Are you interested in adding value to red meat products?

High pressure processing can deliver!

High Pressure Processing workshop outcomes

The Australian red meat industry was introduced to High Pressure Processing (HPP) at a workshop, held in November 2009, run by MLA and hosted by CSIRO at Werribee. The workshop was designed to introduce the technology, products and manufacturers to the industry and to demonstrate benefits and value adding opportunities for red meat. Depending on the product these benefits can include:

- increased shelf life
- improved texture through tenderisation effect
- reduction or elimination of preservatives
- fresher quality chilled red meat meal solutions

High Pressure Processing (HPP) is a technology that applies hydraulic pressure up to 6,000 atmospheres to products immersed in a liquid medium. This process inactivates food-borne pathogens such as *Listeria monocytogenes* while maintaining the integrity and freshness of the food.

HPP is used routinely by a number of companies in the US, Europe and Japan. It is attractive to processors of organic foods – especially cold cuts and smallgoods as they require only natural ingredients such as salt as a preservative. Possible red meat products produced using HPP for the Australian market include but are not limited to; rare roast beef, fresh cooked meals, fresh chilled meals, snack foods, sandwich meats, catering meat and toppings. In all these products HPP enables production of a higher quality, fresher product.

The workshop included a program of speakers to show how HPP could be used in the red meat industry and presentations from manufacturers who currently use HPP in other applications. The technology was demonstrated during a site visit to the award winning 'Donny Boy' HPP facility in Melbourne.

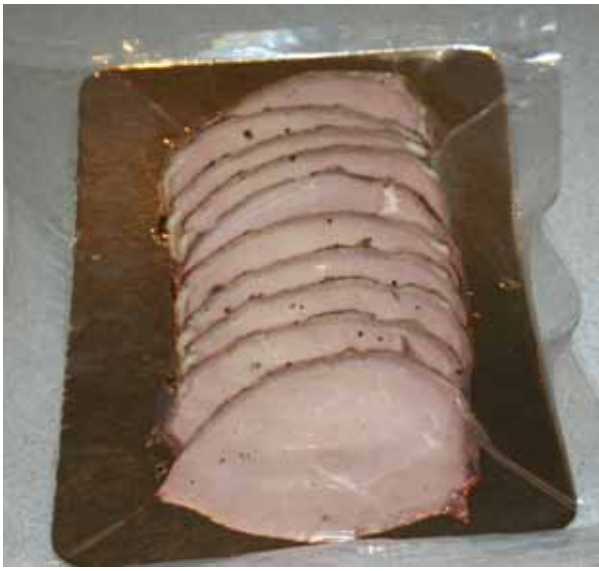
High pressure processing machine

The presentations given covered the following topics:

- **High pressure processing of food**
  (Roman Buckow, CSIRO Food & Nutritional Sciences)
- **High pressure processing for microbiologically safe and stable foods**
  (Belinda Chapman, CSIRO Food & Nutritional Sciences)
- **The pressure fresh experience with high pressure processing**
  (Trent De Paoli, Pressure Fresh)
- **Tenderising beef cuts using high pressure & heat**
  (Anita Sykes, CSIRO Food & Nutritional Sciences)

The first half of the workshop was held at the CSIRO Food and Nutritional Sciences facility in Werribee, VIC. Samples of sliced topside medium rare roast beef (pictured right) were put through the HPP process so attendees were able to see how the technology worked and how it may be applied to red meat to create new and innovative products. The samples maintained their rare fresh appearance and were tasted as part of attendees' lunch.

Trent De Paoli from Pressure Fresh in Bundaberg gave a presentation to the workshop and the group went to the Donny Boy Fresh Food Company's Preshafruit HPP facility to observe the technology in a working environment.



Samples of sliced topside medium rare roast beef

High pressure processing of food

The application of high pressure ruptures the cell walls of microorganisms rendering them inactive. Given normal processing temperatures are not used, applying pressure to high moisture products packaged and immersed in liquid allows for products to retain their 'fresh' pre-processed characteristics.

Products treated at pressures under 600MPa, retain shape and texture. Some change in colour at pressures higher than 600MPa resulting in a 'cooking effect'. However taste and texture remain the same.

