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Feed restriction and weaning weight affects lipogenic activity in sheep adipose tissue

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Background – Adipose tissue (AT) development is influenced by sex, age, genotype, and nutritional state of the animal. Lipogenic enzymes including glycerol-3-phosphate dehydrogenase (G3PDH), glucose-6-phosphate dehydrogenase (G6PDH), and fatty acid synthase (FAS) regulate AT development, by catalysing reactions converting carbohydrates to fatty acids and triglycerides. It is important to understand further the regulation of AT deposition and nutrient partitioning between AT and muscle in order to manipulate the lean to fat ratio of the animal.

Objectives – To determine the effect of nutritional restriction, weaning age, sex, and genotype on lipogenic enzyme activity of ovine subcutaneous AT.

Design – Approximately 600 mixed sex, Merino x Poll Dorset genotype lambs were selected for i) growth, ii) growth and muscling, iii) muscling, or iv) control, and allocated to 1 of 4 treatment groups: 1) Weaning at either, 20 kg (early), or 2) 30 kg (late) live weight; 3) continuous growth from weaning to 45kg; or 4) maintenance growth for a period of 8 weeks from weaning followed by re-alimentation to 45kg. At slaughter, AT was collected and analysed for enzyme activity, and carcases were scanned by dual x-ray absorptiometry (DXA) to determine carcass fat %.

Outcomes – Early weaned animals had higher activities for all enzymes (P<0.001) and carcase fat% (P=0.002) than animals that were late weaned. Nutritionally restricted animals had higher activities (P ≤ 0.003) for all enzymes. Wethers had higher G3PDH (P<0.05) and G6PDH (P=0.026) activities then ewes, and the growth and muscling genotype animals had a lower G3PDH (P ≤ 0.05) activity then the control genotype animals.

Conclusion – These data suggest that nutritional restriction followed by re-alimentation, early weaning, sex, and genotype can influence AT lipogenic enzyme activity and body composition in market weight sheep.

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Dietary intake assessments by FSANZ: validation of National Nutrition Survey data

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Background – FSANZ undertakes dietary intake assessments for nutrients as part of their food standards development. Data on foods people have eaten are combined with recent analysed levels of nutrients in individual foods. The most recent food consumption data for individuals are from the 1995 National Nutrition Survey (NNS) for Australia and the 1997 New Zealand NNS, both of which used a 24-hr food recall methodology. Limitations of the NNS data relate to their age and inability to reflect changes in eating patterns since 1995/97. FSANZ seeks to validate NNS data using more recent information on food consumption. Trans fatty acids (TFA) are used as an example.

Objective – To determine whether food consumption patterns have changed markedly since the NNS data were collected and therefore, whether predicted TFA intakes determined in a recent risk assessment based on the NNS data were valid.

Design – Data from the Roy Morgan Single Source survey (2001-2006) on the frequency of consumption of particular foods were compared with either the 24-hr recall or Food Frequency Questionnaire (FFQ) components of the NNSs.

Outcomes – Major contributors to TFA intake included milk, fat spreads, cheese, yoghurt and potato crisps. The proportion of people reporting consuming milk and fat spreads appears to have remained the same from 1995 to 2006 as did the proportion consuming cheese on a weekly basis. The Single Source data indicate a trend to decreasing consumption of full fat and increasing consumption of low or no fat milk, which may result in a lower TFA intake from natural sources than predicted. The proportion reporting consumption of yoghurt and potato crisps was much higher in the more recent Single Source data, but it is not possible to determine if this is because they are occasionally consumed or if food patterns have actually changed in the last ten years. However, as these foods were minor contributors to total TFA intakes, potential change will not influence the outcome significantly.

Conclusion – Recent consumer surveys can be used to assess the validity of the 1995/97 NNS data by comparing reported food consumption patterns.