

Food Safety Validation of Storage/Transport Temperatures for Live Australian Oyster Species



SIDF 2007- 406

March 2007

A. Pointon¹ & J. Sumner²

¹ SARDI Food Safety Research, 33 Flemington Street, Glenside SA 5065

² M&S Consultants, Deviot, Tas

Contents

Non-Technical Summary	2
Acknowledgements	2
1 Background	3
2 Need	3
3 Objectives	3
4 Methods	4
5 Results and Discussion	4
5.1 Objective 1	4
5.2 Objective 2	4
5.3 Objective 3	4
6 Benefits	5
7 Further Development	5
8 Planned Outcomes	5
9 Conclusion	6

Important Notice

Although SARDI has taken all reasonable care in preparing this report, neither SARDI nor its officers accept any liability from the interpretation or use of the information set out in this document. Information contained in this document is subject to change without notice.

Non-Technical Summary

- 1 A Hazard Identification (HI) for microbial hazards associated with oysters has been undertaken to inform:
 - (1) negotiations with seafood regulators regarding 'temperature equivalence'; and
 - (2) development of a research program to validate various storage regimes for live oysters.
- 2 Enteric viruses, *Vibrio parahaemolyticus* and *Vibrio vulnificus* are identified as hazards reasonably likely to occur in oysters.
- 3 Enteric viruses have been associated with many large outbreaks of oyster-borne disease; their prevalence and concentration in oysters is not influenced by storage regime.
- 4 Vibrios have been associated with a small number of illnesses related to oysters.
- 5 Since temperature may influence the growth of vibrios in live oysters, two storage regimes are considered worthy of research to redress knowledge gaps:
- 6 Growth and survival of *V. parahaemolyticus* in Sydney rock oysters should be monitored according to the existing dispensation (oysters stored no warmer than 25 °C for 72 hours, then colder than 15 °C thereafter) and for the ASQAP requirement (oysters must be stored colder than 10 °C after 24 hours).
- 7 Growth and survival of *V. parahaemolyticus* in Pacific oysters should be monitored according to the ASQAP requirement (oysters must be stored colder than 10 °C after 24 hours).
- 8 Since *V. vulnificus* has a narrower temperature growth range than *V. parahaemolyticus* its behaviour will be captured by the above research.
- 9 The requirement for exported live oysters to be held at a temperature below 5 °C is considered untenable since it leads to mortality of the product.
- 10 SSA has sent letters to AQIS and the state Competent Authorities along with the Hazard Identification report seeking clarification of present regulations to regularise the position of export live oysters within the overall context of live seafood export.
- 11 Informal advice has been received from AQIS that the new Orders do not require that live shellfish have to be held at 5 °C or less.
- 12 It is recommended that research work could be undertaken via the new Australian Seafood CRC Program 2 – Product Quality and Integrity and negotiations with researchers at the Australian Food Safety Centre of Excellence have been initiated to utilise related research outputs within future work.
- 13 This would entail validating a predictive model for *Vibrio parahaemolyticus* for:
 - (1) use in supporting the development of Codes of Practice; and
 - (2) underpinning the establishment of 'Use by Date' for retail product.

Acknowledgements

Seafood regulators and representatives from the NSW, Tasmanian and SA industries are thanked for their support and advice.

1 Background

Apparent anomalies between the Australian Shellfish Quality Assurance Program (ASQAP) and the Export Control Orders stimulated the submission of FRDC Application TM003: *Microbiological validation of current storage and transport temperatures for Pacific oyster industries in Australia*. The application was approved conditional on wider industry involvement. Subsequently, the New South Wales industry identified the above dispensation and asked that it be considered within the proposal.

A teleconference on Friday 23rd Feb with New South Wales, Tasmanian and South Australian industry representatives, NSW Food Authority and Seafood Services Australia considered a background paper canvassing the above issues; no representative of AQIS was available. The meeting determined that, as a prelude to deciding the scope of work designed to close information gaps on storage temperatures and times, a Hazard Identification be undertaken for Pacific oysters (*Crassostrea gigas*) and Sydney rock oysters (*Saccostrea glomerata*).

2 Need

The Australian oyster industry faces a range of regulatory requirements for storage and transport of live oysters. The Export Control (Fish and Fish Products) Orders 2005 indicate that live oysters being exported should be stored at less than 5 °C unless alternative arrangements can be validated and shown to not affect fitness for human consumption. This position appears anomalous for several reasons:

- Storing oysters <5 °C will kill them, making them commercially unacceptable.
- Other seafood products, e.g. prawns, are exported live without regulated temperature regimes.
- AQIS is a signatory to ASQAP, which stipulates that live oysters be held at <10 °C after no more than 24 hours.
- The AQIS document *Validation and verification: a guideline to compliance with the Export Control (Fish and Fish Products) Orders 2005* contains the statement that live fish do not have a preservation step and therefore there is nothing to validate (Section 2.6).

