

NSA Concurrent Oral Session 5: Animal Nutrition & Human Food

Carbohydrate rich diets exacerbate postprandial lipaemia in moderately dyslipidemic subjects, whereas red meat protein-enriched diets have no adverse effects

JCL Mamo, AP James, MJ Soares, K Purcell, D Griffiths and J-L Schwenke
Curtin University of Technology, Bentley, Western Australia 6102

Background - Hypocaloric high protein diets are increasingly advocated for weight management, however their effect on cardiovascular risk factors, particularly postprandial lipaemia is not well understood. Low energy, high carbohydrate diets have also been utilized for weight loss, but have a tendency to exaggerate plasma triglyceride levels, an independent cardiovascular disease risk factor. Delineating the effects of macronutrients on plasma lipids is confounded by concomitant weight reduction, because the latter has effects independent of diet.

Subjects with, or considered at risk of coronary artery disease frequently have greater plasma concentrations of chylomicron remnants and exaggerated lipaemic responses, following the ingestion of fats.

Objectives - In this study, we investigated post-prandial lipaemia in moderately hypertriglyceridemic subjects following a standard high fat mixed meal before and after a dietary intervention.

Design - Subjects were randomised to consume a six week weight maintenance diet equal in fat content but enriched in either carbohydrates (53% of total energy intake), or protein (24% of total energy intake). Protein enrichment was achieved by increasing consumption of lean beef and lamb.

Outcomes - Subjects were moderately hypertriglyceridemic but had normal concentrations of total, LDL and HDL-cholesterol. Consumption of the protein-enriched diet had no adverse effects on fasting lipids, glucose or insulin levels. Moreover, the postprandial response indicated by the incremental area under the triglyceride and apolipoprotein B48 curves were similar before and after intervention with the high protein diet. Subjects who consumed the high carbohydrate diet had no significant changes in fasting plasma lipids, glucose or insulin, however showed a doubling in the apolipoprotein B48 incremental area under the curve.

Conclusion - Chronic consumption of carbohydrate-enriched diets substantially increased arterial exposure to pro-atherogenic chylomicrons during the post-prandial state in moderately hypertriglyceridemic subjects.

Acknowledgement: this study was supported by Meat and Livestock Australia.

Dietary flaxseed improves the fatty acid composition of lamb tissues

CL Collins¹, JJ Davis³, AJ Sinclair⁴, I McCauley¹, FR Dunshea¹, N Linden²

¹Department of Primary Industries, Werribee, VIC 3030

²Department of Primary Industries, Rutherglen, VIC 3685

³Milne Agrigroup, Welshpool, WA 6106

⁴Department of Food Science, RMIT University, VIC, 3001

Background - Consumers are becoming more aware of the importance of the types of fat in their diet, leading to increased interest in producing 'healthier' meat, by manipulating the fatty acid (FA) profile of meat.

Objective - To determine the effect of dietary inclusion of flaxseed oil on the FA profile of lamb tissues.

Design - Thirty-two individually-housed crossbred ewe lambs were randomly allocated to one of four barley/cereal hay feedlot rations containing either no oil (NO), 5% flaxseed oil (FO), 2.5% FO plus 2.5% palm oil (PO), or 5% PO. Another eight lambs remained on pasture as positive controls. Lambs were fed the diets for an eight-week period, after which they were commercially slaughtered. Subcutaneous fat and *M. longissimus thoracis* were collected 24 hrs postmortem for FA analyses.

Outcomes - Feeding FO increased the concentrations of both α -18:3 n-3 (1.14 vs 2.65 g/100g FA for NO and FO treatments, respectively, $P < 0.001$) and γ -18:3 n-6 (0.148 vs 0.298 g/100g FA, $P < 0.001$) and the ratio of polyunsaturated FA (PUFA):saturated FA (SFA) (0.087 vs 0.128, $P < 0.001$) in muscle lipid. Overall the n-6:n-3 fatty acid ratio was higher in muscle lipids from lambs fed NO compared to those fed either FO or pasture (4.61 vs 2.44 and 2.83, $P < 0.001$). Similar trends were observed in the subcutaneous fat samples.

Conclusions - Supplementing rations with FO is a viable means of improving the FA content of tissues from lambs finished in feedlots. In this context, the n-6:n-3 fatty acid ratio was reduced, while the PUFA:SFA ratio was increased in both muscle and subcutaneous fat from lambs supplemented with FO.