

Guideline for Quality and Safety Assessment of Novel Seafood Products

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Project No. 2011/739



AUSTRALIAN
SEAFOOD
COOPERATIVE
RESEARCH CENTRE

February 2014

South Australian Research and Development Institute



This project was conducted by:

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ISBN: 978-1-921563-54-6

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The Australian Seafood CRC is established and supported under the Australian Government's Cooperative Research Centres Program. Other investors in the CRC are the Fisheries Research and Development Corporation, Seafood CRC company members, and supporting participants.

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Non-Technical Summary

PROJECT NUMBER AND TITLE: 2011/739 Guideline for quality and safety assessment of novel seafood products

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PROJECT OBJECTIVES:

1. To develop a guideline for the seafood industry that provides clear and practical guidance on how to assess shelf-life of novel seafood products
2. To identify potential risks of hazards associated with different types of packaging and processing options in seafood
3. To advise on different approaches of how to assess product quality and safety
4. To enhance communication between the seafood industry and scientists

OUTCOMES ACHIEVED

- A technical reference manual (*A Guide to the Identification of Food Safety Hazards and Determination of Shelf-life of Packaged Seafood*) was produced to help members of the Australian seafood industry determine potential food safety risks and regulatory requirements when using common processing and packaging techniques. The technical reference manual also contains information of freshness attributes and their assessment, steps to determine shelf-life and fact sheets for common food safety hazards.
- A user-friendly guide (*Safe Packaged Seafood: A Guide to Identifying Food Safety Hazards and Determining the Shelf-life of Packaged Seafood Products*) was produced and published in a booklet format. The user-friendly guide is a condensed version of the technical reference manual.
- The manual and the guide will be available online through the SafeFish website as a means of knowledge transfer to the seafood industry.

LIST OF OUTPUTS PRODUCED

- A Guide to the Identification of Food Safety Hazards and Determination of Shelf-life of Packaged Seafood.
- Safe Packaged Seafood: A Guide to Identifying Food Safety Hazards and Determining the Shelf-life of Packaged Seafood Products.

- Safe Packaged Seafood: A Guide to Identifying Food Safety Hazards and Determining the Shelf-life of Packaged Seafood Products Abstract titled 'Ensuring Safe Packaged Seafood: A Guide' accepted to World Aquaculture 2014 as an oral presentation.
- The Australian Seafood Cooperative Research Centre (ASCRC) SeaFood Magazine article.
- The Australian Institute of Food Science and Technology Inc. (AIFST) Food Australia Magazine article.

ACKNOWLEDGEMENTS

This work received funds from the Australian Government's CRC Program.

The assistance and support provided to this project by those listed below was appreciated and gratefully acknowledged:

Jayne Gallagher, ASCRC

Emily Mantilla, ASCRC

Miles Toomey, ASCRC

Mark Boulter, Sydney Fish Market

Allan Bremner, Allan Bremner and Associates

Jane Ham, Marine Innovation South Australia

Huon Aquaculture

Damian May, SARDI

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Executive Summary

This project aimed to assist the seafood industry with sound practical advice on the assessments of food safety and quality aspects of new packaged seafood products in a concise and clear format.

Seafood processing and packaging techniques such as modified atmosphere packaging and vacuum packaging have been utilised by the seafood industry to extend product shelf-life, assist in meeting the demand for quality and safe products by consumers and create new market access. However, these techniques can support the growth of certain pathogens that were previously considered to be of low risk. Furthermore, feedback received during discussions with national and local seafood processors suggest the seafood industry has difficulties with assessing food safety and quality attributes of newly developed products. Moreover, there were no guides on assessments of food safety and quality attributes for shelf-life determination of packaged seafood.

At the start of the project the key focus was development and agreement of project structure and scope. Through consultation with industry representatives and ASCRC program managers, it was agreed that the project would be directed by a steering committee with advisory panels for technical review, communication and industry consultation. After a process of consultation, feedback, review and iterations with these project teams, the scope and structure for the technical reference manual were agreed and finalised.

A literature search was undertaken and used to develop the technical reference manual.