Seafood Services Australia commissioned a Hazard Identification report to inform negotiations to regularise the position of export live oysters within the overall context of live seafood export.

3 Objectives

1. Conduct a Hazard Identification to clarify the food safety risks that the myriad of regulations and interpretations seek to mitigate.
2. Use the Hazard Identification to inform the technical interpretation of existing requirements with AQIS and NSW, Tasmanian and South Australian regulators and seek agreement on scientifically justifiable critical limits and define data gaps for validation of the equivalence of alternative temperature regimes.
3. Investigate and pursue other potential additional funding options to assist with funding of the R&D arising from this project (e.g. AFSCoE, Seafood CRC, etc).

4 Methods

See attached Hazard Identification report.

5 Results and Discussion

5.1 Objective 1

See attached Hazard Identification report. The Hazard Identification provides evidence that validates the food safety equivalence of present ASQAP arrangements to that provided by holding product at <5 °C as specified by the Export Control (Fish and Fish Products) Orders 2005.

5.2 Objective 2

The Hazard Identification Report and draft letters to AQIS and state seafood regulators have been provided to SSA for forwarding to Competent Authorities to open official consultation on 'temperature equivalence'.

5.3 Objective 3

Dr John Sumner presented the Hazard Identification report to a national workshop of oyster producers in Sydney on March 20th. Further discussions were held with SA representatives and the following project outline developed from advice provided at these consultations.

5.3.1 Need

Industry identified the following needs:

- To validate industrial practices that enable development of 'Use by Dates' for retail product, based on an Acceptable Level of Risk (ALOP) for *Vibrio parahaemolyticus* (*Vp*).
- To enable further evaluation of time/temperature arrangements underpinning ASQAP i.e. further validation of 'alternative storage arrangements'.

5.3.2 Research Step 1

Conduct *Vibrio parahaemolyticus* growth studies (using inocula and live oysters) in Oysters (Pacific and Sydney Rock) over alternative temperature profiles post-harvest:

- Pacific – evaluate growth at ambient to 9 °C over 24 h, 36 h, 48 h periods as requested by the Tasmanian sector who will also supply typical and worst-case temperatures for evaluation by modelling; and SA to supply temperature:time scenarios for modelling of the impact of alternative handling practices that reflect industrial processing options and efficiencies.
- Sydney Rock – Check ability of *Vp* to grow over a period of 72 hours at 25 °C followed by a cooling period to 15 °C. The NSW growers are to supply typical storage times which will serve as the criteria used in experimental work.

It is proposed that SARDI conduct the oyster:*Vp* growth studies with UTas contributing to the experimental design.

5.3.3 Research Step 2

UTas to further refine the existing broth model for *Vibrio parahaemolyticus* by customising it for oysters. It is envisaged that the oyster:Vp model function similarly to the Refrigeration Index (*E. coli* on meat) for setting time-temperature limits and regulations for live oysters in transport/storage/retail. SARDI to conduct model evaluation/validation including under fluctuating temperature conditions.

5.3.4 Research Step 3

Use the Vp predictive model to develop Code of Practice ‘Critical Limits’ and to underpin setting a ‘Use by Date’ for both Pacific and Sydney Rock oysters.

The model will save an extremely large amount of lab work to address a broad range of post-harvest scenarios. It would need negotiation (?with industry/Competent Authorities?? – potentially needs an Project Expert Panel) regarding the setting of target exposure counts of total Vp or pathogenic Vp per serving.

5.3.5 Project Implementation Options

It is proposed that a project team comprised of SARDI (with SASQAP) and UTas conduct the work. UTas (Tamplin and Ross) have indicated a willingness to collaborate as described.

The three state industry sectors have indicated this is a priority investment for them within the Australian Seafood CRC.

Enquiries for co-funding from the revised National Food Innovation Strategy should be investigated at the project drafting stage on the basis of the issue being common to all sectors.

6 Benefits

The project provides industry with evidence to challenge apparent anomalies in domestic and export requirements for live oysters to support harmonisation of standards across jurisdictions.

7 Further Development

See Results/Discussion: Objective 3

8 Planned Outcomes

- Harmonisation of requirements across jurisdictions for domestic and export handling of live oysters in line with present ASQAP requirements.
- Capacity to minimise business risk in opening new export markets.
- Capacity to maximise the quality of exported live oysters to capture premium prices.

9 Conclusion

The Hazard Identification has been completed (Objective 1) and used to consult with industry who have advised on priorities for further research to support the development of Codes of Practice and development of 'Use by Dates' based on safety requirements related to *Vibrio parahaemolyticus* (Objective 3).

Informal advice has been received from AQIS that the new Orders do not require that live shellfish have to be held at < 5 °C or less. Seafood Services Australia is following up with a letter to AQIS seeking formal notification of this interpretation. Similar letters have been sent to the respective state seafood regulators seeking harmonisation of standards across jurisdictions (Objective 2).