Project Summary

Development and validation of reduced thermal processing requirements for canned abalone

KEY POINTS

- Abalone (*Haliotis* spp.) are a high-valued seafood product harvested from wild and aquaculture systems, and are sold in various formats including live, fresh, frozen, canned and value-added.
- Abalone processors typically lose between 12-30% product yield (meat weight) during thermal processing within cannery operations. This weight loss is associated with the partial loss of haemolymph and is equivalent to 40-102 tonnes per annum.
- Thermal processing of low acid canned foods (such as abalone) remains a very critical and highly regulated operation. Scheduled processes must be established by competent persons having expert knowledge of thermal processing and having adequate facilities for making such determinations.

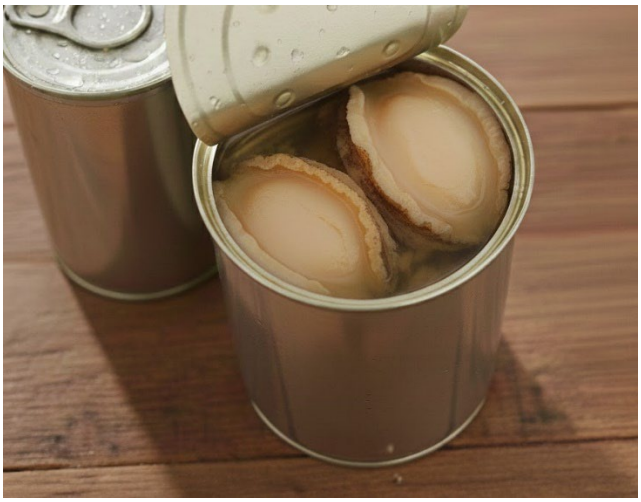

Figure 1. Canned abalone.

THE CHALLENGE

Canned abalone (like all canned products) are heat-treated to eliminate the potential presence of pathogens and reduce the incidence of spoilage organisms. As the science underpinning thermal processing of foods has evolved, the assumption that heat-resistant microorganisms could be located at the center or the slowest heating point has become deeply ingrained.

THE OPPORTUNITY

The aim of this research was to provide robust scientific evidence to allow the abalone industry to reduce the thermal process requirements for Australian and New Zealand wild-caught and farmed abalone whilst enabling the industry to continue to meet the regulatory requirements.

The project aimed to challenge the principle that abalone can be contaminated with pathogenic heat-resistant bacterial spores throughout the meat (or abalone foot) and that the point of microbiological concern may be closer to the edge of the abalone foot and not at the slowest heating point which is generally considered to be the geometric centre of the abalone.

The underlying requirement is to continue to produce commercially sterile foods – a condition achieved by application of heat to render the product free of viable microorganisms including spores of public health significance and microorganisms capable of growing in the product under normal non-refrigerated conditions of distribution and storage.

OUR RESEARCH

The project reviewed published data to provide background information on the evolution and science behind thermal processing of foods and the potential for microbiological contamination in abalone through understanding abalone physiology, post-harvest handling processes and bacterial studies.

endfoodwaste.com.au
enquiries@endfoodwaste.com.au

End Food Waste Cooperative Research Centre is funded through the Australian Government's CRC Program administered by the Department of Science, Industry and Resources.

Two laboratory investigations were completed that assessed the potential for bacterial spore uptake in live abalone and dye migration or penetration in prepared abalone meat.

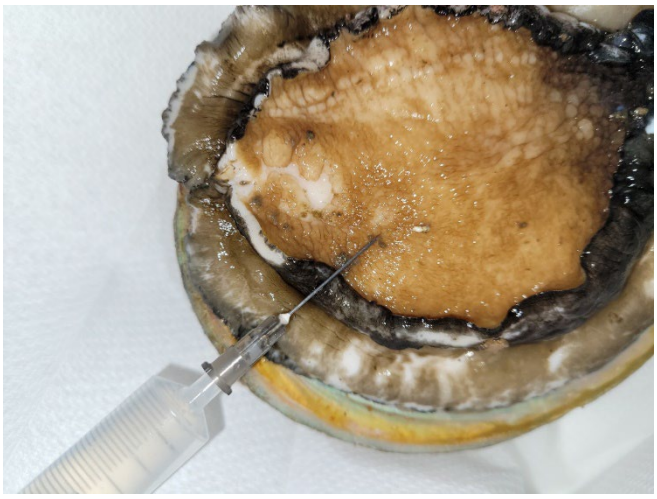

Figure 2. Photograph taken drawing the abalone blood (haemolymph) for microbiological assessment.

OUTCOMES

The literature review concluded that the haemolymph (blood) of many invertebrates (including abalone) can contain a range of bacteria, however there was no evidence to confirm or refute that abalone can be internally contaminated with *Clostridium botulinum*, the causative agent of botulism.

The dye penetration study demonstrated that the dye particles slowly migrated towards the centre of the abalone foot and could penetrate faster through the sinuses.

The live abalone husbandry trial did not recover any anaerobic vegetative cells or anaerobic spores of *Clostridium sporogenes* (a surrogate for *C. botulinum*) from the haemolymph. However, the abalone only consumed a low amount of feed during the trial and variable levels of anaerobic vegetative cells and anaerobic spores were recovered from the visceral mass.

IMPACT

The project ceased prior to confirming that abalone cannot be contaminated with heat-resistant bacterial *C. sporogenes* spores throughout the meat (or abalone foot) or if the existing safe-harbour approach can be challenged and that it would be acceptable to reduce the thermal processing requirements for canned abalone.

This project has established additional national capability in the production and analysis of anaerobic *C. sporogenes* spores, thermal processing expertise and built collaborative partnerships between the abalone industry and researchers.

NEXT STEPS

Food safety has a significant influence on food markets, consumer trust and is fundamental in helping to protect human health. However, the current absence of evidence is not evidence that heat-resistant bacterial spores could be absence from the centre of the abalone foot.

Further *in-vitro* and *in-vivo* trials could be taken to help determine if there is any potential for, or mechanism to prevent, heat-resistance bacteria being present at the slowest heating point; and to complete a microbiological risk assessment.

Alternative approaches to modify the minimum thermal processing requirements could be to review and redraw the thermal death kinetics for *C. botulinum* in abalone tissue.

PROJECT TEAM

Stephen Pahl (South Australian Research and Development Institute (SARDI), Adelaide University Affiliate)

Navreet Malhi (South Australian Research and Development Institute (SARDI))

Khandaker Mahbub (South Australian Research and Development Institute (SARDI), Adelaide University Affiliate)

Valeria Torok (South Australian Research and Development Institute (SARDI), Adelaide University Affiliate)

PROJECT REPORTS/PUBLICATIONS

Nil

PROJECT WEBPAGE

https://endfoodwaste.com.au/reducing-canning-losses-in-the-abalone-industry/

endfoodwaste.com.au
enquiries@endfoodwaste.com.au

End Food Waste Cooperative Research Centre is funded through the Australian Government's CRC Program administered by the Department of Science, Industry and Resources.

ENDFOODWASTE
COOPERATIVE RESEARCH CENTRE

For further information
please contact:

enquiries@endfoodwaste.com.au
or visit endfoodwaste.com.au

ENDFOODWASTE COOPERATIVE RESEARCH CENTRE
Australian Government Department of Industry, Science and Resources
Cooperative Research Centres Program