The technical reference manual includes the following topics:

- Food safety hazards identified at all steps of the supply chain from pre- to post-harvest including processing of each key species (i.e. molluscs, crustaceans and finfish) and product formats (i.e. modified atmosphere packaged, cold smoked, hot smoked and canned).
- Information and relevant links on domestic and international food safety regulatory requirements of seafood products
- Seafood packaging and processing options that are commonly utilised in Australia
- Potential testing methods for food safety hazards
- Quality and freshness attributes of seafood products
- Indicators of freshness attributes and testing methods
- Shelf-life determination.

The technical reference manual contains fact sheets for 16 food safety hazards.

A user-friendly guide was produced based on the technical reference manual in a concise and graphical format. The guide is designed and includes the following sections:

- Introduction
- Hazard identification
- Australian regulatory requirements
- Processing and packaging
- Shelf-life determination.

The technical reference manual and the user-friendly guide are freely accessible at the SafeFish website (www.safefish.com.au) and seafoodcrc.com website for the seafood industry as useful resources regarding appropriate methods to use for food safety and quality analysis. The user-friendly guide will also be distributed to industry members through the ASCRC SeaFood Magazine mailing list and through equipment manufacturing companies

1. Introduction and Background

Due to the demand for high quality and safe seafood from consumers and health organisations, a desire for a satisfactory return on investment, and to increase the value of products by extending shelf-life, the seafood industry have employed processing and packaging techniques such as modified atmosphere packaging (MAP), smoking and canning. However, these packaging and processing techniques can create an environment that supports the growth of certain pathogens that were previously considered to be of low risk, for example *Listeria monocytogenes* or *Clostridium botulinum*.

Discussions with seafood industry members during the project development phase demonstrated that food safety and quality related issues can be complex to navigate. Although there are packaging and organoleptic shelf-life assessment guides available

such as the Seafood Packing Technologies guide by Seafood Services Australia and the Australian Quality Index Manual by Sydney Fish Market, these guides do not contain detailed information on assessments of food safety and freshness attributes to determine shelf-life of new products. Thus, there was a need for a guide to assist members of the seafood industry to greater understand food safety and quality related issues.

Consequently, this project was established to assist the seafood industry with practical guidance on the assessment of food safety and freshness attributes and to determine the safe shelf-life of new packaged seafood products. The project has targeted quality assurance officers, operators, and new product development officers in small to medium size seafood producers.

1.1 Need

This project was developed to address the following needs:

- Non-scientific people in the seafood industry need to have concise and clear guidance on how to assess shelf-life and quality of new products.
- Foodborne pathogens currently considered to be of low risk in seafood products may become high risk in new product types developed; these need to be clearly identified within appropriate guidelines so that industry can ensure product safety.
- Current ASCRC projects have focused on the development of new product types and assessment of product shelf-life. This project will utilise knowledge gained in these projects and increase the uptake of current ASCRC outputs.
- There is a need to reduce costs of unnecessary testing of new products.

1.2 Objectives

The project objectives were to:

- Develop a guideline for the seafood industry that provides clear and practical guidance on how to assess shelf-life of novel seafood products.
- Identify potential risks of hazards associated with different types of packaging and processing options in seafood.
- Advise on different approaches of how to assess product quality and safety.
- Enhance communication between the seafood industry and scientists.

2. Methods

2.2 Development of Technical Reference Manual

At the start of the project, the key focus was the agreement of the project structure and scope before the literature review was undertaken. An initial project meeting was held at the Sydney Fish Market in February 2012 with the ASCRC project manager and risk and compliance manager from the Sydney Fish Market to discuss how the project should be set up with regard to project teams, what seafood products and species should be included and the types of quality and food safety parameters that should be prioritised.

The key outcomes from this meeting were that there should be separate review panels for a) technical content, b) communication and c) industry feedback. A draft discussion paper was prepared and reviewed by the project team and the CRC. Through a process of feedback and a series of iterations, a discussion paper was approved that details:

a) The project team and expert/industry/communication advisory panels involved and their responsibilities.

