

**Effect of canola, soy and fish meal supplements on muscle phospholipid omega-3 fatty acid content and growth performance of lambs**

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The potential effects of omega-3 (w-3) fatty acids (FAs) on disease prevention (eg. heart disease) and the development and function of brain and retinal tissues has led researchers to investigate strategies for producing red meat with more omega-3 lipids. We have previously shown that feeding fish meal (FM) supplement to lambs significantly increased total w-3 FA in muscle. This study examined the effect of alternative sources of dietary oil (canola meal (CM), soy meal (SM)) supplements as well as FM on muscle phospholipid (PL) FA composition, growth performance and carcass traits of lambs.

Thirty two cross bred wether lambs (mean LW 32.1 kg) were allocated by stratified randomisation to four treatments: basal diet of oaten chaff:lucerne chaff (80:20) ad libitum (BAS); BAS + FM (80 g DM, 60 % crude protein (CP)); BAS + CM (84 g DM, 40 % CP); BAS + SM (75 g DM, 44 % CP) for seven weeks. Roughage and supplement intake were recorded daily. At the end of the study lambs were slaughtered after an overnight fast and hot carcass weight (HCW) and fat depth (GR site) were recorded. FA composition of PL of muscle longissimus thoracis (LT) was determined from a chilled sample taken 24 h post mortem.

	BAS	FM	CM	SM	sem
Crude protein intake (g/day)	77 <sup>a</sup>	137 <sup>c</sup>	117 <sup>b</sup>	115 <sup>b</sup>	3.0
Metabolisable energy intake (MJ/day)	6.5 <sup>a</sup>	8.3 <sup>b</sup>	7.9 <sup>b</sup>	7.7 <sup>b</sup>	0.22
Liveweight gain (g/day)	74 <sup>a</sup>	163 <sup>c</sup>	132 <sup>b</sup>	113 <sup>b</sup>	10.2
Hot carcass weight (kg)	17.9 <sup>a</sup>	20.1 <sup>b</sup>	18.8 <sup>a</sup>	18.6 <sup>a</sup>	0.33
GR fat depth (mm)	12.1 <sup>b</sup>	10.1 <sup>a</sup>	10.5 <sup>a</sup>	10.4 <sup>a</sup>	0.58
EPA + DHA (mg in PL/100 g meat) <sup>#</sup>	23.6 <sup>a</sup>	32.8 <sup>b</sup>	20.9 <sup>a</sup>	29.2 <sup>b</sup>	2.4
Ratio of w-6/w-3 <sup>#</sup>	1.7 <sup>b</sup>	1.2 <sup>a</sup>	1.7 <sup>b</sup>	1.7 <sup>b</sup>	0.08

Means are the average of eight observations except #, EPA = eicosapentaenoic acid, DHA = docosahexaenoic acid. Values with different superscripts within a row are different at 'P<0.05' level.

Daily CP intake was highest (P< 0.01) with FM, intermediate with CM and SM when compared with lambs fed BAS diet, but metabolisable energy (ME) intake was lower (P<0.01) only with BAS than the other groups. Daily LWG and HCW were significantly greater (P<0.01) for animals fed FM than for those fed CM and SM, which in turn were greater for LWG only than BAS lambs. When adjusted to HCW (18.9 kg), FM fed lambs had a significantly (P<0.05) lower GR fat depth than the other groups. Feeding FM and SM significantly (P<0.01) increased the total EPA + DHA content of LT muscle PL compared with BAS and CM. The ratio of w-6/w-3 in muscle PL was only significantly (P<0.01) higher with FM feeding than with CM, SM and BAS.

The improved growth performance and carcass quality of FM lambs may have been due to increased daily CP and ME intake or a rumen by pass effect of FM protein. The possibility that there may be an association between a reduced w-6/w-3 ratio in muscle PL and growth performance and fat deposition needs to be examined.

1. Ponnampalam EN, Hosking BJ, Egan AR, Sinclair AJ. N-3 and n-6 polyunsaturated fatty acids in lamb meat supplemented with fish meal and its impact on human health. Proc. Nutr. Soc. Aust 1995;19:50.