

Genetic and Environmental Factors Influencing the Levels of EPA Plus DHA in Lamb Meat in a Study Encompassing Most Sires and Finishing Systems in Australia

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The fatty acid composition of lamb can differ with feeding system, breed type, genotype, age of animal, sex and muscle type (Wood and Enser, 1997) but these effects are poorly defined given that most experiments are based on small numbers of animals. This study investigated environmental and genetic variation for the health claimable long chain omega-3 fatty acids (eicosapentaenoic acid, EPA and docosahexaenoic acid, DHA) content of lamb under Australian management systems. The overall design of the study is explained elsewhere (Hopkins et al., 2009). Briefly 4500 ewes across 7 locations were joined to about 100 selected sires of Merino, maternal and terminal sires over summer/autumn of 2006/2007. The sites used are shown in Table 1. Lambs were maintained under extensive grazing with the provision of supplementary feeds (grains with hay or feedlot) during times of poor availability of green pasture. At each site lambs were slaughtered at several slaughter dates so as to achieve a target slaughter weight of ~21 kg. Site of rearing ($P < 0.01$) explained the greatest proportion of variations in the EPA plus DHA content of lamb meat, followed by date of slaughter ($P < 0.01$). The effects of sire type ($P = 0.052$) or dam breed ($P < 0.029$) on EPA+DHA were not relatively very strong; but more data from subsequent slaughters are needed to underpin the magnitude of the genetic effects.

Table 1. The average EPA plus DHA content (mg per 100 g) of fresh lamb meat in sheep reared in different parts of Australia and slaughtered at different ages (in days)

Site	Slaughter 1		Slaughter 2		Slaughter 3		Slaughter 4		Site average	
	mg	Age	mg	Age	mg	Age	mg	Age	mg	n
Kirby	30 (1.1)	235	28 (1.1)	270	26 (0.9)	352	-	-	27.5	245
Cowra	34 (0.5)	158	34 (0.4)	200	36 (0.8)	325	-	-	34.3	291
Rutherglen	31 (0.3)	227	30 (0.3)	254	21 (0.8)	392	-	-	29.4	298
Hamilton	12 (0.2)	274	9 (0.2)	299	31 (0.8)	456	-	-	13.9	197
Struan	27 (0.4)	214	28 (0.5)	249	29 (0.4)	280	16 (1.0)	352	26.8	293
Turretfield	18 (0.4)	214	16 (0.3)	249	15 (0.3)	278	15 (0.4)	359	16.1	264
Katanning	21 (0.4)	177	14 (0.4)	228	12 (0.3)	248	19 (0.3)	395	16.2	416

Figures in parenthesis are standard error of mean.

Lambs grazing perennial pasture (Cowra) or annual pasture (Kirby, Rutherglen and Struan flocks) during most of the post-weaning period had EPA+DHA from high to moderate levels. Lambs from Hamilton, Turretfield and Katanning, produced meat with lower levels of EPA+DHA; a reflection of the practice of provision of pellets or grain with hay prior to slaughter in those regions. The national average EPA plus DHA per 100 g of fresh lamb meat was 23.5 ± 0.21 mg. This was equivalent to 31.7 mg EPA plus DHA per 135 g serve, which was higher than the 30 mg cut-off point for 'source' claim for EPA plus DHA content (FSANZ, 2005). This is the first national data showing a snap shot of the omega-3 content of lamb which encompasses all recognised sire lines and finishing systems. Additional data from subsequent years will be used to determine the genetic basis of variations in EPA plus DHA content of lamb meat.

FSANZ (2003). Food Standards Australia and New Zealand.

http://www.foodstandards.gov.au/_srcfiles/Standard_1_2_8_Nutrition_Info_v113.pdf Accessed on 04/01/ 2008.

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