Successful products on the market are predominantly juices, vegetable and meat (beef, chicken, turkey and pork) products. Seafood and beverage products are increasingly being produced using HPP.

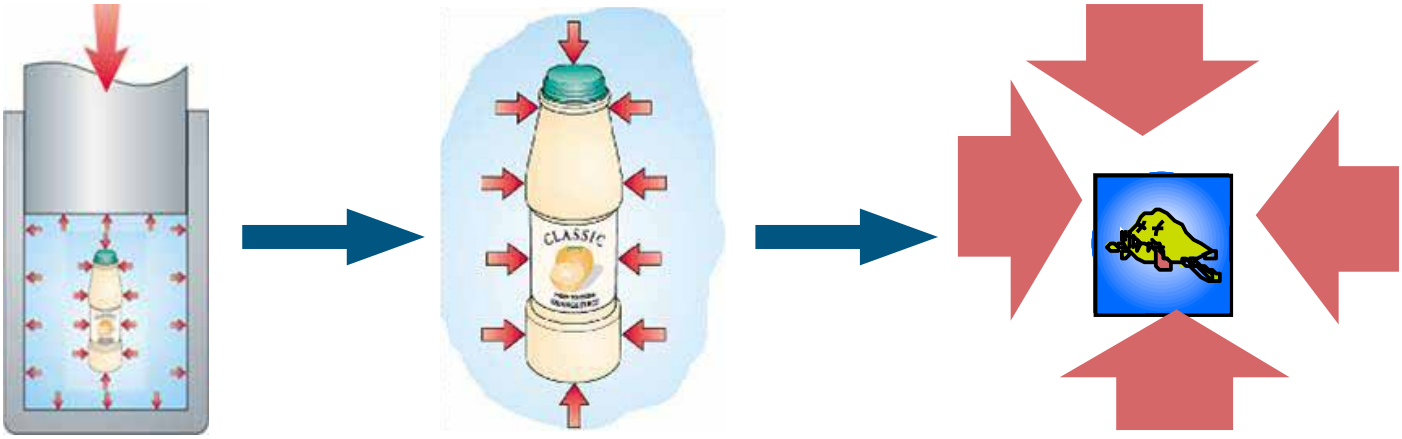
Microbiological safety and stability of high pressure processing of foods

Surveys show that consumers prefer fresh, low/no preservative healthy natural and safe foods. Manufacturers are looking to meet consumer demands and improve shelf life for their products.

HPP can be used to reduce microbial counts in products whilst maintaining high quality in texture and flavour. The degree of inactivation is product specific and is influenced by pH, water activity & salt concentration.

Microbial inactivation using HPP also depends on process conditions such as exposure time, pressure level, application of heat. Extending shelf-life of products is important for manufacturers; some products may be able to have their shelf-life doubled from 45 days to 90 days.

Product	Shelf-life extension
Marinated beef loin (raw)	13–15 days
Blood sausage (fresh)	28 days
Cooked sliced ham	up to 66 days depending on HPP level



Mechanism of high pressure process on micro-organisms.

High pressure processing can be used to:

- extend shelf-life
- improve safety
- improve sensory quality eg reduce heat
- improve consumer perception eg reduce preservatives and chemicals
- provide a pathway to the development of very different products

Ambient high pressure processing is already widely commercialised overseas for safety and shelf-life extension of meat products. High temperature high pressure processing is ready for first stage technology transfer to industry.

