News

Summary of a scientific meat nutrition workshop: Aukland 17-20 March 2003

Executive summary
The workshop brought together leading nutrition scientists from around the world to share the latest research into the nutritional attributes of red meat, in order to produce a scientifically-based and endorsed document. For this workshop, red meat is defined as beef, lamb and pork.

Workshop findings

Red meat reaffirmed as important source of dietary iron
- Meat is an important source of dietary iron. Its contribution of about 15% to the total iron intake in western-style omnivorous diets marks its real value as a major source of haem iron, which is at least twice as well absorbed as non-haem iron. Iron status cannot be predicted from dietary iron intake because of the difference in iron bioavailability between haem and non-haem iron. Hence estimates of haem and non-haem iron content are needed for food composition databases in order to examine the relationship between diet and iron nutrition.
- Meat contains a ‘factor’ that increases the absorption of non-haem iron from meat and other foods consumed at the same time, which has been the subject of much scrutiny but is not yet identified.
- Those with a hereditary predisposition to iron overload may have poorer control of iron absorption from meals containing absorption promoters. However, there is currently no evidence that a high meat intake leads to iron overload in the general population, and it can improve iron status in iron-depleted individuals.

Professor Susan Fairweather-Tait, Institute of Food Research, UK

- National UK Diet and Nutrition Surveys have provided extensive and robust data on food consumption and nutritional status, allowing for an analysis of the links between them. They have shown that ‘low’ consumers of red meat tend to have poor iron intakes, a higher incidence of anaemia, and, amongst women and girls, lower iron stores.
- ‘Not consuming red meat’ was the most powerful and consistent predictor of low iron status in schoolgirls, so dietary messages need to be targeted appropriately to this group. ‘Eat more red meat’ is the strongest dietary message that can be given to all age groups to maintain or improve iron status with its subsequent implications for health status.

Dr Margaret Ashwell, Ashwell Associates, UK

- Determining the bioavailability of dietary iron – its absorption and utilisation in a complete meal – is a key feature in understanding iron nutrition and making dietary recommendations. These measurements can be made more accurate by labelling a food intrinsically. This has now been done for the first time in lamb, produced by a long-term infusion of a stable iron isotope. In forthcoming human trials, the absorption of iron from the meat will be measured by its incorporation into red blood cells.

Dr Scott Knowles, AgResearch Limited, New Zealand

Other vitamins and minerals – zinc, vitamin B12, ...
- Total diet studies throughout Europe have shown iron, selenium, copper and zinc intakes to be of concern, many below the recommended levels. The significance of the ‘meat and meat products’ food group to the daily intake of selenium and zinc is high, for iron and copper it’s substantial.

Professor Wim van Dokkum, TNO Research Institute, The Netherlands

- Zinc, like iron, is more bioavailable in meat and fish than other sources, such as cereals. In industrialised countries, meat is usually the major food source of this micronutrient. Absorption of zinc can be enhanced or inhibited in a similar way to iron, with amino acids and organic acids being the enhancers. Any trend towards lower meat diets has a negative impact on the bioavailability of dietary zinc, particularly if the resulting diet is high in cereal grains and legumes, which contain significant amounts of the major zinc inhibitor, phytate. The ratio of zinc to phytate is an important predictor of zinc bioavailability in diets, as well as total zinc content, but comprehensive data on phytate contents of plant-based foods are lacking. Simply supplementing a low meat diet with zinc does not necessarily compensate due to the reduced rate of absorption seen in the absence of meat.

Professor Rosalind Gibson, University of Otago, New Zealand

- Vitamin B12 deficiency is not commonly seen amongst omnivores as this vitamin is found in animal foods. To ensure adequate vitamin B12 in infants, breastfeeding mothers should be encouraged to eat meat or animal foods. Very severe effects of vitamin B12 deficiency have been seen in infants of breastfeeding vegans, and although deficiency could be corrected by B12 injections, IQ of the infants may not recover fully.

Vegetarian adults have been found to have low serum vitamin B12 levels compared with omnivores. They also tend to have a raised homocysteine level, an emerging risk factor for cardiovascular diseases and possibly also for dementia. About 50% of vitamin B12 intake comes from meat products and offal.

Professor Stewart Truswell, University of Sydney, Australia
More emerging benefits

**Weight loss**

- An emerging body of evidence shows that increasing the proportion of protein to carbohydrate in the diet during weight loss appears to have beneficial effects, such as greater fat loss and sparing of lean body mass. A recent study in Australia has shown that a high protein-diet, in which the major source of protein was red meat, achieved a slightly higher weight loss than the high carbohydrate diet, increasing to a significant difference in those women with high triglycerides.

- On both diets, levels of triglycerides, LDL cholesterol, insulin and glucose were lowered. However for women with high triglycerides, triglyceride lowering was substantially greater on the high protein diet, in addition to a greater fat and midriff loss. Further advantages of the high meat diet for all the women were a higher nutrient density, significant improvements in nutritional status, specifically plasma ferritin, vitamin B12, and no adverse effects on calcium excretion.

- Compliance was a good deal better on the high protein diet, with three times more women on the high carbohydrate diet not continuing the diet.

- High protein diets, containing red meat, can therefore be a safe and effective method of weight loss, and possibly the optimal eating pattern for reducing heart disease risk in those with high triglycerides.

*Dr Manny Noakes, CSIRO Health Sciences and Nutrition, Australia*

**Reduced fat intake**

- Red meat has come in for criticism over the years as a major source of fat in the diet. Animals are becoming larger and leaner though, with excess fat trimmed off by processors. The leaner the animal, the less the % waste, as the yield of primal cuts remains constant. Consumers also prefer a leaner product visually, trimming external fat before and/or after cooking. A study of 400 subjects revealed an average fat intake of just 7.9g from a 200g steak.

