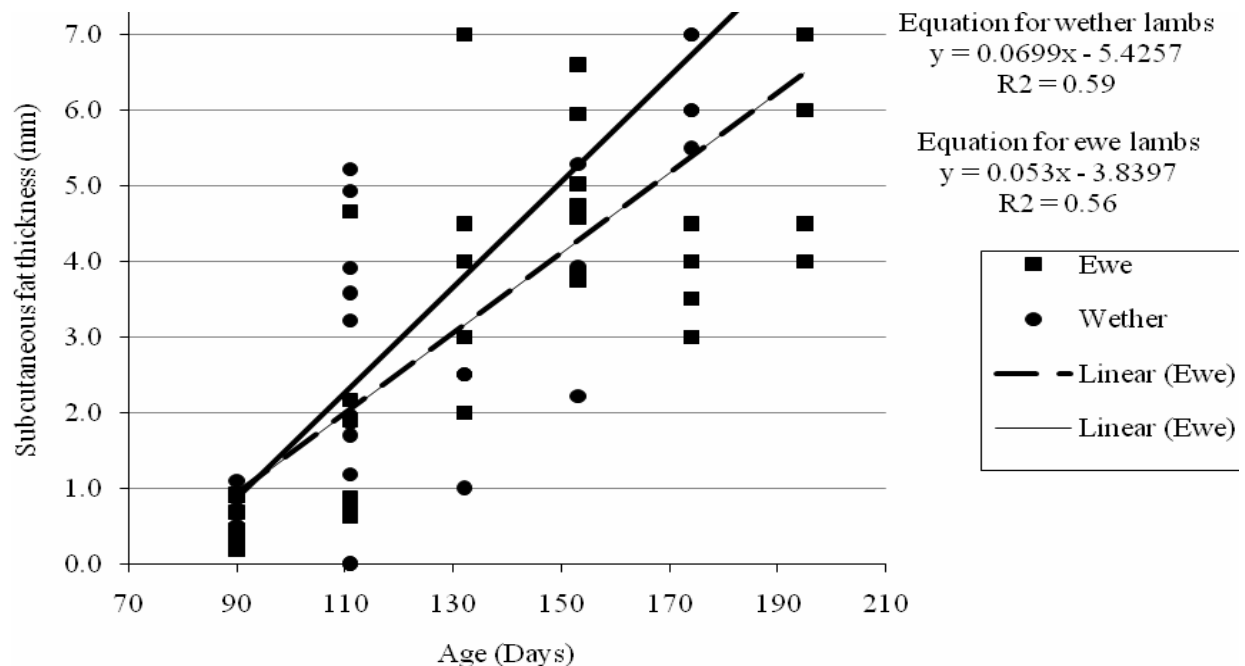


Figure 2 Regression line for the increase in subcutaneous fat thickness in Merino lambs with an increase in slaughter age.

Conclusions

Merino wethers' subcutaneous fat depth will be thicker than Merino ewes, while their visceral fat deposition will be lower than ewes when the sheep receive *ad libitum* feeding under feedlot conditions. Consumer demand will determine at what age, and therefore fat content, they prefer their lamb/mutton. However, a continuous change in consumer demand may result in preference for a different fat content of carcasses and could thus result in a change in the optimal slaughter age.

Acknowledgement

The Western Cape Agricultural Research Trust for financial support of this study.

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