

Performance, Carcass Yield and Muscle Omega-3 Fat Content of Lambs Grazing Perennial Pasture or Annual Pasture with Supplements during Autumn

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The changes in nutritional value and composition of sheep diets on-farm as influenced by climate change and seasonal variation are the main reason for variation in animal performance and functionality of lamb meat post-farm gate. The quality of pasture is determined by the nutritional composition and is influenced by growth stage and plant species (Descalzo and Sancho 2008). When finishing lambs out of season and quality of pasture is suboptimal, grazing of dry annual pasture with supplementation may be necessary to maintain weight gain and subsequent carcass yield and composition of meat. Previous research has shown that supplementation with linseed can improve the polyunsaturated fat content of meat (Delmotte *et al* 2007). This study investigates carcass yield and muscle omega-3 fatty acid composition of lambs grazing perennial pasture (lucerne/phalaris) or annual pasture with supplements.

Fifty-four second cross lambs were allocated to 4 treatments comprising; 1, perennial pasture; 2, annual pasture with hay/oat supplement; 3, annual pasture with hay/oat/whole bruised linseed supplement; and 4, annual pasture with hay/oat/linseed meal supplement. The experimental design comprised 18 groups of 3 lambs, with 3 groups for treatment 1 and 5 groups each for treatments 2, 3 and 4. Treatment 2, 3 and 4 lambs were fed 500 g/hd.day for 2 weeks and 700 g/hd.day for the remaining six weeks to ensure live weight gain. The crude protein, crude fat and dry matter digestibility of annual and perennial pasture were 10.7 vs 10.6%, 1.4 vs 1.1% & 35 vs 36. The experiment was conducted during autumn when most of the annual pasture was dry. After eight weeks of feeding, lambs were slaughtered and a 25 g muscle sample was collected for determination of fatty acid content.

Initial live weight of lambs for all treatment groups ranged from 35.5-36.0 kg. Lambs grazing perennial pasture had higher live weight ($P < 0.003$) and carcass weight ($P < 0.003$) at slaughter than lambs grazing annual pasture based diets (Table 1). Among lambs grazing annual pasture, flaxmeal treatment had heavier slaughter weight ($P < 0.01$) and carcass weight ($P = 0.09$) than lambs receiving hay/oat grain ration but did not differ from flaxseed treatment. There was no difference for health claimable long chain omega-3 (LCOFA) or total omega-3 polyunsaturated fat content in muscle between treatments (Table 1).

Table 1. Slaughter weight, carcass weight, and muscle long chain omega-3 (LCOFA) and total omega-3 (TOFA) fatty acid content of lambs grazing perennial pasture alone or annual pasture with supplements

Measurement	Perennial Pasture	Annual Pasture			SED	
		Oat grain	Flaxseed	Flaxmeal	Perennial vs other	Within annual
Slaughter weight (kg)*	45.4 ^c	40.4 ^a	41.9 ^{ab}	42.2 ^b	0.53	0.49
Carcass weight (kg)*	21.7 ^b	17.9 ^a	18.4 ^a	18.7 ^a	0.45	0.35
LCOFA (mg/100 g meat)	33.5	30.1	31.5	29.4	2.3	1.6
TOFA (mg/100 g meat)	117.5	103.1	113.5	109.2	7.7	6.1

* Within a row means with superscripts are significantly different ($P < 0.05$)

Results suggest that animals grazing perennial pasture were selecting a diet higher in nutritive value. Meat from all lambs can be classified as a source of long chain omega-3 (> 30 mg/ 135 g serve). The performance of lambs on annual pasture was low although lambs were offered supplements, which may be due to differences in microbial degradation of the rumen products and absorption of nutrients for tissue growth in the body.

Delmotte, C., Rondia, P., Raes, K., Dehareng, F., Decruyenaere, V. (2007). *Ser. A, Med. Sem.* **74**, 41.

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