The effect of age on the fat distribution in Merino lambs

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Abstract

The goal of this study was to determine the effect of age on fat distribution, both visceral and subcutaneous, 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 rams, 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, to analyze the effect of age on the different fat parameters. Age had a positive effect ($P<0.0001$) on % visceral fat with an increase of 0.029% for rams and 0.032% for ewes for every day. Similarly, fat thickness increased at a rate of 0.070 mm for rams and 0.053 mm for ewes for every day, indicating that gender had an influence ($P<0.0001$) on the rate of fat deposition. However, the inverse rate of deposition between the genders (visceral fat versus subcutaneous fat) warrants further discussion.

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 wooled sheep is derived from meat, contributions being even higher in the case of mutton and dual-purpose sheep (Hoon *et al.*, 2000).

An ever changing market demand for leaner meat is an increasing problem because 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. 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 (rams and ewes) where 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 rams and 50 ewes) were finished off under feedlot conditions and slaughtered at different ages. The lambs were fed a balanced diet (16% protein, 10MJ ME/kg feed) *ad libitum* and had free access to water. The 108 lambs were divided into six groups with the first group being slaughtered at 90 days of age, the second at 111 days of age, the third at 132 days of age, the fourth at 153 days of age, the fifth at 174 days of age and the sixth group at 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 carcass mass, while the subcutaneous fat thickness was measured at the 13th rib, 2.5cm 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 rams and ewes respectively deposited their fat with an increase in age.

Results and discussion

The average live weight at the different slaughter ages of both rams and ewes is given in Table 1, the carcass weight of the sheep (Table 1) was taken 48h post mortem when the carcasses had a core temperature ranging from 1.6ºC to 3.6ºC.

Rams had a higher percentage of visceral fat at 90 days of age than ewes at the same age (Figure 1). However, the rams deposited visceral fat at a lower rate with an increase in age than ewes, with ewes depositing 4.68% visceral fat at 195 days of age and rams only 4.60% at the same age. Age therefore had a

positive effect (P<0.001) on percentage visceral fat deposited in both rams and ewes, with an increase of 0.029% for rams and 0.032% for ewes per day.

Table 1. The means of 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 %	13th rib fat thickness (mm)
Rams	90	30.13	11.65	1.02	0.69
	111	37.71	15.50	2.14	2.36
	132	44.33	18.36	2.89	3.33
	153	49.83	21.06	3.64	7.01
	174	48.80	21.69	3.77	5.64
	195	52.80	22.86	4.60	8.44
Ewes	90	31.36	11.94	0.85	0.52
	111	33.25	13.73	1.94	1.82
	132	41.31	17.67	2.71	3.45
	153	47.78	19.91	3.48	5.63
	174	49.33	22.23	3.31	3.69
	195	49.70	21.17	4.68	6.75

