PRELIMINARY HERITABILITY ESTIMATES OF INDIVIDUAL FATTY ACIDS IN SHEEP MEAT

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Genetic improvement of sheep meat has largely focused on increasing growth rate and muscularity while reducing total carcase fat content in sheep. This trend to reduce the total amount of carcase fat is mainly due to the consumer demand and price incentive (for producers) for lean carcases. However, tenderness and juiciness of red meat is related to its intramuscular fat (IMF) content and the industry aim is to retain IMF at 3-5 g/100 g cut. Intramuscular fat in sheep is also an important source of essential fatty acids that have health benefits. This paper aims to estimate the heritability of individual fatty acids to determine whether breeding offers opportunities to increase the proportion of the beneficial fatty acids while reducing the amount of saturated fatty acids in sheep meat.

Four hundred and eighty nine hogget rams from the Merino resource flocks in Katanning that were born in 2001, were slaughtered to study the inheritance of carcase traits in Merino sheep. Complete pedigrees, birth status, date of birth and age of the dam were available on each animal. Meat samples were collected from the loin area on each carcase. The samples were freeze-dried and all visible fat trimmed. A sub-sample of muscle was ground and the IMF extracted with ether. Methyl esters were made from the fat which was then used to produce fatty acid profiles using a Perkin-Elmer gas chromatography with a BPX70 capillary column. The column was 110 m long and had an internal diameter of 0.32 mm with a film thickness of 0.25 µm. Peak identification was made by using an internal standard mixture containing fatty acids from C4 to C24 carbon atoms. The data were analysed with ASREML (Gilmour). An animal model with age of dam and type of birth as fixed factors was fitted to the data. Day of birth was fitted as a covariate. The heritability of each fatty acid was determined by expressing the additive variance relative to the total phenotypic variance. Age of the dam was the only fixed factor that had a significant effect on fatty acids. Animals born from older dams had significantly higher amounts of the omega 3 fatty acids.

Table 1. Number of records (n), mean, standard deviation (SD) and heritability (h^2) estimates of individual fatty acids (FA) of sheep meat

Fatty acid	n	%*	SD	h^2	se
CLA c9,t11	489	0.86	0.23	0.37	0.14
Total SFA	489	51.34	3.10	0.44	0.14
Total unsaturated FA	489	48.65	3.10	0.44	0.14
Total n-3 FA	489	0.93	0.22	0.16	0.11
C16:0	489	22.79	1.56	0.50	0.15
C18:0	489	24.01	3.40	0.44	0.14
C18:1 t9	489	2.28	1.53	0.10	0.10
C18:1 t11	489	1.05	1.27	0.03	0.08
C18:1 c9	489	38.89	3.07	0.64	0.15
C18:1 c7	489	0.60	0.18	0.01	0.07
C18:2	489	2.57	0.54	0.18	0.10
C18:3	489	0.76	0.16	0.32	0.13
EPA	266	0.08	0.05	0.17	0.18
DPA	469	0.13	0.08	0.21	0.12

*g fatty acid per 100 g total fatty acids; EPA, eicosapentaenoic acid (20:5); DPA, docosapentaenoic acid; SFA, saturated fatty acids; CLA, conjugated linoleic acid

Table 1 indicates the heritability estimates for the different fatty acids. From these results (based on resource flocks of a single breed) it appears that there is opportunity to change the proportion of total fatty acids by selection. De Smet *et al*. (2004) came to the same conclusion in a review of the role of genetic factors in fatty acid composition of farm animals. Before any breeding programs can commence the genetic relationships between individual fatty acids should be determined.

DE SMET, S., RAES, K. and DeMEYER, D. (2004). *Anim. Res.* **53:** 81-98.

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