*Professor Roy Bickerstaffe, Lincoln University, New Zealand*

**Lifestyle and cancer**

- Studies into the nutritional factors associated with cancer have moved from foods to individual nutrients back to foods, but we should be looking even more broadly to find the answer. Lifestyle patterns give clues as to how factors work together, and reflect how these factors occur in our lives, which is rarely in isolation. These associations are often complex and appear to be influenced by many inter-related factors. Reports relating to red meat are often inconsistent, whether in terms of the amount, type or preparation of the meat, partly due to differing definitions. The strongest protective factor for colon cancer is physical activity - a lack of it increasing risk considerably, as well as its ability to modulate other risk factors.

*Dr Martha Slattery, University of Utah, USA*

**Vitamin D and bone health**

- Red meat as a supplier of dietary vitamin D is a relatively new area of interest, although its role in reducing the risk of rickets was reported as long ago as the early 1900s. A British review in 1997 revealed that meat contributes 21% of dietary vitamin D, a much higher level than first realised. Dunnigan's work in Glasgow on rickets and osteomalacia led him to believe that the bioavailable contribution of red meat's vitamin D to blood levels was four to five times greater than predicted from estimates of vitamin D content. As with the other micronutrients, there may be a 'meat factor' that enhances vitamin D status and hence bone health, which could explain these differences. When exposure to ultra-violet radiation is limited, meat is the most significant independent dietary factor in reducing rachitic and osteomalacic risk. An absence of meat consumption in vegetarians has been associated with a significantly lower bone mineral density and vitamin D status compared to women eating an omnivorous diet. Vitamin D may also be protective against cancer, through its hormonal effect on cell proliferation and differentiation.

*Maureen Strong, Human Nutrition and Meat Science Manager, Meat and Livestock Commission, UK*

**Evidence-based nutrition**

- Recommendations for the prevention and treatment of selected diseases will be considered in the context of their evidence-base. A hierarchy exists for scientific evidence, with randomised controlled trials the gold standard. In the case of chronic disease, where nutritional factors may operate as promoters or protectors many years prior to the onset of disease, these trials may not be suitable, leaving a need for a range of robust scientific procedures to justify nutritional recommendations or dietary guidelines.

*Professor Jim Mann, University of Otago, New Zealand*

**Global Marketing**

- Science is paramount for successful nutrition marketing, providing the evidence base for consumer-relevant campaigns. An objective of global nutrition marketing is to encourage interactive discussion about true market experiences, global research and science. Demand drivers for red meat are: health and nutrition; quality; food safety; convenience; taste and palatability, but the product must retain nutritional legitimacy first and foremost.

*Tanya Hart, Marketing Manager, New Zealand Beef and Lamb Marketing Bureau*

**Conclusions**

1. Red meat maintains its unequalled role as a source of highly bioavailable iron and zinc, and makes a major contribution to selenium and copper intakes.
2. Not eating red meat is a powerful and consistent predictor of low iron status in schoolgirls.
3. Red meat contains a 'meat factor' that affects the absorption of iron, zinc and possibly other nutrients, from both meat itself and other foods. For this
reason, supplementation does not fully compensate for a diet low in red meat.

4. More research into diet and lifestyle patterns in the development of cancer is required, rather than individual foods. Studies on red meat are inconsistent.

5. Emerging opportunities for red meat are in the fields of weight loss and vitamin D.

Speakers and chairs
Jim Mann, University of Otago; Tanya Hart, NZ Beef and Lamb Marketing Bureau; Clare Wall, Massey University; Susan Fairweather-Tait, Institute of Food Research, UK; Wim van Dokkum, TNO Nutrition and Food Research, The Netherlands; Margaret Ashwell, Ashwell Associates, UK; Rosalind Gibson, University of Otago; Stewart Truswell, University of Sydney, Australia; Scott Knowles, AgResearch Limited; Cliff Tasman-Jones, NZ Nutrition Foundation; Manny Noakes, CSIRO Health Sciences and Nutrition, Australia; Roy Bickerstaffe, Lincoln University; Martha Slattery, University of Utah, US; Maureen Strong, Meat and Livestock Commission, UK; Neil Taylor, Meat NZ

Attendees
Andrea Mortensen and Veronique Droulez, Meat and Livestock Australia; Pat Scarlett, Beef Information Centre, Canada; Mary Ann Binnie, Canada Pork; Grethe Andersen, Danske Slagterier, Denmark; Laurence Wrixon, International Meat Secretariat, France; Josée Cloutier and Virginie Grandjean, Centre D’Information des Viandes, France; Nicolai Worm, CMA, Germany; Allan Frazer and Neil Clarke, Meat New Zealand; Julian Lee, AgResearch Ltd, NZ; Jane Coad, Gordon Reynolds and Harsharnjit Gill, Massey University, NZ; Red Slater and Fiona Carruthers, NZ Beef and Lamb Marketing Bureau; Pip Duncan and Mary Taylor, NZ Pork Industry Board; Graeme Jarvis, Meat and Wool Innovation Ltd, NZ; Chris Cook, Auckland District Health Board, NZ; Naomi Sutton, University of Otago, NZ; Ian Ivey, Strive Partnership, NZ; Mike Tempest, Livestock and Meat Commission of Northern Ireland; Karin Franson, Svensk Köttinformation, Sweden; Marianne Smeets, Voorlichtingsbureau Vlees, The Netherlands; Mary Young and Kim Essex, National Cattlemen’s Beef Association, US.