Different consultation panels were established and their roles were identified. The panels included:

- (i) a steering committee which consisted of the Principal Investigator (PI) and facilitators;
- (ii) a technical review panel which consisted of top seafood experts with expertise in seafood safety and quality. Mark Boulter (Risk and Compliance Manager for Sydney Fish Market) and Allan Bremner were selected for this panel whose role was to review the technical reference manual, provide expert advice to steering committee on the scope and methods for literature review; and approve the contents of the technical reference manual;
- (iii) an industry consultation panel which consisted of local and national seafood companies such as Ferguson Australia, Huon Aquaculture, Angelakis Brothers, Kailis Brothers, Oyster Bob and De Costi Seafoods were identified to potentially review and provide feedback on the ease of use, application and practicality of the user-friendly guide. Any feedback would be directed to the steering committee and the technical review panel; and
- (iv) a communication consultation panel which consisted of Jane Ham from SARDI and Emily Mantilla from the ASCRC; they would be involved in developing the structure and presentation of the user-friendly guide and ensure the key messages are delivered to the target audience.

The ASCRC program managers were consulted throughout the development of the technical reference manual regarding the content, format and layout of the final guide.

b) The scope of the technical reference manual

The scope of the technical reference manual was developed by the PI with the assistance of the discussion paper (developed as an output from the initial project meeting). The PI reviewed pertinent documents such as the Sydney Fish Market seafood handling guidelines, Seafood Packing Technologies guide by Seafood Services Australia and the guidelines for the Safe Manufacture of Small Goods by Australian Livestock Limited. The PI also reviewed relevant information such as the Codex Code of Practice for Fish and Fishery Products, the New Zealand Ministry for Primary Industries Hazard Sheets, the Australian New Zealand Food Standards Code, the 'Green Book', the Guide to Calculating the Shelf-life of Foods by New Zealand Food Safety Authority and references published by the following:

- International Commission on Microbiological Specifications for Foods (ICMSF);
- University of California, Davis (UC Davis);
- US Food and Drug Administration (USFDA);

- Department of Agriculture (DA); and
- Food Standards Australia New Zealand (FSANZ).

The initial project meeting held at the Sydney Fish Market also discussed the need to separate the food safety and quality aspects into different sections. This requirement was to aid information transfer and keeps the regulatory requirements distinct from the quality requirements. Information regarding the consumption of seafood by Australian consumers was obtained to identify the most popular product types. This was undertaken by a review of the ASCRC Omnibus Consumer Research Findings completed by Nick Danenberg in 2010 which reported the top seafood products consumed. In addition, information was obtained from the Australian Bureau of Agricultural and Resource Economics and Sciences (ABARES): Australian fisheries statistics 2008 report on the production of seafood species in terms of volume and value in the past 10 years.

In May 2012, the PI also completed a market survey of Australian seafood products available in Adelaide-based supermarket stores and seafood retailers. The stores include Woolworths, Foodland, Capps Bros, Angelakis Bros and several local seafood markets. This survey provided information on the most commonly utilised product processing techniques, packaging types and seafood species.

c) Literature review

After the structure of the technical reference manual was finalised, a more detailed literature review was completed.

d) Review of technical manual

The technical reference manual was reviewed by the technical review panel and ASCRC managers which provided feedback on language, structure and content.

2.2 Production of user-friendly industry guide

The user-friendly guide was developed in conjunction with the communication consultation panel and the industry review panel. The panels were appointed to review and provide feedback regarding the ease of use and the usefulness of the guide to the steering committee. The ASCRC managers were heavily engaged in the process to ensure that the guide maintained the requirements that it was easy to access, appealing and informative for the seafood industry. Two thousand hard copies of the guide have been printed and will be distributed with the ASCRC SeaFood magazine (April 2014 edition) and via equipment manufacturers. A digital version has also been developed for online users.

Other paths to utilisation include:

- An article publication in the Food Australia Magazine which is distributed nationally to around 2,000 AIFST members.
- An oral presentation at the 2014 World Aquaculture Society conference.

