

Meat technology-What's new

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US consumers' willingness to pay for grass-finished beef

Approximately 85% of the beef raised and sold through retail outlets in the US is grain-finished on a high-concentrate diet that often includes growth hormones and antibiotics. However, there is an emerging interest in forage- or grass-finished beef which has been attributed to consumers' concerns about the effects of production and processing methods on the safety and nutritional content of their food and effects on the environment. Some Australian companies have begun selling premium grain-fed beef into the US market, but no known Australian-branded grass-fed beef products are currently being marketed at US retail outlets. A combined Australian-North American study used experimental auctions and consumer surveys to provide insight into product attributes that are most important when marketing grass-fed beef to US consumers.

A total of 225 consumers participated in the auction process at two locations in the United States. The auction process was structured to provide information on product attributes such as flavour and nutritional characteristics and socio-demographic factors that are most important in determining US consumers' preferences and willingness to pay premiums for grass-finished versus grain-finished beef.

The growth of a viable grass-fed beef market in the US is likely to depend on the palatability and quality being equivalent to grain-fed beef. It did appear that health-related messages are more important drivers of willingness-to-pay, on average, than the absence of antibiotics and hormones and traceability. However, the research found that US consumers perceived Australian meat products to be relatively less safe than meat from Canada and the US, and country-of-origin labelling could also be a concern. Labelling information regarding grass-fed beef's potentially beneficial nutritional attributes is vital for maintaining and growing niche markets for grass-fed beef in the US. The results suggested that Australia may have a comparative advantage for finishing beef on forage and marketing premium grass-fed differentiated products in the US market because of the willingness of some to pay a premium for this class of beef.

Meat and cancer

A report by the World Cancer Fund published in 2007, concluded that the consumption of red and processed meats was a cause of colorectal cancer. This controversial report stressed that people should eat no more than 500 g of cooked

red meat per week and should avoid eating processed meats; however, meat is a primary source of protein and provides all essential amino acids plus various micronutrients. Red meat is an easily absorbable source of iron, zinc and selenium as well as vitamins B6, B12, and vitamin D, and significant amounts of omega-3 polyunsaturated fatty acids. A New Zealand review presented at the annual International Congress of Meat Science and Technology considered some of the relevant literature with emphasis on where a cancer hazard might be arising and how the risk could be minimised.

There is epidemiological evidence in support of a conclusion that a diet high in red and processed meats may increase the risk of certain cancers. This may not necessarily be due to the meat, as such, but may be due to a high fat intake and/or carcinogens generated through the cooking and processing methods. Studies have shown that a high saturated-fat intake is associated with the development of some types of cancer; and high-temperature cooking of meat, such as grilling, frying and barbecuing, can lead to the development of heterocyclic amines (HCAs) which have also been associated with an increased risk of certain types of cancers.

N-nitroso compounds (NOCs) are produced by the reaction of nitrite and nitrogen oxides with secondary amines and *N*-alkylamides. They are present in certain processed meat, including bacon, smoked fish and smoked cheese, and can be formed in the body after consumption of red and processed meat and have been implicated in some cancers.

The risk of cancers associated with high meat consumption may be reduced by the inclusion of foods high in dietary fibre and anti-carcinogens (such as vitamin C) in the diet, especially at the time of meat consumption. In other words, a balanced diet which includes adequate fruit and vegetables along with meat protein will reduce cancer risks. Meat also contains potential anti-carcinogens, including omega-3 polyunsaturated fatty acids and conjugated linoleic acid (CLA).

Influence of body condition on prevalence of *E. coli* and *Salmonella* in beef cows

Ruminants fed a below-maintenance diet have been reported to have an increased pH in the rumen which can result in an increased prevalence of *E. coli* in the faeces; however, information on the influence of body condition on the prevalence of pathogenic bacteria in the faeces of cows is lacking. A study was conducted in the US to determine the effects of body condition (BC) and forage type on the prevalence of faecal shedding of *E. coli* O157:H7 and *Salmonella* from grazing beef cows.

Two groups of cows in thin and moderate BC were grazed on two types of pasture (Bermuda grass and toxic tall fescue) for 62 days while suckling their calves. Faecal samples were collected

at three intervals (days 0, 30 and 62) and analysed for the presence of *E. coli* O157:H7 and *Salmonella*.

Shedding of *E. coli* and *Salmonella* was highly sporadic with *Salmonella* not being detected in the same cow more than once, and only two cows being positive for *E. coli* O157:H7 on more than one collection date. Overall, *E. coli* O157:H7 was detected in 2.6% of samples and *Salmonella* in 2.0%. There was no difference in prevalence between groups of cows of different body condition or from different pasture types.

Reducing power consumption in multi-compressor refrigeration systems

Refrigeration compressors are normally the largest consumers of electricity in an export abattoir. A combination of screw and reciprocating compressors are used with ammonia as a refrigerant to chill and freeze the product. Similar systems are in use in Norway in fish-processing plants and Norwegian engineers have developed a model to optimise compressor operation for energy efficiency.

The system has five screw compressors with slide-valve capacity regulation and was modelled during a peak operating period and during the low season when little active freezing was occurring. Slide-valve control is an inefficient method of capacity control as almost as much power is required at part-load as under full-load operation. The existing control arrangement allowed several compressors to operate at partial load at the same time. Compressor speed control, using a variable-frequency drive, is a more energy-efficient alternative to slide-valve regulation for capacity control.

The model showed that the greatest improvement in efficiency could be made when the system was under part-load operation such as when not all freezing tunnels were being used.

The system was first optimised without variable-frequency drives. The simulation showed that it was more efficient to have two compressors at a high part-load operation than one compressor at a low part-load. Another simulation modelled fitting variable-speed drives to up to three of the five screw compressors. This indicated that it was worthwhile installing

one variable-speed drive, but not two. There did not appear to be a large difference between optimising operation of the system with, and without, variable-speed drives.

Citrus co-products to reduce residual nitrite in meat products

Sodium or potassium nitrite is widely used in meat processing as a curing agent; is important for colour development, delaying onset of oxidative rancidity; and for microbiological safety by inhibiting neurotoxin formation by *Clostridium botulinum*. Health concerns due to the potential formation of carcinogenic *N*-nitroso compounds have led to a tendency for reduced usage and a search for processes that result in reduced residual nitrite levels in cured meat products without jeopardising safety. A Spanish review considered the research on citrus co-products as an ingredient to reduce residual nitrite levels.

The majority of citrus fruits are used for juice production, resulting in the generation of large quantities of co-products. These include albedo (which is the white, spongy cellulosic tissue which is the principle component of the peel), dietary fibre (which is produced by washing and drying the raw citrus co-product), and the citrus fibre wash water.

Raw, cooked and dehydrated lemon albedo have been trialled at different levels in cooked and dry-cured meat products. Raw albedo was more effective than cooked in reducing residual nitrite levels in dry-cured sausages and in cooked products, such as bologna.

Orange dietary fibre (ODF) was used as an ingredient at a level of 0.5 to 2.0% in cooked and dry-cured sausages. This resulted in a reduction in nitrite levels, increasing with increased concentration of ODF.

Citrus fibre wash water (CFWW) has also been used, but mainly in cooked products, replacing part of the water normally used in the product formulation. The use of CFWW at 10% reduced the residual nitrite by about 42%. The reduction was attributed to the nitrite reacting with the polyphenols in the wash water.

The results of the various investigations indicated that citrus fibre showed the greatest potential to reduce residual nitrite levels, followed by albedo and citrus wash water.

The information contained herein is an outline only and should not be relied upon in place of professional advice on any specific matter.

Contact us for additional information

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