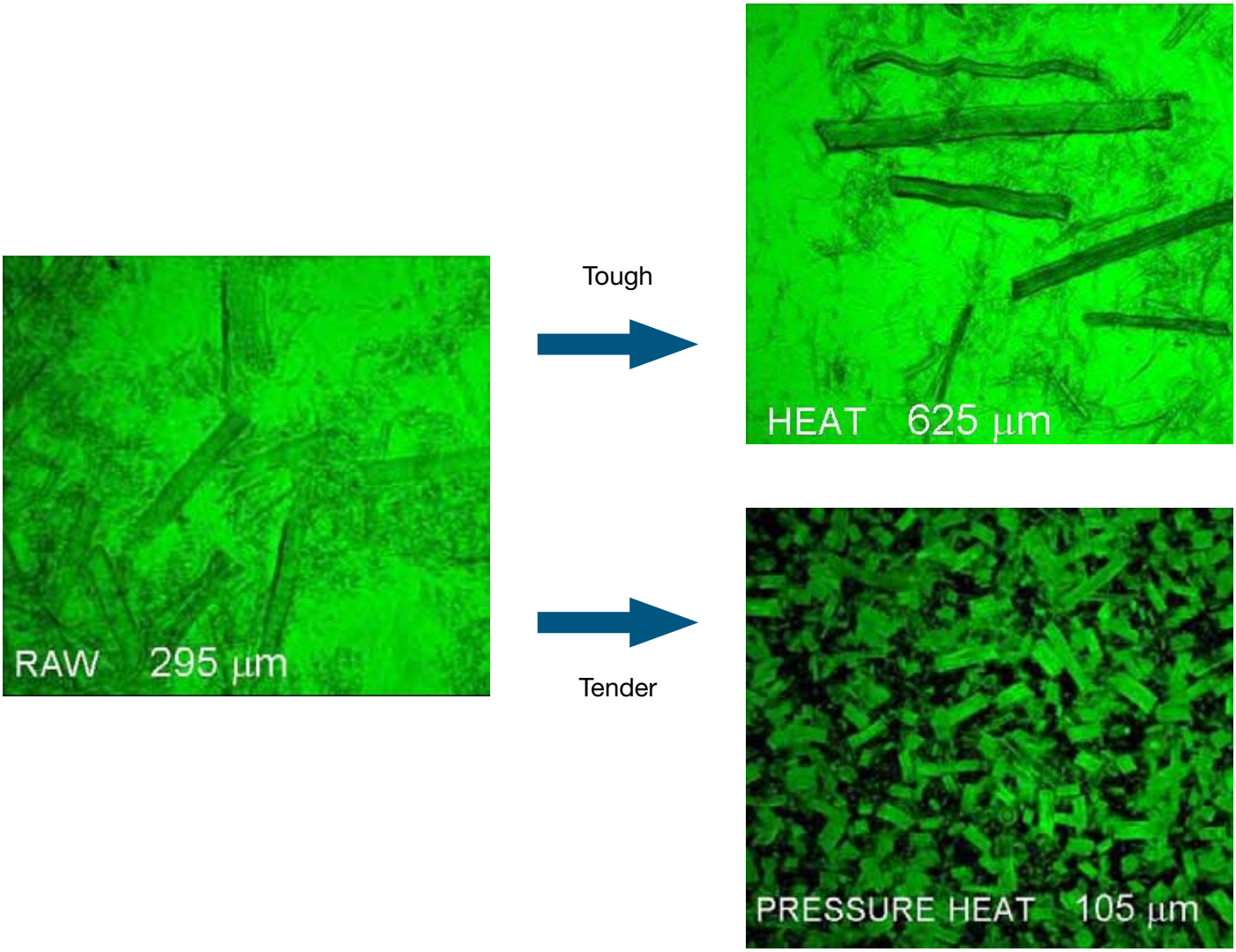
Tenderising beef cuts using high pressure heat

HPP has the potential to improve the tenderness of traditionally low value cuts of meat, if heat is included in the process, this is called pressure heating.

The addition of heat between 50–70°C when pressure at 200MPa is applied results in a meat product that is tenderer. For this increase in tenderness to occur, meat is subjected to heat and pressure for 20 mins. This process results in a more tender uncooked product.

To allow adequate heat transfer the meat portions used should be of a thickness no greater than 30mm.

Pressure heating may allow for the production of ready-to-eat meals and steak products with less or no preservatives.



Microscope images of pressure and heat effect on muscle fibres.

An Opportunity for You!

MLA is currently seeking companies who are interested in developing high pressure processed red meat products for existing or new domestic and/or export markets. Assistance through co-funding opportunities is available through Ausralian Meat Processing Corporation (AMPC) and the MLA Donor Company for companies and projects that meet requirements for funding.

HPP Machinery

Avure
http://www.avure.com/

NC Hyperbaric
http://www.nchyperbaric.com/index.htm

Australian HPP Manufacturers
(Toll Manufacturing Capable)

Presha Fruit
(Donny Boy)
http://preshafood.com.au/

Pressure Fresh
http://austchilli.com.au/devindexpf.aspx

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