

## Concurrent Session 8A: PUFA/Heart Disease

### Grain-finishing of lambs increases saturated fats and omega-6 fats but not the omega-3 fats in meat

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**Background** – With the variation in rainfall in Victoria, the nutritive quality and the seasonal availability of pasture has been a concern for the sustainability of muscle foods from lambs in terms of productivity and nutritive value. The number of farms feeding grain to finish lambs has increased in the industry recently to meet standards for carcass quality, fatness and carcass weight with the potential for altering the health-enhancing omega-3 polyunsaturated fatty acid content in meat.

**Objective** – To compare the health-enhancing polyunsaturated fat and total fat levels in meat of lambs grazing pasture or finished on grain feeding.

**Design** – Thirty crossbred lambs, 8 months old, grown under grazing systems in southern Victoria were randomly allocated to two feeding regimes and maintained on-farm. One group grazed spring grass and the other was offered a grain-based diet *ad libitum* level. The grain-based diet consisted of 75% barley grain, 15% legume grain (lentils) and 10% grass hay on fresh basis. After five weeks of feeding, lambs were slaughtered and the loin muscle (*longissimus thoracis*) from the forequarter area (4<sup>th</sup> rib) was analysed for fatty acid composition.

**Outcomes** – Meat from the grass feeding regime had lower levels (mg/ 100 g) of total fat (2971 vs 3563; P<0.002), C14- & C16-saturated fat (853 vs 1069; P< 0.001) and omega-6 fat (n-6; 132 vs 157; P<0.001). The levels (mg/ 100g) of health enhancing polyunsaturated fatty acids such as eicosapentaenoic acid & docosahexanoic acid (27.4 vs 29.2) and total omega-3 fat (n-3; 94.7 vs 97.9) were similar between grass and grain-based diets, respectively. The ratio of n-6 to n-3 content in meat was higher with grain feeding than grass feeding (1.6 vs 1.4; P<0.001).

**Conclusion** – Results demonstrate that on-farm finishing of lambs with grain feeding increased saturated, n-6 and ratio of n-6 to n-3 fatty acid levels in meat. Further research is needed to identify pathways that maintain the health enhancing fat levels in lambs finished with grain feeding.

### Dietary ω-3 polyunsaturated fatty acids eliminate thirst deficits associated with aging

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**Background** – During the European heatwave of 2003 more than 40,000 people died, the majority of the deaths were in individuals over 65 years of age. This was primarily attributed to their failure to maintain adequate hydration. Aging humans and rats have a reduced sensation of thirst when challenged by dehydration stimuli that typically induce thirst in younger adults. In association with the impaired renal function that occurs with aging this can lead to severe dehydration, causing confusion, dizziness and falls.

**Objective** – Aging results in upregulation of ω-6 PUFA derived prostaglandins in the midbrain, which are inhibitors of thirst following dehydration. The cardiovascular literature reveals that increasing tissue ω-3 PUFA reduces the production of the ω-6 PUFA derived prostaglandins. Therefore, we examined the effect of ω-3 PUFA supplementation on thirst in aging.

**Design** – Adult (4 month old) and aged (22 month old) male Brown Norway rats were maintained for 6-months on an ω-3 PUFA deficient (DEF) diet or ω-3 PUFA supplemented (SUP) diet. Between 2 and 6 months on the diet animals were subjected to a battery of thirst inducing stimuli including injection of hypertonic saline, injection of angiotensin II, 24-hour water deprivation and acute thermal dehydration.

**Outcomes** – Aged animals had an impaired thirst response to dehydration compared with adult animals following hyper-osmotic and dehydration stimuli. Thirst was completely restored by dietary ω-3 PUFA supplementation. Supplementation did not alter thirst responses in adult animals. Diet had no effect on urine output or plasma vasopressin, a hormone that conserves body fluid by reducing urinary water loss.

**Conclusion** – These results provide the first evidence that ω-3 PUFA supplementation restores thirst in aging. These results may lead to clinical trials of ω-3 PUFA supplementation in elderly populations.