3. Results and Discussion

3.1 Technical Reference Manual

Key species and product formats were identified through local market survey, Omnibus consumer report and ABARES fisheries report to determine key product types and seafood species, key hazards, freshness attributes and their indicators to be covered by the technical reference manual.

A copy of the manual is contained in appendix 3.

3.2 User-friendly guide

The user-friendly guide which is the primary output of the project was developed and progressed at the same time as the development of the technical reference manual. The guide includes only the most significant components of information that is present in the technical reference manual. After several rounds of changes, the guide was reviewed by a quality assurance manager at Huon which provided positive feedback.

A copy of the guide is contained in appendix 4.

4. Benefits and Adoption

4.1 Benefits

This project has resulted in the development of a technical reference manual and a user-friendly guide containing information on food safety hazards and freshness attributes, and their assessments for new packaged seafood products. These outputs will guide seafood industry members on the important considerations when establishing new packaged seafood products and determining their shelf-life.

4.2 Adoption

The technical reference manual will be available online at the SafeFish website (www.safefish.com.au). It is intended that this will be available to the seafood industry as an ultimate resource regarding appropriate methods to use for food safety and quality assessments. Hard copies of the user-friendly guide will initially be distributed through the ASCRC SeaFood magazine circulation list.

5. Further Development

It is envisaged that the user-friendly guide will be included as part of the ASCRC series of how to guides. Further development opportunities include workshop or masterclasses to demonstrate how to assess food safety and quality attributes of new packaged seafood products to determine shelf-life. The funds for these development opportunities are to be sourced separately.

6. Planned Outcomes

The technical reference manual and user-friendly guide will support the following outcomes over the medium to long term:

6.1 Public Benefit Outcomes

- Improved safety and quality of Australian seafood through adoption of international best practice for assessing shelf-life and safety.
- Improved communication between scientists and the seafood industry by utilising equipment distributors and industry associations.
- Reduced risks and hazards of foodborne illnesses associated with emerging pathogens from newly developed seafood products using advanced packaging and processing techniques.
- Improved consumer trust and overseas market confidence.

6.2 Private Benefit Outcomes

- Greater understanding of food safety and quality issues which can be used to reduce product development costs and wastage for ASCRC industry participants.
- Greater potential to uptake technology that could lead to increased shelf-life of packaged seafood products.
- Increased opportunity of developing new product types.

6.3 Linkages with ASCRC Milestone Outcomes

This project has provided data to support the completion of the following ASCRC Outputs and Milestones:

Output 4.4 – Technology transfer leading to successful commercialisation and utilisation of CRC outputs

- Milestone 4.4.4 – Implementation plan to ensure rapid industry adoption completed for the selected research outputs

7. Conclusion

This project has provided a comprehensive technical reference manual and a user-friendly guide for the seafood industry. The manual includes detailed information on food safety hazards identified at all steps of production for key seafood species, common processing and packaging types, quality attributes of seafood products, indicators used to measure quality attributes, regulatory requirements for food safety criteria, approved and recommended testing methods, shelf-life determination process, fact sheets and links to useful resources. The guide provides the seafood industry with clear and easy to understand information required prior to development of new packaged products.

Appendix 1: Intellectual Property

Technical reference manual

Anantanawat S., McLeod C., Madigan T., Pahl S., Stewart I., McNaughton M. & Turnbull A. 2014. *A Guide to the Identification of Food Safety Hazards and Determination of Shelf-life of Packaged Seafood*. South Australian Research and Development Institute. Urrbrae, South Australia. December 2013. Available from: www.safefish.com.au.

User-friendly guide

Anantanawat S., Madigan T., Pahl S. & Turnbull A. 2014. *Safe Packaged Seafood: A Guide to Identifying Food Safety Hazards and Determining the Shelf-life of Packaged Seafood Products*. Australian Seafood Cooperative Research Centre, Bedford Park, South Australia. Available from: www.safefish.com.au.

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Cath McLeod (until June 2013)

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Appendix 3: The technical reference manual

See a separate document

Appendix 4: The user-friendly guide

See a separate document