

High Pressure Processing

INTERVENTION SUMMARY	
Status	An Emerging Technology
Location	Packaging/retail packs
Intervention type	Full thickness treatment of packaged product
Treatment time	0.5-5 minutes
Regulations	No specific restrictions in EU, US or Australia.
Effectiveness	Up to 4 logs
Likely Cost	High capital outlay
Value for money	Viable for Ready-To-Eat meat products at present
Plant or process changes	The equipment required is quite large
Environmental impact	Utilises energy to achieve pressure increase
OH&S	Noise production
Advantages	<p>Less use of preservatives such as lactates or salt for processed meat products. Potential for manufacture of new, minimally processed ready-to-eat meat products. Good consumer acceptance likely as no additives are needed</p> <p>Penetrates full thickness of product, so is ideal for comminuted product</p>
Disadvantages or Limitations	<p>Possible meat colour/texture changes on raw meat products</p> <p>Product must be packaged. Only specific packaging types may be used that can withstand the HPP treatment (trials in progress at Food Science Australia)</p>

High Pressure Processing

High pressure processing (HPP) involves submerging the (normally) packaged food in a liquid (usually water) within an enclosed vessel. The pressure is generated either by pumping more liquid into the pressure vessel or by reducing the volume of the pressure chamber.

HPP kills microorganisms by interrupting their cellular function without the need for heat. Studies show that the process extends product shelf life by inactivating spoilage organisms. When appropriately used, HPP does not alter the texture, appearance or flavour of foods.

HPP was reviewed by Hugas *et al.* (2002). Pressures of 101 MPa to 1013 MPa have been explored as potential food safety treatments for meat. The effects of extreme pressure on microorganisms are not fully understood, but substantial reductions (> 5 log cycles) in numbers of *Pseudomonas fluorescens*, *Citrobacter freundii* and *Listeria innocua* in ground beef have been demonstrated (Carlez *et al.* 1993), and high pressure treatment slowed the development of spoilage organisms during subsequent storage of ground beef (Carlez *et al.* 1994). Microbial reductions are enhanced when high pressure treatment is combined with mild heating or chilling, but colour changes were observed after 10 minutes of treatment. The use of pulsed high pressure can be more effective than continuous single application, so treatment times can be reduced (Hayakawa *et al.* 1994).

High pressure processing is a very promising technology for ready-to-eat (RTE) meats because there are few barriers to approval by regulatory authorities, no special labelling requirements because no chemicals are used, and if used appropriately there are no changes to texture or flavour of the product. Researchers found that in RTE meats pressure treated at 600 MPa at 20°C for 180 s, there was no deterioration in sensory quality, no difference in consumer acceptability, a 4 log reduction in *Listeria monocytogenes* in inoculated product and the refrigerated shelf life was extended (Hayman *et al.* 2004). Hugas *et al.* (2002) reported that HPP treatment (600 MPa for 10 minutes at 30°C) could extend the shelf-life of food including cooked ham, dry cured ham and marinated beef loins. Avure Technologies markets HPP technology as *Fresher Under Pressure*®.



Meat Industry Services

Supported by:



Proponent/Supplier Information

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Website: <http://www.fresherunderpressure.com/>

Brand: *Fresher Under Pressure*®.

References

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