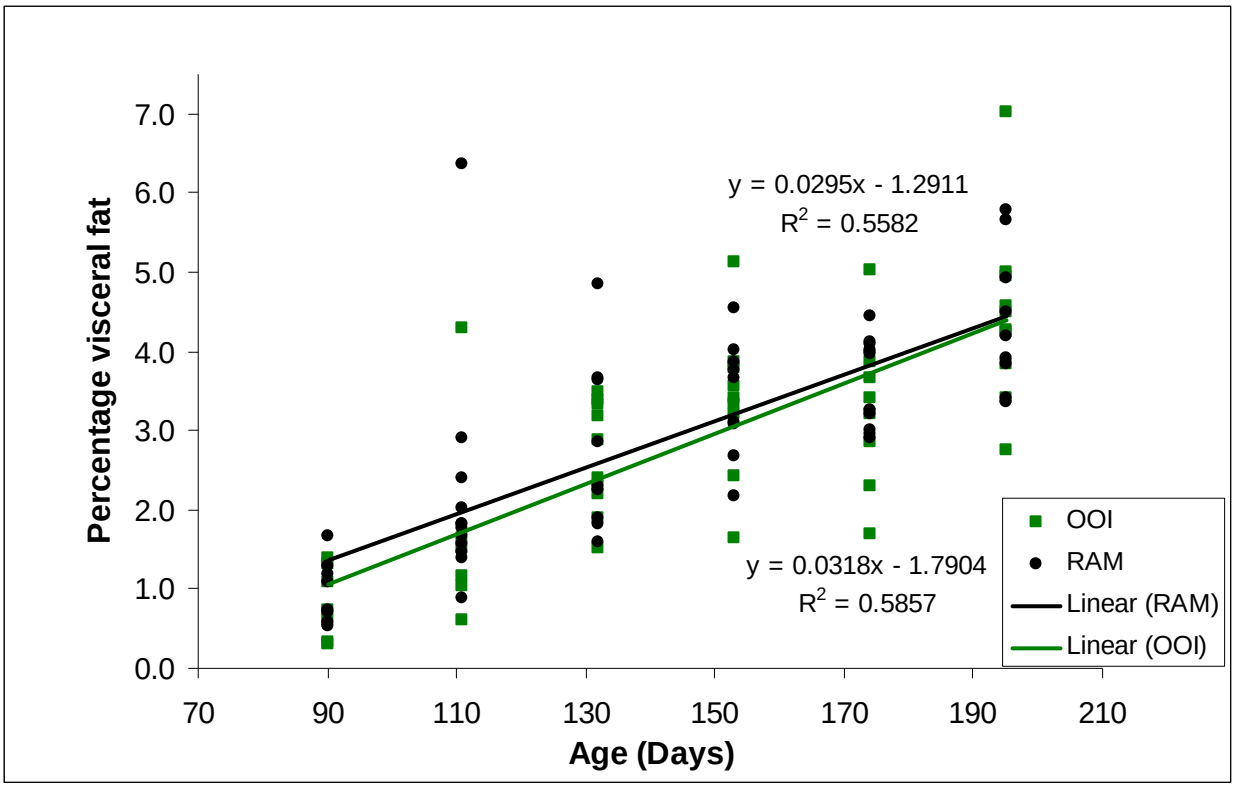

Figure 1. Regression line of the increase in visceral fat percentage for both rams and ewes with an increase in slaughter age.

From Figure 2 it can be seen that the subcutaneous fat thickness at the 13th rib increased at rate of 0.070mm for rams and 0.053mm for ewes per day. These results indicate that gender had a significant influence (P<0.001) on the rate of fat deposition as well as the site of fat deposition. Rams will therefore deposit subcutaneous fat at a higher rate than ewes, but they will deposit visceral fat at a lower rate.

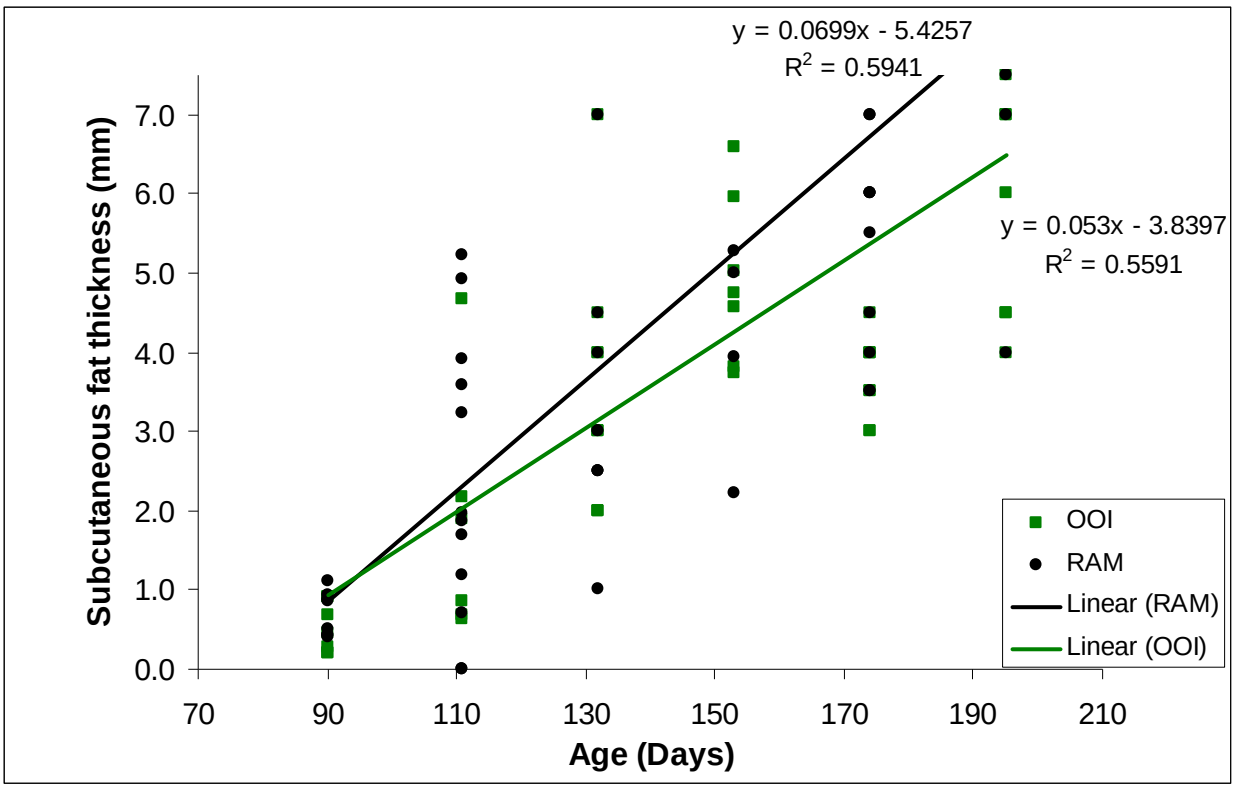

Figure 2. Regression line for the increase in subcutaneous fat thickness with an increase in slaughter age.

Conclusions

Merino rams subcutaneous fat depth will be thicker than Merino ewes, while their visceral fat deposition will be less than ewes when the sheep receive *ad libitum* feeding in feedlot conditions. Consumer demand will determine at what age, and therefore fat content, they prefer their 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.

This research is the beginning of a whole series, where three sheep breeds (Merino, South African Mutton Merino and Dorper) will be produced under the same conditions to determine the rate of which each breed deposits fat, and the change in fat: bone: muscle.

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